

SURVEY OF EDUCATIONAL LEVELS, PROFESSIONAL REGISTRATION AND TECHNICAL COMPETENCY OF CP-18 CAREERISTS

INTRODUCTION

In May 2004, HQUSACE conducted a voluntary survey of careerists in the engineering and architectural series (0801-0896, 1008, 1350, 1370, 1372 and 1373) of Career Program 18 – Engineers and Scientists (Resources and Construction) to gain insight into their educational levels, professional registration and competencies. The survey results will provide very useful information on the status of the workforce and will be used for strategic planning of the CP-18 program. Also, the results will provide an assessment on how CP-18 careerists compare to an industry proposal to require a master's degree or equivalent education as a condition for professional registration.

The web-based survey was posted on the Technical Excellence Network website. All CP-18 Career Program Managers in USACE, ACSIM and IMA were requested to encourage their careerists to respond to the survey. A total of 2006 careerists responded, mostly in USACE, out of the total Army CP-18 population of about 15,000.

PROFILE OF RESPONDENTS

Tables 1A, 1B, 1C and 1D show the distribution of respondents by series, grade, functional area and responsibility level. The majority of the respondents are in Series 0810 – Civil Engineering (60.6%), and 0801 – General Engineering is the second most common series (8.9%). GS-12 is the most prevalent grade level (36.8%), and GS-13 the second most common grade (31.8%). About 41.2% of the careerists are in Engineering and 21.7% are in Construction. With respect to responsibility level, 21.1% are team leaders, 18.4% are technical specialists, 17.0% are journeyman and 16.6% are managers.

EDUCATION

Bachelor's Degree: About 93.5% of the respondents have a bachelor's degree. The subject areas of the bachelor degrees are shown in Table 2. As expected 59.9% of the careerists have a civil engineering degree. Mechanical engineering (9.9%) and electrical engineering (7.0%) are the next most common degrees.

Master's Degree: Tables 3A, 3B, 3C and 3D show the distribution by series, grade, functional area and responsibility level of the respondents that have a master's degree. Overall, 35.2% of the careerists have a master's degree, with the greatest number of master's degrees for careerists in the civil engineering job series. An additional 17.6% of all careerists reported some graduate education not resulting in a degree. As expected, there is a clear correlation between possession of a master's degree and increasing grade level: GS-11 = 25.5%, GS-12 = 31.1%, GS-13 = 36.7%,

GS-14 = 44.1%, GS-15 = 52.6%, and SES = 75.0%. Not surprisingly, a master's degree is most common in the R&D area (80%), and environmental (44.8%) and civil works planning (44.15) are the next most frequent. The percentage of master's degrees is fairly consistent from the supervisor to executive levels. Table 3E shows the areas of study for the master's degrees. Not surprisingly, 43.5% of the master's degrees are in civil engineering. MBA (7.9%) and environmental engineering (7.5%) are the next most common master's degrees.

Doctorate Degrees: Tables 4A, 4B, 4C and 4D show the distribution by series, grade, functional area and responsibility level of the respondents that have a doctorate degree. Overall, 2.9% of the careerists have a doctorate degree, with the greatest number in the civil engineering job series. Pay band DB-4, which is used in R&D positions, has the highest percentage of PhDs (37.0%). Not surprisingly, a doctorate degree is most common in the R&D area (36.7%). Technical specialists have the highest percentage of PhDs at 6%. The field of study of the doctorate degrees was not collected.

PROFESIONAL REGISTRATION

Tables 5A, 5B, 5C and 5D show the distribution by series, grade, functional area and responsibility level of the respondents that have a state-issued professional registration. Overall, 64.4% of the careerists have a professional registration. This correlates fairly well with a manual data call of the MSCs in October 2003 indicating that about 55% of the engineers and architects in the engineering and construction functional areas are registered. This is a very high level of registration compared to the industry at large. (NSPE reports that about 20% of all engineers nation-wide are registered.)

Of course, the highest number of registered professionals are civil engineers (829 or 41.3% of all respondents). As expected, there is a clear correlation between professional registration and increasing grade level: GS-9 = 19.3%, GS-11 = 39.0%, GS-12 = 63.7%, GS-13 = 73.0%, GS-14 = 78.5%, GS-15 = 91.2%, and SES = 100%. GS-12 is approximately the grade level where an engineer has gained enough experience to qualify for registration, which is evidenced by the big increase in registration percentage between GS-11 and GS-12. All functional areas have a fairly consistent percentage of registered professionals, except public works is considerably lower (48.6%). Supervisors have the highest level of registration. Table 5E shows the areas of professional registration, the vast majority being in engineering (84.4%).

Tables 6A, 6B, 6C and 6D show the distribution by series, grade, functional area and responsibility level of the respondents that are in a position that requires professional registration. Overall, 22.7% of the careerists are in such a position. Civil engineers occupy 71.3% (325/456) of the positions requiring registration. As expected, there is a clear correlation between positions requiring professional registration and increasing grade level: GS-11 = 6.0%, GS-12 = 12.3%, GS-13 = 33.9%, GS-14 = 46.7%, GS-15 = 64.9%. (The sample of SES respondents was not large enough to

make a valid observation.) About 33.5% of the construction positions required registration, with engineering was next at 29.3%. Executive and supervisor positions have the highest requirement for registration, at 47.8% and 50.9%, respectively. Surprisingly, only 22.0% of the technical specialists reported being in a position requiring professional registration.

About 42.2% (545/1292) of the careerists that are professionally registered also have a master's degree (or higher), or stated differently, 27.2% (545/2006) of the entire survey population has both a professional registration and master's degree. About 64.6% (352/545) had their master's degree before (or when) they obtained professional registration. Hence, CP-18 careerists compare favorably with the American Society of Civil Engineer's "Body of Knowledge" (<http://www.asce.org/raisethebar>) concept that would require a master's degree or equivalent education as a prerequisite for registration.

COMPETENCIES

Careerists were asked to self-evaluate their level of competency in 15 areas according to how they obtained that competency (mode): by formal university education, by non-university education and training, and work experience. The 15 competency areas were based on the ASCE *Body of Knowledge* concept, which seeks to define the knowledge, skills, and attitudes that an engineer must have to practice competently at the professional level in the 21st century. For each mode in each competency, the careerist could select from four levels of competency:

- Level 0 = None - not exposed to this area
- Level 1 = Recognition – a reasonable level of familiarity
- Level 2 = Understanding – a thorough mental grasp or comprehension
- Level 3 = Ability – a capability to perform with competence

Table 7 displays the results of the competency survey. The table shows the average response (mean) for each question. The following observations are made:

- In all but the first and second competency areas, the highest level of competency was obtained through experience. Even for the first two competency areas, experience was very close to formal education in contributing to a high level of competency.
- In all the competency areas, non-university education contributed least to the overall competency level.
- In all but the last three competency areas university education contributed more to overall competency than did non-university education.
- The highest levels of competency (in descending order) were reported in the following areas:

- An ability to apply knowledge of mathematics, science and engineering.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- An ability to identify, formulate, and solve engineering problems.
- A recognition of the need for, and an ability to engage in life-long learning.
- An ability to apply knowledge in a specialized technical and/or professional area.
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

EDUCATION GAPS

Careerists were asked to identify gaps in their education that should be fulfilled in order for them to properly accomplish their job and to grow professionally. Table 8 shows those topics that were cited 10 or more times. The top ten results are listed below.

- Program and Project Management
- Communications (Written and Oral)
- Acquisition, Contracting, Contract Administration, Contract Law
- Technical Courses - Various and Unspecified
- Leadership
- Management
- Team Building, Group Dynamics, Human Relations
- Construction, Construction Management
- Public Policy and Administration, Government, DoD/Army Policy
- Budgeting and Scheduling

SUMMARY

- The CP-18 workforce is well educated: about 94% with bachelor's degrees and 35% with master's degrees, or higher.
- Professional registration (64%) far exceeds the industry average.
- About 27% of the careerists have both a master's degree and professional registration, and 65% had their master's degree prior to obtaining registration.
- Registration is required for about 23% of the CP-18 positions.
- Experience is the most important factor in developing competency, and non-university education the least.

- Careerists reported the highest competency in the following areas:
 - An ability to apply knowledge of mathematics, science and engineering.
 - An understanding of professional and ethical responsibility.
 - An ability to communicate effectively.

- The most frequently mentioned educational needs were as follows:
 - Program and Project Management
 - Communications (Written and Oral)
 - Acquisition, Contracting, Contract Administration, Contract Law
 - Technical Courses - Various and Unspecified
 - Leadership

Series	Number	Percent
Not Indicated	55	2.7%
0801 - General Engineering	178	8.9%
0804 - Fire Prevention Engineering	9	0.4%
0806 - Materials Engineering	5	0.2%
0807 - Landscape Architecture	17	0.8%
0808 - Architecture	67	3.3%
0810 - Civil Engineering	1215	60.6%
0819 - Environmental Engineering	81	4.0%
0830 - Mechanical Engineering	140	7.0%
0850 - Electrical Engineering	130	6.5%
0855 - Electronics Engineering	6	0.3%
0893 - Chemical Engineering	16	0.8%
0896 - Industrial Engineering	9	0.4%
1008 - Interior Design	4	0.2%
1350 - Geology	63	3.1%
1370 - Cartography	5	0.2%
1373 - Land Surveying	6	0.3%
Total	2006	100.0%

Grade	Number	Percent
Not Indicated	11	0.5%
DB - 02	5	0.2%
DB - 03	1	0.0%
DB - 04	46	2.3%
DB - 05	7	0.3%
GS - 05	7	0.3%
GS - 06	3	0.1%
GS - 07	33	1.6%
GS - 08	2	0.1%
GS - 09	57	2.8%
GS - 10	1	0.0%
GS - 11	200	10.0%
GS - 12	739	36.8%
GS - 13	638	31.8%
GS - 14	195	9.7%
GS - 15	57	2.8%
SES -	4	0.2%
Total	2006	100.0%

Functional Area	Number	Percent
Not Indicated	37	1.8%
Civil Works Planning	68	3.4%
Construction	436	21.7%
Engineering	826	41.2%
Environmental	125	6.2%
Operations	140	7.0%
Program/Project Management	242	12.1%
Public Works	72	3.6%
Research and Development	60	3.0%
Total	2006	100.0%

Level of Responsibility	Number	Percent
Not Indicated	76	3.8%
Intern or Entry Level	122	6.1%
Journeyman	342	17.0%
Team Leader	424	21.1%
Supervisor	271	13.5%
Technical Specialist	369	18.4%
Manager	333	16.6%
Executive	69	3.4%
Total	2006	100.0%

Table 2 – Bachelor’s Degree Area of Study

Disciplines	Percent	Disciplines	Percent
Aeronautical Engineering	0.2%	Geography	0.3%
Aerospace Engineering	0.2%	Geology	4.4%
Agricultural Engineering	1.6%	Geophysical Engineering	0.1%
Anthropology	0.1%	Geotechnical Engineering	0.1%
Architectural Engineering	4.6%	Hydraulics	0.1%
Biology	0.6%	Industrial Engineering	1.2%
Cartography/Geodesy	0.2%	Interior Design	0.3%
Chemical Engineering	1.9%	Landscape Architecture	0.6%
Civil Engineering	59.9%	Materials Engineering	0.3%
Coastal Structures	0.1%	Mathematics	0.3%
Computer Science	0.1%	Mechanical Engineering	9.9%
Construction Management	0.6%	Metallurgical Engineering	0.1%
Earth Sciences	0.1%	Mining Engineering	0.3%
Economics	0.1%	Molecular Biology/Biochemistry	0.1%
Electrical Engineering	7.0%	Nuclear Engineering	0.1%
Electronics Engineering	0.4%	Oceanography	0.2%
Engineering	0.2%	Petroleum Engineering	0.3%
Engineering Mechanics	0.1%	Physics	0.5%
Engineering Science	0.2%	Structural Engineering	1.1%
Environmental Engineering	1.2%	Wildlife Biology	0.1%
Fire Protection Engineering	0.1%	Wildlife Management	0.1%
Forestry	0.2%	Zoology	0.1%

Series	Number	Percent
Not Indicated	24	
0801 - General Engineering	57	32.0%
0804 - Fire Prevention Engineering	0	0.0%
0806 - Materials Engineering	3	60.0%
0807 - Landscape Architecture	9	52.9%
0808 - Architecture	17	25.4%
0810 - Civil Engineering	473	38.9%
0819 - Environmental Engineering	37	45.7%
0830 - Mechanical Engineering	25	17.9%
0850 - Electrical Engineering	23	17.7%
0855 - Electronics Engineering	1	16.7%
0893 - Chemical Engineering	7	43.8%
0896 - Industrial Engineering	6	66.7%
1008 - Interior Design	0	0.0%
1350 - Geology	24	38.1%
1370 - Cartography	0	0.0%
1373 - Land Surveying	0	0.0%
Total	706	35.2%

Grade	Number	Percent
Not Indicated	4	
DB - 02	3	60.0%
DB - 03	1	100.0%
DB - 04	38	82.6%
DB - 05	6	85.7%
GS - 05	0	0.0%
GS - 06	0	0.0%
GS - 07	3	9.1%
GS - 08	1	50.0%
GS - 09	16	28.1%
GS - 10	0	0.0%
GS - 11	51	25.5%
GS - 12	230	31.1%
GS - 13	234	36.7%
GS - 14	86	44.1%
GS - 15	30	52.6%
SES -	3	75.0%
Total	706	

Functional Area	Number	Percent
Not Indicated	8	
Civil Works Planning	30	44.1%
Construction	123	28.2%
Engineering	295	35.7%
Environmental	56	44.8%
Operations	35	25.0%
Program/Project Management	87	36.0%
Public Works	24	33.3%
Research and Development	48	80.0%
Total	706	

Level of Responsibility	Number	Percent
Not Indicated	29	
Intern or Entry Level	30	24.6%
Journeyman	112	32.7%
Team Leader	136	32.1%
Supervisor	105	38.7%
Technical Specialist	136	36.9%
Manager	133	39.9%
Executive	25	36.2%
Total	706	

Table 3E – Master’s Degree Areas of Study

Disciplines	Percent	Disciplines	Percent
Accounting	0.1%	Geography	0.1%
Aeronautical Engrg & Aviation Mgmt	0.1%	Geology	3.3%
Aerospace Engineering	0.1%	Geophysics	0.1%
Agricultural Engineering	1.3%	Geotechnical Engineering	1.3%
Anthropology	0.1%	Hydraulic Engineering	0.3%
Architecture	2.0%	Hydrogeology	0.6%
Biochemistry	0.1%	Industrial Engineering	0.7%
Biological Science	0.3%	Information Management	0.1%
Business	0.1%	Landscape Architecture	0.7%
Business Administration	1.0%	Management	0.3%
Chemical Engineering	0.8%	Marine Geology	0.1%
Civil Engineering	43.5%	Materials Engineering	0.1%
Coastal & Oceanographic Engrg	0.4%	MBA	7.9%
Community Planning	0.1%	Mechanical Engineering	2.5%
Computer Science	0.1%	Mining Engineering	0.3%
Construction Management	4.0%	National Resource Strategy	0.1%
Economics	0.1%	Operations Management	0.3%
Electrical Engineering	1.6%	Physics	0.3%
Engineering	0.1%	Policy Sciences	0.1%
Engineering Management	1.8%	Public Administration	0.1%
Engineering Physics	0.1%	Public Policy/Administration	2.0%
Environmental Engineering	7.5%	Secondary Education	0.1%
Environmental Management	0.1%	Soil Science	0.1%
Environmental Science	0.3%	Structural Engineering	4.7%
Environmental Studies	0.1%	Systems Engineering	0.3%
Facilities Engineering	0.1%	Systems Management	0.7%
Forestry	0.3%	Urban and Regional Planning	0.1%
Geodesy	0.1%	Water Resources	0.6%

Series	Number	Percent
Not Indicated	1	
0801 - General Engineering	2	1.1%
0804 - Fire Prevention Engineering	0	0.0%
0806 - Materials Engineering	0	0.0%
0807 - Landscape Architecture	0	0.0%
0808 - Architecture	1	1.5%
0810 - Civil Engineering	38	3.1%
0819 - Environmental Engineering	8	9.9%
0830 - Mechanical Engineering	1	0.7%
0850 - Electrical Engineering	2	1.5%
0855 - Electronics Engineering	0	0.0%
0893 - Chemical Engineering	1	6.3%
0896 - Industrial Engineering	0	0.0%
1008 - Interior Design	0	0.0%
1350 - Geology	4	6.3%
1370 - Cartography	0	0.0%
1373 - Land Surveying	0	0.0%
Total	58	2.9%

Grade	Number	Percent
Not Indicated	0	
DB - 02	0	0.0%
DB - 03	0	0.0%
DB - 04	17	37.0%
DB - 05	3	42.9%
GS - 05	0	0.0%
GS - 06	0	0.0%
GS - 07	0	0.0%
GS - 08	0	0.0%
GS - 09	1	1.8%
GS - 10	0	0.0%
GS - 11	2	1.0%
GS - 12	15	2.0%
GS - 13	11	1.7%
GS - 14	7	3.6%
GS - 15	2	3.5%
SES -	0	0.0%
Total	58	

Functional Area	Number	Percent
Not Indicated	1	
Civil Works Planning	2	2.9%
Construction	1	0.2%
Engineering	19	2.3%
Environmental	9	7.2%
Operations	1	0.7%
Program/Project Management	3	1.2%
Public Works	0	0.0%
Research and Development	22	36.7%
Total	58	

Level of Responsibility	Number	Percent
Not Indicated	3	
Intern or Entry Level	1	0.8%
Journeyman	6	1.8%
Team Leader	13	3.1%
Supervisor	5	1.8%
Technical Specialist	22	6.0%
Manager	6	1.8%
Executive	2	2.9%
Total	58	

Series	Number	Percent
Not Indicated	14	
0801 - General Engineering	103	57.9%
0804 - Fire Prevention Engineering	8	88.9%
0806 - Materials Engineering	4	80.0%
0807 - Landscape Architecture	14	82.4%
0808 - Architecture	52	77.6%
0810 - Civil Engineering	829	68.2%
0819 - Environmental Engineering	53	65.4%
0830 - Mechanical Engineering	83	59.3%
0850 - Electrical Engineering	62	47.7%
0855 - Electronics Engineering	4	66.7%
0893 - Chemical Engineering	8	50.0%
0896 - Industrial Engineering	2	22.2%
1008 - Interior Design	4	100.0%
1350 - Geology	47	74.6%
1370 - Cartography	0	0.00%
1373 - Land Surveying	5	83.3%
Total	1292	64.4%

Grade	Number	Percent
Not Indicated	4	
DB - 02	2	40.0%
DB - 03	1	100.0%
DB - 04	29	63.0%
DB - 05	5	71.4%
GS - 05	0	0.00%
GS - 06	2	66.7%
GS - 07	12	36.4%
GS - 08	1	50.0%
GS - 09	11	19.3%
GS - 10	1	100.0%
GS - 11	78	39.0%
GS - 12	471	63.7%
GS - 13	466	73.0%
GS - 14	153	78.5%
GS - 15	52	91.2%
SES -	4	100.0%
Total	1292	

Functional Area	Number	Percent
Not Indicated	13	
Civil Works Planning	43	63.2%
Construction	301	69.0%
Engineering	555	67.2%
Environmental	66	52.8%
Operations	78	55.7%
Program/Project Management	163	67.4%
Public Works	35	48.6%
Research and Development	38	63.3%
Total	1292	

Level of Responsibility	Number	Percent
Not Indicated	40	
Intern or Entry Level	34	27.9%
Journeyman	209	61.1%
Team Leader	266	62.7%
Supervisor	214	79.0%
Technical Specialist	246	66.7%
Manager	230	69.1%
Executive	53	76.8%
Total	1292	

Type	Number	Percent
Not Indicated	59	4.6%
Architecture	73	5.7%
Engineering	1091	84.4%
Geology	59	4.6%
Interior Design	4	0.3%
Surveying	6	0.5%

Table 6A – Professional Registration Required by Series		
Series	Number	Percent
Not Indicated	1	
0801 - General Engineering	24	13.5%
0804 - Fire Prevention Engineering	6	66.7%
0806 - Materials Engineering	3	60.0%
0807 - Landscape Architecture	2	11.8%
0808 - Architecture	25	37.3%
0810 - Civil Engineering	325	26.7%
0819 - Environmental Engineering	11	13.6%
0830 - Mechanical Engineering	18	12.9%
0850 - Electrical Engineering	24	18.5%
0855 - Electronics Engineering	2	33.3%
0893 - Chemical Engineering	1	6.3%
0896 - Industrial Engineering	0	0.0%
1008 - Interior Design	1	25.0%
1350 - Geology	8	12.7%
1370 - Cartography	0	0.0%
1373 - Land Surveying	5	83.3%
Total	456	22.7%

Table 6B - Professional Registration Required by Grade		
Grade	Number	Percent
Not Indicated	0	
DB - 02	0	0.0%
DB - 03	0	0.0%
DB - 04	5	10.9%
DB - 05	1	14.3%
GS - 05	0	0.0%
GS - 06	0	0.0%
GS - 07	1	3.0%
GS - 08	0	0.0%
GS - 09	1	1.8%
GS - 10	0	0.0%
GS - 11	12	6.0%
GS - 12	91	12.3%
GS - 13	216	33.9%
GS - 14	91	46.7%
GS - 15	37	64.9%
SES -	1	25.0%
Total	456	

Table 6C - Professional Registration Required by Functional Area		
Functional Area	Number	Percent
Not Indicated	3	
Civil Works Planning	6	8.8%
Construction	146	33.5%
Engineering	242	29.3%
Environmental	13	10.4%
Operations	11	7.9%
Program/Project Management	24	9.9%
Public Works	6	8.3%
Research and Development	5	8.3%
Total	456	

Table 6D - Professional Registration Required by Level of Responsibility		
Level of Responsibility	Number	Percent
Not Indicated	7	
Intern or Entry Level	3	2.5%
Journeyman	24	7.0%
Team Leader	68	16.0%
Supervisor	138	50.9%
Technical Specialist	81	22.0%
Manager	102	30.6%
Executive	33	47.8%
Total	456	

Table 7 – Competencies

Level 0 = None; Level 1 = Recognition; Level 2 = Understanding; Level 3 = Ability

Competency	Level Achieved by Formal Education	Level Achieved by Non-University Education	Level Achieved by Experience	Composite Competency Level
1. An ability to apply knowledge of mathematics, science and engineering.	2.7	1.6	2.5	6.8
2. An ability to design and conduct experiments, as well as analyze and interpret data.	2.4	1.3	2.2	5.9
3. An ability to design a system, component or process to meet desired needs	2.1	1.4	2.4	5.9
4. An ability to function on multi-disciplinary teams.	1.7	1.7	2.8	6.2
5. An ability to identify, formulate, and solve engineering problems.	2.4	1.6	2.6	6.6
6. An understanding of professional and ethical responsibility.	2.0	1.9	2.8	6.7
7. An ability to communicate effectively.	2.0	2.0	2.7	6.7
8. A broad education necessary to understand the impact of engineering solutions in a global and societal context.	1.9	1.6	2.4	5.9
9. A recognition of the need for, and an ability to engage in life-long learning.	2.0	2.0	2.6	6.6
10. A knowledge of contemporary issues.	1.8	1.8	2.4	6.0
11. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	2.1	1.7	2.5	6.5
12. An ability to apply knowledge in a specialized technical and/or professional area.	2.1	1.8	2.7	6.6
13. An understanding the elements of project management, construction, and asset management.	1.3	1.7	2.6	5.6
14. An understanding of business and public policy and administration fundamentals.	1.1	1.6	2.3	5.0
15. An understanding the role of the leader and leadership principles.	1.3	2.0	2.6	5.9

Table 8 - Education Gaps

Program and Project Management: 288
Communications (Written And Oral): 270
Acquisition, Contracting, Contract Administration, Contract Law: 264
Technical Courses - Various And Unspecified: 221
Leadership: 140
Management: 88
Team Building, Group Dynamics, Human Relations: 86
Construction, Construction Management: 77
Public Policy And Administration, Government, DoD/Army Policy: 70
Budgeting and Scheduling: 64
Professional Registration – Preparation for, and Continuing Education: 55
Fiscal Policy and Law, Financial Management: 53
Business, Business Management, Business Law: 51
Environmental Management, Environmental Law, Sustainable Design: 46
Computer Software: 43
Other Non-Technical Courses: 40
Law – General: 38
Electrical Engineering: 34
Structural Engineering: 30
Personnel Management: 30
Geology and Geotechnical Engineering: 29
GIS: 26
Mechanical Engineering: 25
Supervision: 19
Hydraulics and Hydrology: 18
Planning, Master Planning: 18
Ethics: 16
CADD: 16
Master's Degree, MBA: 15
Administration: 15
Professional Development – General: 14
Negotiations: 14
Cost Estimating and Engineering: 13
Civil Works Policy: 13
Time Management: 11