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	Engineering and Design GUIDELINES FOR THE CAREER DEVELOPMENT OF GEOTECHNICAL ENGINEERS	
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**Engineering and Design
GUIDELINES FOR THE CAREER DEVELOPMENT
OF GEOTECHNICAL ENGINEERS**

1. Purpose.

a. The US Army Corps of Engineers (USACE) must continue to develop and maintain a highly-trained and experienced geotechnical staff to support the engineering activities associated with the civil works program. The guidance in this pamphlet describes the experience, education, training, and skill development opportunities that Corps geotechnical members should have to ensure that USACE maintains the essential geotechnical capabilities required to support the USACE planning, design, construction, operation and dam safety mission. This information should be used by geotechnical engineers in USACE in the preparation of Individual Development Plans (IDP) for their individual career development especially in the technical arena.

b. The Army Civilian Training, Education and Development (ACTEDS) (reference 3g) provides guidance on the types of experience, training, education, and career planning which are recommended for progression to the key leadership positions in the career program. However, the principal emphasis of ACTEDS is on developing leadership and management skills. The guidance provided in this pamphlet provides guidelines for development of technical and professional skills which are not detailed in the ACTEDS. The two documents

should be used together to help managers and careerists develop organizational and individual development plans for technical and supervisory positions in geotechnical engineering in USACE.

c. This pamphlet should be used as guidance for development of individual career plans. The experience, education, training, and skill development opportunities suggested are those considered necessary for the member to perform the assigned tasks; however, the suggested experiences are not to be considered as absolute requirements.

2. Applicability. This pamphlet applies to all USACE elements having civil works responsibilities.

3. References.

a. AR 690-1-950, Civilian Personnel Career Management, Chapter 11.

b. DA Pamphlet 690-43, Supervisors Guide to Career Development and Counseling for Career Program Employees.

c. DA Pamphlet 690-46, Mentoring.

d. ER 350-1-416, Headquarters, US Army Corps of Engineers (HQUSACE) Centrally and Locally Sponsored Long-Term

(LTT) Program.

e. ER 350-1-420, 5 - Year IDP and Development Assignments.

f. ER 690-1-958, Army Civilian Career Program for Engineers and Scientists (Resources and Construction).

g. Memorandum, CEHR-C, 3 December 1990, Subject: Army Civilian Training, Education and Development (ACTEDS) for Engineers and Scientists.

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5. Responsibilities.

a. Professional development of the geotechnical workforce is both the ongoing responsibility of the Corps of Engineers and the individual Corps geotechnical member. By fostering individual professional development through training, education, and/or developmental opportunities that are directly linked to the job responsibilities, the Corps enhances development of its corporate workforce. A viable, proactive corporate professional development plan promotes optimum performance of team members in their present jobs and provides a reservoir of job skills to meet future Corps needs, while providing careerists opportunities to achieve career goals.

b. Supervisors, managers and Career Program Managers are responsible for making the careerist aware of career development programs and providing opportunities to meet corporate needs, but the ultimate responsibility for career development rests with the careerist.

In order to be qualified to assume or apply for positions when the opportunity arises, particularly for those positions with advancement potential, the careerist should develop an individual development plan which states career goals, identifies specific positions associated with those goals and includes any training, education, or skill development required for desired positions. The plan should provide for attainment of plan objectives in a deliberate, progressive manner. While many opportunities for professional and career development are available to the member at Corps expense during work hours, the careerist should also consider opportunities that are available at individual expense during non-work hours.

6. Nature and Scope of Geotechnical Engineering.

a. Geotechnical engineering is that portion of civil engineering that deals with all aspects of the theory and practice of soil mechanics. In particular, it includes the following activities for the planning, design, construction, operation, and rehabilitation of civil works projects: site evaluation, selection and characterization; subsurface investigations and exploration; institute and laboratory testing; foundation design for embankments and other major structures; design of earth and rock-fill dams; levee design; seepage investigations, dewatering and seepage control systems; developing performance parameters; instrumentation and monitoring systems; pavement design; forensics and performance evaluation; and the engineering evaluation and designation of natural construction materials for use as construction materials.

b. The scope includes all field

investigations; laboratory and field testing; design of geotechnical features including analyses and documentation; technical review; development of contract documents and instructions to construction personnel; coordination and visits to construction sites; and monitoring and evaluation of the performance of completed civil works structures.

c. The Corps of Engineers has technical capability requirements which are unique to the mission. To satisfy these requirements, the Corps must maintain a cadre of trained and experienced professional geotechnical engineers to ensure safe design, construction and operation of dams, levees and other flood control projects. Examples of these essential technical capabilities are:

- (1) exploration and testing for dams and levees,
- (2) foundation design for dams and levees,
- (3) embankment design for dams and levees,
- (4) seepage evaluations and groundwater modeling,
- (5) design of dewatering, seepage and uplift control systems,
- (6) emergency response for flood fighting and evidence of distress,
- (7) developing performance parameters for embankment dams and levees,
- (8) monitoring actual performance of embankment dams and
- (9) evaluation and testing of construction materials for embankment dams and levees for design and construction control.

d. Technical tasks performed by geotechnical engineers from entry level GS-5/7/9 through GS/GM-15 managers are defined in Appendix A. Knowledge, skills, and abilities (KSA) which the geotechnical team member must possess in order to perform these tasks are listed in Appendix B. These tasks and competencies were identified by a group of highly experienced geotechnical Corps members selected from both field and headquarters organizations with varied geotechnical responsibilities. Additionally, the tasks were verified through a survey in which every USACE organization with geotechnical capabilities had the opportunity to participate.

7. Professional Development.

a. *General.* Professional development is multifaceted. It may include, but certainly is not limited to, formal academic education, short-term and long-term training, seminars, correspondence courses, on-the-job training, on-the-job developmental assignments, developmental assignments on other than assigned job, and involvement in professional societies, associations, and activities. Appendix C lists the professional development considered necessary for the geotechnical careerist to acquire the technical competencies, defined by the KSAs, which are needed to perform essential tasks at a given grade level. The professional development requirements have been divided into three categories: formal training, on-the-job training, and developmental assignments. These categories are discussed below.

b. Formal training.

(1) Short-term training. This type of training usually consists of organized study

offered as short courses by various government sources (i.e., the Proponent-Sponsored Engineer Corps Training Program (PROSPECT) courses) and nongovernment vendors in a traditional classroom setting. Officially, short-term training is less than 120 days in duration. The length of short-term training varies. Also included in this category are formal correspondence courses and developmental assignments or programs less than 120 days in duration. (For the purposes of this guidance, developmental assignments are listed separately from formal training.)

(2) Long-term training. Training and education to which a member is assigned on a continuous, full-time basis for more than 120 calendar days is counted as long-term training. Selection of members for long-term training is competitive. The assignment may be to either Government or non-Government facilities, such as the senior service colleges, fellowship programs, and university programs. (For the purposes of this guidance, developmental assignments are listed separately from formal training.) See ER 350-1-416 for additional information on long-term training.

c. *On-the-job training.* On-the-job training (OJT) is one of the most effective ways to learn a new task/skill. OJT may consist of intensive short-term instruction and practice or may be a long-term continuous process. While the OJT does not have to take the form of traditional formal instruction, the OJT should be planned to teach essential elements of the task/skill in a sequential manner which will facilitate learning. As the name implies, OJT is done at the job site, usually in a one-on-one situation between the learner and a skilled task performer who serves

as a mentor for the learning of that task/skill. Positive aspects of OJT include the opportunity to learn the task/skill from a member who currently performs the task, the opportunity to perform the task on an actual project while using actual materials and equipment, the mentor's review of the learner's work, and the feedback provided by the mentor to the learner.

d. *Developmental assignments.* Temporary assignments to different positions can provide the opportunity for a careerist to develop new knowledge, skills, and abilities in a job situation. The knowledge, skills, and abilities may lead to future capabilities for the organization as well as foster individual career development. Developmental assignments of less than 120 days are counted as short-term, while assignments in excess of 120 days are counted as long-term training. (See paragraphs 7b (1) and (2) above.)

8. Professional Registration. Professional registration in a state of an individual's choice should be a career goal of each geotechnical engineer. AR 690-1-950, Chapter 2 identifies key positions in the district, MSC and Headquarters which require professional engineer registration. Team members aspiring to fill one of these key positions should include development of knowledge, skills, and abilities which would enable them to acquire the required registration in their IDPs.

9. Professional Society Participation. Participation in a professional society or organization provides for the exchange of technical information and experiences with other federal and private practice geotechnical engineers. Geotechnical engineers are encouraged to be active members in the

professional societies of their choice. Membership in these organizations provides self-development, enhances the individual's professional network and assists in maintaining state-of-the-art technical knowledge and capabilities in USACE.

10. USACE Technical Committees. Geotechnical engineers are encouraged to actively participate as a member of USACE technical committees and task groups. These activities assist in the evaluation of methods, procedures, and practices in USACE and the civil engineering profession for applicability in the design construction, and operation of civil works projects. Task groups also assist in establishing technical criteria and standards by drawing on the individual experiences and expertise in the geotechnical community.

FOR THE COMMANDER:

3 Appendices
APP A- Geotechnical Technical and Managerial Task Inventory
APP B- Knowledge, Skills and Abilities
APP C- Technical Career Development Plan for Geotechnical Engineers



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APPENDIX A

GEOTECHNICAL TECHNICAL AND MANAGERIAL TASK INVENTORY

This appendix contains a listing of the technical tasks performed by geotechnical engineers from the entry levels (GS-05/07/09) through the Technical Expert (GS-15). Managerial, technical and advisory tasks for the Technical Manager (GM-13/14 and GM-15) are also included. The geotechnical engineer should make a concentrated effort to develop the skills and knowledge at each grade level to ensure that he or she obtains an adequate depth of experience during career development.

GS-0810-05/07/09 Geotechnical Engineer

PLANNING GEOTECHNICAL PROJECTS

1. Assist in the collection of regional and project site-specific data.
2. Assist in the performance of site reconnaissance.
3. Assist in the development of quantity estimates for investigations and design for feasibility studies.
4. Assist in the preparation of engineering documentation.
5. Assist in preparation for briefings and meetings.

DESIGNING & ANALYZING GEOTECHNICAL PROJECTS

6. Collect data for developing detailed scope of work.
7. Participate in conducting portions of special purpose geotechnical and materials investigations.
8. Assist in the preparation of testing instructions and tabulating results for evaluation.
9. Perform calculations and portions of detailed analyses for geotechnical aspects of the project design.
10. Calculate quantities for materials distribution plans
11. Prepare portions of contract documents.
12. Prepare CADD drawings.
13. Use engineering software application packages.

CONSTRUCTING GEOTECHNICAL PROJECTS/ASPECTS OF PROJECTS

14. Collect information and data from field sites for design verification.
15. Reduce and plot data for design verification.
16. Assist in the collection and interpretation of construction control data.
17. Assist in the preparation of geotechnical aspects of post construction reports.
18. Monitor/inspect installation of field instruments.
19. Collect/monitor instrumentation data.

OPERATING AND MAINTAINING GEOTECHNICAL ASPECTS OF PROJECTS

20. Assist with geotechnical assistance to operations and maintenance staff.
21. Provide geotechnical assistance to operations and maintenance staff.
22. Perform initial evaluation of data collected from engineering devices at projects.
23. Perform inspections and performance evaluations of geotechnical components of projects.
24. Make recommendations for additional investigations or remedial actions based on results of inspections and evaluations.
25. Assist in response to emergencies such as floods, earthquakes, and hurricanes as geotechnical member of emergency response team.

RESEARCHING AND DEVELOPING GEOTECHNICAL APPLICATIONS

26. Assist in special purpose geotechnical and material investigations by performing limited portions of investigations under the supervision of senior engineer.
27. Assist in performance of special purpose geotechnical tests.
28. Monitor/collect data from special purpose geotechnical tests.
29. Conduct analysis of test results and investigation findings under guidance of senior engineer.
30. Conduct literature review to determine research precedents and state of art in area of research.

GS-0810-11 Geotechnical Engineer

PLANNING GEOTECHNICAL PROJECTS

31. Research/collect existing regional and site-specific data.
32. Perform site reconnaissance.
33. Assist in site reconnaissance.
34. Assist in determination of scope of investigation and design Initial Project Management Plan (IPMP).
35. Initiate site-specific field investigation program.
36. Perform determination of geotechnical aspects for feasibility.
37. Assist in determination of geotechnical aspects for feasibility.
38. Assist in performing geotechnical evaluations for benefit determination.
39. Assist in performing risk analysis.
40. Assist in formulation of conceptual design.
41. Prepare geotechnical aspects of engineering documentation.
42. Prepare materials/briefings for public meetings.
43. Assist in public meetings.

DESIGNING/ANALYZING GEOTECHNICAL PROJECTS

44. Provide input for/prepare detailed scope of geotechnical work.
45. Assist with special purpose geotechnical and materials investigations such as excavation unwatering study, landslide analysis, seismic evaluations, dam safety re-evaluations and modifications, reservoir rim evaluations, ground water modeling.
46. Develop and conduct detailed field investigations.
47. Select laboratory testing program.
48. Assign laboratory testing program.
49. Evaluate laboratory testing program.
50. Assist in the design of foundations and excavations, including dredging and disposal areas.
51. Design foundations and excavations, including dredging and disposal areas.
52. Assist in the design of earth and rock embankments.
53. Assist in the design of tunnels and underground openings.
54. Design pavements, roadways, airfields, etc.
55. Design less complex containment systems (HTRW), i.e., landfill caps, pond liners, etc.
56. Assist in the design of instrumentation systems.
57. Design less complex instrumentation systems.
58. Design slope protection.
59. Design channel stabilization.

EP 690-2-3
15 Feb 98

60. Participate in the design of shore line protection.
61. Assist in the preparation of material usage, excavation and construction sequence, and quantity estimates.
62. Evaluate materials for construction.
63. Assist in preparation of engineering considerations for construction personnel.
64. Assist in the preparation of construction contracting documents.
65. Assist in the preparation of concrete mix and shotcrete design.
66. Assist in remedial design and repair of concrete structures.

CONSTRUCTING GEOTECHNICAL PROJECTS/ASPECTS OF PROJECTS

67. Provide geotechnical assistance to project construction staff.
68. Conduct site visit for design verification.
69. Provide technical assistance for contract modifications.
70. Collect design/construction control data.
71. Interpret design/construction control data.
72. Investigate construction site conditions for foundation treatment and fill/concrete placement.
73. Prepare post-construction reports.
74. Review and provide technical input for as-builts.
75. Inspect foundation excavation and treatments.
76. Control embankment placement.

OPERATING AND MAINTAINING GEOTECHNICAL ASPECTS OF PROJECTS

77. Provide geotechnical assistance to operations and maintenance staff.
78. Inspect performance of project components.
79. Evaluate performance of project components.
80. Monitor instrumentation data for project performance.
81. Evaluate instrumentation data for project performance.
82. Recommend modifications for identified project deficiencies.
83. Verify dredging condition surveys.
84. Provide geotechnical assistance for emergency operations.
85. Respond to emergencies (natural disasters such as flood fighting, hurricanes, earthquakes).
86. Assist in instructing project personnel in formal dam safety training.

RESEARCHING AND DEVELOPING GEOTECHNICAL APPLICATIONS

87. Assist in conduct of special purpose geotechnical and materials investigations.
88. Assist in conducting special purpose geotechnical tests.

89. Prepare portions of technical guidelines, design guidance, and reports.
90. Review state-of-the-art practices and procedures for Corps applications.

GS-0810-12 Geotechnical Engineer

PLANNING GEOTECHNICAL PROJECTS

91. Formulate conclusions and recommendations based on personal or subordinates' research and collection of existing data.
92. Perform site reconnaissance.
93. Provide geotechnical recommendation for site selection.
94. Determine scope of investigation and design (IPMP).
95. Initiate site-specific field investigation program.
96. Determine geotechnical aspects for feasibility.
97. Perform geotechnical evaluations for benefits determination.
98. Perform risk analysis.
99. Formulate conceptual design.
100. Prepare geotechnical aspects of engineering documentation.
101. Assure technical review is scheduled.
102. Prepare materials/briefings for public meetings.
103. Brief public.

DESIGNING & ANALYZING GEOTECHNICAL PROJECTS

104. Prepare detailed scope of geotechnical work.
105. Conduct special purpose geotechnical and materials investigations such as excavation unwatering study, landslide analysis, seismic evaluations, dam safety re-evaluations and modifications, reservoir rim evaluations, ground water modeling.
106. Develop detailed field investigations.
107. Direct detailed field investigations.
108. Develop design for soil/structure interaction.
109. Select, assign, and evaluate laboratory testing program.
110. Select design parameters.
111. Design foundations and excavations, including dredging and disposal areas.
112. Design earth and rock embankments.
113. Design tunnels and underground openings.
114. Design pavements, roadways, airfields, etc.
115. Design containment systems (HTRW).
116. Design instrumentation systems.
117. Design slope protection.

118. Design channel stabilization.
119. Design shore line protection.
120. Prepare material usage, excavation and construction sequence, and quantity estimates.
121. Evaluate materials for construction.
122. Prepare engineering considerations for construction personnel.
123. Prepare construction contracting documents.
124. Prepare concrete mix and shotcrete design.
125. Perform remedial design and repair of concrete structures.
126. Perform technical review.
127. Analyze/interpret performance of structures and foundations (forensic).

CONSTRUCTING GEOTECHNICAL ASPECTS OF PROJECTS

128. Execute responsibilities of embankment engineer.
129. Provide geotechnical assistance to project construction staff.
130. Conduct site visit for design verification.
131. Provide technical assistance for contract modifications.
132. Collect design/construction control data.
133. Interpret design/construction control data.
134. Direct/advise resident engineer on foundation conditions, treatment, and fill/concrete placement.
135. Prepare post-construction reports.
136. Review technical input for as-builts.
137. Provide technical input for as-builts.

OPERATING & MAINTAINING GEOTECHNICAL ASPECTS OF PROJECTS

138. Provide geotechnical advice/assistance to operations and maintenance staff.
139. Evaluate project performance based on inspection and instrumentation data.
140. Commend modifications for identified project deficiencies
141. Verify dredging condition surveys
142. Provide geotechnical advice/assistance for emergency operations.
143. Respond to emergencies (natural disasters such as flood fighting, hurricanes, earthquakes).
144. Assure technical review is scheduled and performed.
145. Instruct project personnel in formal dam safety training.
146. Accept foundation excavations and treatments.

RESEARCHING AND DEVELOPING GEOTECHNICAL APPLICATIONS

147. Conduct special purpose geotechnical and materials investigations.
148. Conduct special purpose geotechnical tests.
149. Prepare technical guidelines, design guidance, and reports.
150. Study/evaluate state of the art practices and procedures for Corps applications.

ENSURING IMPLEMENTATION OF STATE-OF-THE-ART TECHNOLOGY

151. Serve on regional boards, as officer in professional organizations, or USACE task groups.

GS-0810-13/14 TECHNICAL EXPERT

PLANNING GEOTECHNICAL PROJECTS

152. Review geotechnical recommendation for site selection.
153. Coordinate geotechnical recommendation for site selection.
154. Review scope of investigation and design (IPMP).
155. Coordinate scope of investigation and design (IPMP).
156. Review geotechnical aspects for project formulation.
157. Coordinate geotechnical aspects for project formulation.
158. Review conceptual design.
159. Coordinate conceptual design.
160. Review geotechnical aspects of engineering documentation.
161. Coordinate geotechnical aspects of engineering documentation.
162. Represent agency at public meetings.
163. Represent agency regionally as a technical expert.
164. Develop policy, technical criteria and standards for geotechnical input to project formulation.
165. Ensure compliance with policy, technical criteria and standards for geotechnical input to project formulation through quality assurance process.
166. Perform technical Review (independently).
167. Lead Technical review (independently).
168. Assure Technical review is scheduled/performed.

DESIGNING & ANALYZING GEOTECHNICAL PROJECTS

169. Prepare detailed scope of geotechnical work.

EP 690-2-3
15 Feb 98

170. Conduct special purpose geotechnical and materials investigations such as excavation unwatering study, landslide analysis, seismic evaluations, reservoir rim evaluations, ground water modeling.
171. Develop detailed field investigations.
172. Direct detailed field investigations.
173. Review detailed field investigations.
174. Develop design for soil/structure interaction.
175. Review design for soil/structure interaction.
176. Select laboratory testing program.
177. Assign laboratory testing program.
178. Evaluate laboratory testing program.
179. Review laboratory testing program.
180. Select design parameters.
181. Review design parameters.
182. Design foundations and excavations, including dredging and disposal areas.
183. Review foundations and excavations designs, including dredging and disposal areas.
184. Design earth and rock embankments.
185. Review earth and rock embankment designs.
186. Design tunnels and underground openings.
187. Review tunnel and underground opening designs.
188. Design pavements, roadways, airfields, etc.
189. Review pavement, roadway, airfield, etc., designs.
190. Design containment systems (HTRW).
191. Review containment systems (HTRW) designs.
192. Design instrumentation systems.
193. Review instrumentation system designs.
194. Design slope protection.
195. Review slope protection designs.
196. Design channel stabilization.
197. Review channel stabilization designs.
198. Design shore line protection.
199. Review shore line protection designs.
200. Prepare material usage, excavation and construction sequence, and quantity estimates.
201. Review material usage, excavation and construction sequence, and quantity estimates.
202. Evaluate materials for construction.
203. Review materials for construction.
204. Prepare engineering considerations for construction personnel.
205. Review engineering considerations for construction personnel.
206. Prepare construction contracting documents.

207. Review construction contracting documents.
208. Prepare concrete mix and shotcrete design.
209. Perform remedial design and repair of concrete structures.
210. Review remedial design and repair of concrete structures.
211. Perform Technical review (independently).
212. Lead Technical review (independently).
213. Serve as regional technical resource.
214. Serve as technical resource to advise Chief, Engineering Division.

CONSTRUCTING GEOTECHNICAL ASPECTS OF PROJECTS

215. Provide geotechnical assistance to project construction staff.
216. Conduct site visit for design verification.
217. Provide technical assistance for contract modifications.
218. Collect design/construction control data.
219. Interpret design/construction control data.
220. Direct resident engineer on foundation conditions, treatment, and fill/concrete placement.
221. Advise resident engineer on foundation conditions, treatment, and fill/concrete placement.
222. Prepare post-construction reports.
223. Review technical direction for as-builts.
224. Provide technical direction for as-builts.
225. Serve as regional technical resource.
226. Provide technical expertise in construction claim cases.
227. Negotiate contract clauses, requirements, and disputes.

OPERATING AND MAINTAINING GEOTECHNICAL ASPECTS OF PROJECTS

228. Provide geotechnical advice/assistance to operations and maintenance staff.
229. Evaluate project performance based on inspection and instrumentation data.
230. Recommend modifications for identified project deficiencies.
231. Verify dredging condition surveys (nature of materials).
232. Provide geotechnical advice/assistance for emergency operations.
233. Respond to emergencies (natural disasters such as flood fighting, hurricanes, earthquakes).
234. Perform Technical review (independently).
235. Lead Technical review (independently).
236. Coordinate dam safety program.
237. Serve as regional technical resource.
238. Assure dam safety training is conducted.

EP 690-2-3
15 Feb 98

- 239. Plan dam safety exercises.
- 240. Develop dam safety exercises.

RESEARCHING AND DEVELOPING GEOTECHNICAL APPLICATIONS

- 241. Conduct special purpose geotechnical and materials investigations.
- 242. Conduct special purpose geotechnical tests.
- 243. Prepare technical guidelines, design guidance, and reports.
- 244. Study/evaluate state-of-the-art practices and procedures for Corps applications.
- 245. Serve as regional technical resource.

ENSURING IMPLEMENTATION OF STATE-OF-THE-ART TECHNOLOGY

- 246. Instruct in PROSPECT geotechnical short courses/seminars.
- 247. Serve on regional boards, as officer in professional organizations, or USACE task groups.

GS/GM-0810/1350-13/14 TECHNICAL MANAGER

PLANNING GEOTECHNICAL PROJECTS

- 248. Provide geotechnical resources to support the production of planning products.
- 249. Develop policy used to define the geotechnical portion of planning processes.
- 250. Review all geotechnical input to the planning process.
- 251. Represent agency at public meetings.
- 252. Represent agency regionally.
- 253. Perform technical review.
- 254. Lead technical review team.

DESIGNING/ANALYZING GEOTECHNICAL PROJECTS

- 255. Approve detailed statement of work and product requirement documents.
- 256. Provide required geotechnical resource management input to accomplish planning and engineering products and services.
- 257. Coordinate required geotechnical resource management input with other offices in order to accomplish planning and engineering products and services.
- 258. Supervise technical experts and provide technical supervision for planning and

engineering products and services.

259. Develop geotechnical policy and procedures.
260. Manage geotechnical related programs, i.e., dam safety, HTRW
261. Advise the Commander on geotechnical technical issues.
262. Perform technical review.
263. Lead technical review team.
264. Assure technical review process is accomplished.
265. Advise dam safety officer/committee on dam safety remedial designs and repairs.
266. Serve as technical resource in representing the agency regionally.
267. Assure cost-effective design, quality product and services, customer satisfaction.

OPERATING AND MAINTAINING GEOTECHNICAL ASPECTS OF PROJECTS

268. Provide geotechnical expertise/resources to support district O&M programs.
269. Provide geotechnical expertise/resources to support district construction programs.
270. Negotiate contract clauses, requirements, and disputes.

RESEARCHING AND DEVELOPING GEOTECHNICAL APPLICATIONS

271. Develop engineering and scientific R&D programs.
272. Supervise/manage engineering and scientific R&D programs.
273. Represent organization on national and international review and policy boards for technical specialities.
274. Provide technical expertise and information to respond to global disasters and other emergency situations.
275. Facilitate technology transfer from R&D projects to improve design/construct criteria and practices.

ENSURING IMPLEMENTATION OF STATE-OF-THE-ART TECHNOLOGY

276. Instruct in PROSPECT geotechnical short courses/seminars.
277. Serve on regional boards, as officer in professional organizations, or USACE task groups.

GS-0810-15 Technical Expert

DEVELOPMENT, REVIEW AND EVALUATION OF AGENCY TECHNICAL DEVELOPING CRITERIA AND STANDARDS

- 278. Develop the technical criteria and standards for application on civil works projects
- 279. Participates in interagency task groups for developing governmentwide criteria and standards

ESTABLISHING GEOTECHNICAL AND MATERIALS POLICY, PRACTICES AND PROCEDURES

- 280. Develop technical policy, practices and procedures for geotechnical engineering applications
- 281. Represents USACE on interagency task groups for development of government wide standards, practices and procedures

TRAINING, RESEARCH AND DEVELOPMENT AND TECHNOLOGY TRANSFER

- 282. Develops technical training for geotechnical engineering applications
- 283. Monitors and coordinates training and technology transfer

CONSULTATION AND REPRESENTATION

- 284. Provides technical consultation within USACE
- 285. Represents USACE on Federal and non-Federal committees and task groups

GM 0810/1350-15 Technical Manager

STAFF SUPERVISION AND OPERATIONAL CONTROL

- 286. Plans, sets priorities, schedules and supervises activities carried out by the branch
- 287. Provides advice, counsel and instructions on work and administrative matters accomplished in the branch
- 288. Responsible for identifying training needs of the technical staff
- 289. Provides technical support the Emergency Operations Center

290. Maintains property accountability

PLANNING, DEVELOPMENT, REVIEW AND EVALUATION OF AGENCY TECHNICAL CRITERIA AND STANDARDS

291. Supervises the development of USACE technical criteria and standards for implementation in the planning, design, construction, operation, evaluation and modification of civil works projects.

292. Represents USACE on national and international committees and working groups that are developing technical guidelines, criteria and standards.

ESTABLISHING GEOTECHNICAL AND MATERIALS POLICY, PRACTICES AND PROCEDURES

293. Supervises the development of USACE technical policy for implementation in the planning, design, construction, operation, evaluation and modification of civil works projects.

294. Supervises the development of technical practices and procedures for implementation in USACE

295. Plans and supervises policy compliance reviews

TRAINING, RESEARCH AND DEVELOPMENT AND TECHNOLOGY TRANSFER

296. Supervises and provides oversight for the development of technical training in geotechnical engineering, materials engineering and engineering geology.

297. Provides oversight for technical monitorship of the Civil Works Research and Development Program

CONSULTATION AND REPRESENTATION

298. Supervises the coordination and development of the geotechnical, materials and geology technology transfer plans.

299. Serves as the functional representative for Geotechnical Engineers, Materials Engineers and Engineering Geologists.

300. Represents USACE on Federal and non-Federal committees and working groups.

301. Provides technical consultation within USACE and to other Federal agencies, state and foreign governments.

APPENDIX B

KNOWLEDGE, SKILLS, AND ABILITIES (KSAs)

This appendix contains the KSAs that the geotechnical engineer must possess for the corresponding grade level. Skills to communicate in verbal and written form are common to all grade levels.

GS-0810-05/07/09 Geotechnical Engineer

1. Knowledge of basic geotechnical engineering principles.
2. Skill in use of computer hardware and software (basic and specific to discipline).
3. Knowledge/ability to communicate technical information orally.
4. Knowledge/ability to communicate technical information in written formats.
5. Ability to interrelate effectively with individuals and teams.
6. Knowledge of organizational structures and functions.

GS-0810-11 Geotechnical Engineer

7. Ability/skill in specialized geotechnical techniques, i.e., specialized geotechnical techniques, i.e., soil mechanics, geology, subsurface exploration/investigations, foundation design, shear strength, lab testing, analytical techniques, slopes, tunnels, etc.
8. Skill in computer applications as applied in geotechnical engineering.
9. Knowledge of construction methods and processes with respect to geotechnical aspects of projects.

10. Ability/skill to execute geotechnical applications in HTRW.
11. Ability/skill in geotechnical instrumentation and applications.
12. Knowledge of inspection/evaluation techniques.
13. Knowledge of materials and concrete and their applications.
14. Knowledge of risk and uncertainty.
15. Knowledge of engineering guidance documents and state-of-the-art, i.e., USACE criteria such as ER, ETLs, engineering literature/journals.
16. Knowledge of advanced geotechnical principles.
17. Knowledge of contracting principles and procedures.

GS-0810-12 Geotechnical Engineer

18. Ability/skill in conducting effective meetings and briefings.
19. Ability to effectively lead teams.
20. Knowledge of the geotechnical aspects of emergency management and operations
21. Knowledge of budgeting principles for nonfinancial managers.
22. Ability to manage technical engineering design processes for geotechnical products and services.
23. Ability to perform duties of embankment/earthwork engineer.
24. Ability to develop/execute the technical aspects of contract documents and/or scopes of work for AE contracts
25. Knowledge of dam safety policies, practices, and regulatory requirements.

GS-0810-13/14 Technical Expert

26. Ability to execute technical aspects of the planning process
27. Ability and technical expertise specific to region and geotechnical specialty.
28. Ability to apply USACE policies on technical review and quality assurance for products and services.
29. Ability to effectively lead teams.
30. Ability to develop effective interpersonal relationships.
31. Ability to apply value engineering principles to geotechnical aspects of projects.
32. Ability to apply policies, practices, and regulatory requirements for dam safety.
33. Ability to perform forensic geotechnical investigations.
34. Ability to serve as geotechnical expert in legal disputes in claims against the government.

GS-0810/1350-13/14 Manager

35. Ability to execute responsibilities and requirements of contracting officer's representative.
36. Ability to identify customers and their requirements.
37. Knowledge of computer systems (software and hardware) for use in planning equipment requirements, budget projects, workload execution, and training requirements.
38. Knowledge of partnering principles and applications.
39. Knowledge/ability (advanced) in all geotechnical aspects of projects and organizations.
40. Knowledge/ability in contract negotiations.

41. Knowledge/ability in adult learning principles and instructional methods.

GS-0810-15 Technical Expert

42. Knowledge of the “state-of-the-art” geotechnical principles, practices and procedures as they relate to civil works projects.
43. Ability to develop technical criteria and standards from the “state-of-the-practice” that are suitable for use in USACE civil works program.
44. Ability to work on interagency task groups.
45. Ability to provide sound, thorough and timely technical advice and consultation on complex geotechnical problems and issues.
46. Ability to manage large technical programs.
47. Skills and ability to communicate in verbal and written form.

GM-0810/1350-15 Technical Manager

48. Ability to plan, set priorities, schedule and supervise activities of an organization.
49. Ability to assess the technical needs and requirements of a large engineering organization.
50. Ability to identify the technical criteria, standards and practices that are needed to support the organizational missions, goals and objectives.
51. Ability to establish technical policy and procedures for a large engineering organization.
52. Ability to provide sound and timely technical advice to senior agency officials.
53. Ability to represent the agency in federal, non-federal and foreign government technical activities.

APPENDIX C

TECHNICAL CAREER DEVELOPMENT PLAN FOR GEOTECHNICAL ENGINEERS

Grade (KSA)	Formal Training (Source)	On-the-Job Training	Developmental Assignment
GS-05/07/09			
(1)	Drilling and Sampling for Engineering Purposes - PROSPECT #216	Geotechnical field investigations assignment for 1 to 3 months	Rotational assignments within the Geotechnical Branch
	Lab Testing and/or Analysis of test results (University short course)	Laboratory testing/analysis, District Laboratory (2-4 weeks)	Developmental assignment in Design Branch
(2)	Computer Applications for Engineers and Managers - PROSPECT # 19	Engineering application packages (slope stability, seepage analyses, pile design) taught by senior engineers	
(3)	Technical briefing - short courses by vendors	Prepare and present technical briefings to the design team/supervisor	
(4)	Effective Technical Communications short course (vendors)	Prepare/draft portions of technical reports	
(5)	Team Building / TQM / CQI (in-house)		
(6)	New Employee Orientation (local)	Assigned an organizational mentor	Developmental assignment in Design Branch and H & H Branch
GS-11			
Priority 1			
(7)	Shear Strength - PROSPECT # 248		Six- month assignment in a Planning Division
	Seepage and Piping - PROSPECT # 250		
	Soil-Structure Interaction - PROSPECT #113		
	Advanced Computer Application in Geotechnical Engineering - University/vendor - short courses		
Priority 2			
	Dam Safety Course - PROSPECT #028		
	Seismic Design for Buildings - PROSPECT #027		

Grade (KSA)	Formal Training (Source)	On-the-Job Training	Developmental Assignment
GS-11 (continued)			
	Seismic Stability Evaluation of Embankment Dams - PROSPECT #247		
	Geotechnical Aspects of HTW - PROSPECT #395		
	Priority 3		
	Stream-bank Erosion and Protection - PROSPECT #285		
	Fundamentals of Grouting - PROSPECT #217		
	Ground Modification and Improvement - PROSPECT #249		
	Intensive Course in Geotechnical Engineering (Virginia Tech)		
	Professional conferences and seminars		
(8)	Priority 1		
	Groundwater Modeling, - PROSPECT # 108		
	CADD, slope stability; seepage modeling, digital terrain modeling (vendor, university and a Intergraph short courses)		
	Priority 2		
	Pile design; soil reinforcement (vendor, university, a Intergraph short course)		
(9)	Earthwork I-QV - PROSPECT # 040 Earthwork II-QV - PROSPECT #200		Six-month developmental assignment in a construction field office

Grade (KSA)	Formal Training (Source)	On-the-Job Training	Developmental Assignment
GS-11 (continued)			
(10)	Clay Liner Design, Basic Spill Response, vendor or university Safety and Health for Hazardous Waste Sites - PROSPECT #351 Safety and Health for Hazardous Waste Sites-8 - Hour refresher - PROSPECT #766 HTRW Overview (identification of toxic waste) - PROSPECT # 350		
(11)	Instrumentation - university short course	Assignment to dam safety organizational unit and participate in periodic inspections	
(12)	Dam Safety Course - PROSPECT # 028 Training Aids for Dam Safety (TADS) Nondestructive testing - vendor or university short course)	Participation in Periodic Inspection/Continuing	
(13)	Various short courses seminars in laboratory testing	Two to four week assignment at a district laboratory	
(14)	Probability and Reliability in Geotechnical Engineering - PROSPECT #279		
(15)	Required or supplemental reading for self-development in Corps technical libraries, professional organization memberships		
(16)	Groundwater Modeling -- PROSPECT #108 Advanced short courses, seminars, and conferences)	Soil/structure interaction, seismic evaluations and foundation design	Long term training in geotechnical engineering - graduate level

Grade (KSA)	Formal Training (Source)	On-the-Job Training	Developmental Assignment
GS-11 (continued)			
(17)	A/E Contracting - PROSPECT # 004 A/E Cost Contracting - PROSPECT #292 Specification Writing - Construction PROSPECT #185		
GS-12			
(18)	Short courses or seminars universities and vendors	Conduct briefings	
(19)	Leadership development programs (DA sources)	Assignments as team leader	
(20)		Assignment as technical assistant for emergencies	Participation in emergency management exercises with FEMA
(21)	Operating Budget Applications for Non-financial Managers - PROSPECT #746		
(22)		Applying design policies and procedures as technical manager	
(23)			Developmental assignment to construction field office for 6 months
(24)	A/E Contracting - PROSPECT #004 See KSA #17.		
(25)	See KSA #7, 10, 11 and 12.		Developmental assignment at an MSC
GS-13/14			
(26)			Developmental assignment to planning element for 6 months
(27)	Advanced technical specialty short courses, (seismic, coastal, wetlands; etc.) as required for the regional area		
(28)			Developmental assignment at MSC or USACE

Grade (KSA)	Formal Training (Source)	On-the-Job Training	Developmental Assignment
GS-13/14 (continued)			
(29)	Middle Managers Course (TRADOC) Federal Executive Program (OPM)		
(30)	Value Engineering Workshop PROSPECT # 110	Serve as VE team member or leader	
(31)		Active participation in professional organizations such as ASCE, USCOLD, ACI, ASDSO Prepare and present technical papers at ASCE, USCOLD, ACI, ASDSO conferences	Developmental assignment in MSC or HQ Dam Safety Office
(32)		Assignments in Operations Division	
((33)	Masters level course work in geotechnical engineering		
GS-13/14 Manager			
(34)		Assignment as COR for an A/E contract	
(35)	Support for Others Seminar	Active participation in professional such as ASCE, USCOLD, ACI and ASDSO Serve on regional committees and task forces/groups Attend local/regional seminars, conferences, and conventions	Developmental assignment in project management
(36)	Read newsletters and technical journals.		
(37)	Partnering training, local vendors Team Building - See KSA #5.		
(38)	See KSA #35.		
(39)	Specialty courses and seminars		

Grade (KSA)	Formal Training (Source)	On-the-Job Training	Developmental Assignment
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GS-13/14 Manager (continued)

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| (40) | A/E Contracting - PROSPECT #004 - See KSA #17

Negotiating, Bargaining and Dispute Resolution - PROSPECT # 306 | | |
| (41) | Instructional Methods - PROSPECT #064 | | |

GS-15 Technical Expert

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| (42) | Masters level work in Geotechnical Engineering | | |
| (43) | | Review of the criteria and standards used in other agencies and the profession | |
| (44) | | Assignment to an interagency working group | |
| (45) | | Involvement in the independent technical review of complex projects or modifications | |
| (46) | | Manage soils portion of the Civil Works Research and Development program | |
| (47) | Effective writing - local | | |

GM-15 Technical Manager

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| (48) | Work management - local | | |
| (49) | | Interagency review groups for technical needs | |
| (50) | Short courses and seminars | Working meetings within the organization for development of technical criteria and standards | |
| (51) | Leadership courses - local, Federal Executive Institute - OPM | Participation in professional organizational work groups | |
| (52) | Effective briefing techniques - local | Formal presentation to peers and Chief, Engineering Division | |
| (53) | | Serve as representative on interagency and other task groups | |