

# **Program Improvement Report**

## **Bachelor of Science in Civil Engineering**

### **2014-2015**

*Department of Civil Engineering*  
*College of Engineering, Computer Science, and Construction Management*  
*California State University, Chico*



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Editors' Note: This document provides a summary of findings and actions resulting from implementation of the Civil Engineering *Program Improvement Plan (PIP)* in effect at the time of this report. The applicable *PIP* is described in the companion document:

*Program Improvement Plan*, Bachelor of Science in Civil Engineering, Third Edition, May 2015.

Program Improvement Reports (*PIRs*) are compiled on an academic year cycle and are based on the *PIP* in effect at the time of the report. Minor deviations from the applicable plan are called out in each report.

The *PIP* is updated periodically, but only when justified by significant changes to any part of the plan.

History of Modifications to the *Program Improvement Plan*:

<u>Version</u>	<u>Changes</u>
August 2005	Initial description of the plan (1 <sup>st</sup> Edition).
September 2009	Comprehensive revision of the plan (2 <sup>nd</sup> Edition). This version was not fully implemented until it was subsequently updated in May 2015.
May 2015	Major revision to student learning outcomes (SLO) distribution and embedded assessment (3 <sup>rd</sup> Edition).

The current edition of the *PIP* and all editions of the *PIR* are archived at:

[http://www.csuchico.edu/ce/menu\\_about/menu\\_program\\_assessment.shtml](http://www.csuchico.edu/ce/menu_about/menu_program_assessment.shtml)

*Program Improvement Report\**  
**Bachelor of Science in Civil Engineering**  
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\* Reference: *Program Improvement Plan*, Bachelor of Science in Civil Engineering, Third Edition, May 2015.

## Introduction

The various means and processes used to assess the effectiveness of the Civil Engineering program are fully described in the companion document *Program Improvement Plan*, Bachelor of Science in Civil Engineering, Third Edition, May 2015. Based on implementation of the *PIP*, this *Program Improvement Report* provides a summary of findings and actions resulting from assessment processes employed during the 2014-2015 academic year. Since certain assessment measures may not have been employed during the period addressed by this *PIR*, some sections may not contain any findings, as noted in this report.

The *PIR* presents only summaries and selected data deemed valuable to program assessment. Sections that are shaded in the accompanying tables are from periods prior to the academic year addressed by this *PIR*. Although these data provide historical perspective, they are not the emphasis of this report.

Section I of this report, *Assessment Summaries and Observations*, presents findings based on application of the *PIP*, but provides no suggestions for possible reactions to the findings. Possible reactions will instead be found in Section II *Actions Planned as a Result of Assessment*, where various actions are discussed, including a general reference to the assessment finding(s) that suggested each action. This reflects the complex synergy between assessment and improvement – for instance, a planned action may be suggested by multiple assessment measures.

An important consideration when reviewing the assessment findings is that the Civil Engineering program recently grew at an unprecedented rate. This growth impacted many aspects of the program, including successful recruitment of an adequate number of instructional faculty and sufficient access to appropriate educational facilities, including laboratories.

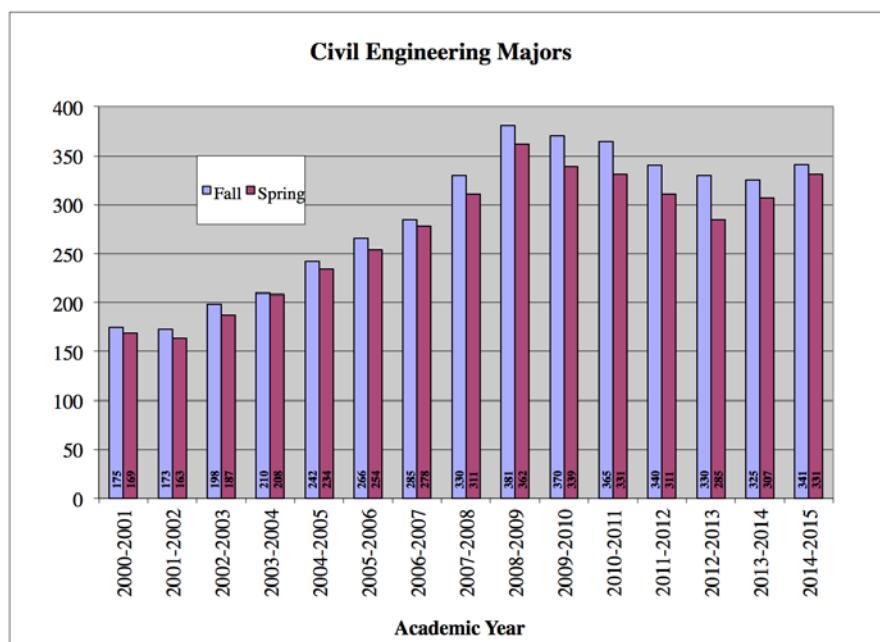


Figure 1: History of the major headcount in the Civil Engineering program.

## I. Assessment Summaries and Observations

### 1. Direct and Embedded Assessment (PIP Sections I.1 through I.4)

The CIVL program's direct and embedded assessment process utilizes specific assignments in selected courses to measure students' achievement of certain program learning outcomes. The plan describing this process was revised and implemented during the 2014-2015 academic year. Consequently, these data represent application of the most recent *Program Improvement Plan* and incorporate changes to the BSCE requirements that were implemented commencing Fall 2012.

Summary data from Fall 2014 and Spring 2015 are presented in Table I.1.1 (following page) as the percentage of students who successfully demonstrated achievement of the specified outcome in the designated course. Only certain courses are used for this assessment. Since some courses are taught only once each academic year, these courses will not display results in off-semesters – these cells are shaded gray in the table.

As can be seen, student achievement rates generally fall above minimally acceptable levels, called the *standard*, indicating that the program is successfully providing students with the knowledge, skills, and attitudes targeted by the program. However, shown as black-highlighted entries in the table, student achievement fell below the standard in six instances, as follows:

*Students completing the civil engineering program at CSU, Chico must demonstrate:*

- a1. *an ability to apply knowledge of mathematics, science, and engineering, including mathematics through differential equations*, as assessed in MATH 260 Differential Equations during Spring 2015 (76.9% student achievement < standard of 80%).
- a2. *an ability to apply knowledge of mathematics, science, and engineering, including calculus-based physics*, as assessed in PHYS 2014A Mechanics during Fall 2014 (56.5% student achievement < standard of 80%).
- a3. *an ability to apply knowledge of mathematics, science, and engineering, including chemistry*, as assessed in CHEM 111 General Chemistry during Fall 2014 (56.5% student achievement < standard of 80%).
- a5. *an ability to apply knowledge of mathematics, science, and engineering, including four technical areas appropriate to civil engineering*, as assessed in CIVL 461 Water Resource Engineering during Spring 2015 (73.1% student achievement < standard of 80%)<sup>1</sup>.
- c. *an ability to design a system, component, or process to meet desired needs in more than one civil engineering context and within realistic constraints*, as assessed in CIVL 461 Water Resource Engineering during Spring 2015 (44.4% student achievement < standard of 90%)<sup>1</sup>.
- k. *an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice*, as assessed in CIVL 461 Water Resource Engineering during Spring 2015 (72.0% student achievement < standard of 90%)<sup>1</sup>.

It warrants comment that, in all six of these instances, this was the first time these particular assessment measures have been employed in these courses. Also, for all six instances, there were other comparable assessments where students exceeded the standard, either in the same course in another semester or in an assessment of the same outcome in another course.

<sup>1</sup>In the case of CIVL 461 this was the first time the course had been offered and 5 students out of 25 did not turn in the ABET design assignment on the day it was due, which skews the results.

**TABLE I.1.1 STUDENTS DEMONSTRATING OUTCOME ACHIEVEMENT**

CE Program Learning Outcome	Course Used for Outcome Assessment	Semesters by Academic Year									
		F14	S15								
<i>The following assessment measures have a minimum acceptable achievement rate of 80%.</i>											
a: ability to apply knowledge of mathematics, science, and engineering, including ...											
a1: math through diff. eqns	MATH 260 Differential Equations	85.7%	76.9%								
a2: calculus-based physics	PHYS 204A Mechanics	56.5%	84.4%								
a3: chemistry	CHRM 111 General Chemistry	73.3%	87.5%								
a4: biology	CIVL 175 Bio. Proc. In Envir. Engng.	83.3%	94.4%								
a5: at least four technical areas appropriate to civil engineering											
structural engineering	CIVL 415 Reinforced Concrete Design	92.7%	86.4%								
environmental engineering	CIVL 431 Environmental Engineering		93.1%								
transportation engineering	CIVL 441 Transportation Engineering	96.6%									
water resource engineering	CIVL 461 Water Resource Engineering		73.1%								
<i>The following assessment measures have a minimum acceptable achievement rate of 90%.</i>											
b: ability to design and conduct experiments, as well as to analyze and interpret data	CIVL 415 Reinforced Concrete Design	97.6%	100.0%								
	CIVL 441 Transportation Engineering	95.2%									
c: ability to design a system, component or process to meet desired needs	CIVL 461 Water Resource Engineering		44.4%								
	CIVL 558C Eq. & Wind Engn. - Caps.		96.4%								
	CIVL 561C Hydro. & Open Ch. - Caps.										
	CIVL 562C Ground. Hydro. - Caps.	100.0%									
	CIVL 571C Nat. Sys. Waste. Tr. - Caps.	100.0%									
	CIVL 575C Solid & Haz. Waste - Caps.										
	CIVL 586C Adv. Transp. Engr. - Caps.		100.0%								
d: ability to function on multi-disciplinary teams	CIVL 495 Lifelong Dev. for Engineers	100.0%	100.0%								
	CIVL 595 Capstone Design Project	100.0%	100.0%								
e: ability to identify, formulate, and solve engineering problems	CIVL 441 Transportation Engineering	95.2%									
	CIVL 558C Eq. & Wind Engn. - Caps.		96.3%								
	CIVL 561C Hydro. & Open Ch. - Caps.										
	CIVL 562C Ground. Hydro. - Caps.	100.0%									
	CIVL 571C Nat. Sys. Waste. Tr. - Caps.	100.0%									
	CIVL 575C Solid & Haz. Waste - Caps.										
	CIVL 586C Adv. Transp. Engr. - Caps.		100.0%								
f: understanding of professional and ethical responsibility	CIVL 495 Lifelong Dev. for Engineers	100.0%	100.0%								
	CIVL 595 Capstone Design Project	100.0%	100.0%								
g: ability to communicate effectively	CIVL 595 Capstone Design Project	100.0%	100.0%								
	CIVL 558C Eq. & Wind Engn. - Caps.		96.4%								
	CIVL 561C Hydro. & Open Ch. - Caps.										
	CIVL 562C Ground. Hydro. - Caps.	100.0%									
	CIVL 571C Nat. Sys. Waste. Tr. - Caps.	90.0%									
	CIVL 575C Solid & Haz. Waste - Caps.										
	CIVL 586C Adv. Transp. Engr. - Caps.		100.0%								
h: broad education necessary to understand impact of engineering solutions in a global and societal context	CIVL 431 Environmental Engineering		94.8%								
	CIVL 495 Lifelong Dev. for Engineers	100.0%	100.0%								
i: recognition of the need for, and an ability to, engage in lifelong learning	CIVL 495 Lifelong Dev. for Engineers	100.0%	100.0%								
j: knowledge of contemporary issues	CIVL 495 Lifelong Dev. for Engineers	100.0%	100.0%								
	CIVL 595 Capstone Design Project	100.0%	100.0%								
k: ability to use techniques, skills, and modern engineering tools for engineering practice	CIVL 461 Water Resource Engineering		72.0%								
	CIVL 558C Eq. & Wind Engn. - Caps.		96.4%								
	CIVL 561C Hydro. & Open Ch. - Caps.										
	CIVL 562C Ground. Hydro. - Caps.	100.0%									
	CIVL 571C Nat. Sys. Waste. Tr. - Caps.	100.0%									
	CIVL 575C Solid & Haz. Waste - Caps.										
	CIVL 586C Adv. Transp. Engr. - Caps.		100.0%								
l: understanding of basic concepts in management, business, public policy, and leadership	CIVL 495 Lifelong Dev. for Engineers	100.0%	100.0%								
	CIVL 595 Capstone Design Project	100.0%	100.0%								

## 2. Fundamentals of Engineering Examination (PIP Section I.5)

Question 13 on the Graduating Senior Survey solicits from students their self-reported success on the Fundamentals of Engineering (FE) examination.

The results in Table I.2.1 demonstrate that 88% of those surveyed who had taken the FE and had also received test results passed the examination (i.e., 14 of 16 students who had received results passed). While not conclusive, this result strongly suggests adequate student preparation in the fundamentals of civil engineering, a central mission of the program.

TABLE I.2.1 SELF-REPORTED PERFORMANCE ON THE FE EXAMINATION  
Q13. Took a comprehensive exam

Year	No	Yes and passed	Yes and didn't pass	Yes, waiting for results	Total
2014-2015	5	14	2	3	24

These results should be viewed only as a self-reported sample, since not all graduating students completed the survey. Instead, the return rate varies greatly from year to year (see Table I.3.1). Until better and more reliable data are available for student success on the FE exam, this assessment measure should not be considered a primary indicator of program achievement.

As general information, Table I.2.2 presents the official record of performance by CSU, Chico CIVL current students and graduates on professional exams. It is important to note that the National Council of Examiners for Engineering and Surveying (NCEES) provides these data only for first-time examinees. Since students are encouraged by the faculty to take the FE examination early, many will fail to pass the exam until a subsequent attempt. Consequently, these results tend to be biased towards a lower pass rate and are highly variable.

TABLE I.2.2 NCEES REPORTED PERFORMANCE ON EXAMINATIONS  
July 1, 2014 – May 31, 2015

Exam	FS	FE-Civil	PS	PE-Civil
Taking Passing % Passing	2	26	1	9
	0	14	1	2
	0%	54%	100%	22%
ABET Norm	55% - 70%	70%	46% - 54%	59% - 61%

FS = Fundamentals of Surveying

FE-Civil = Fundamentals of Engineering (Civil)

PE-Civil = Principles and Practice of Engineering (Civil-Construction)

## 3. Graduating Senior Survey (PIP Section I.6)

Summary data resulting from administration of the survey are presented in Appendix A. Table A.1 provides general response data regarding student demographics and student satisfaction with non-academic aspects of their experiences at CSU, Chico. Table A.2 addresses student satisfaction with their education and self-evaluation of their preparation in program student

learning outcomes. These data sets are generated for all programs in the College of Engineering, Computer Science, and Construction Management, and are tabulated annually by the college.

The number of students who successfully completed all requirements for the Bachelor of Science in Civil Engineering is tabulated by academic year in Table I.3.1. The completion rate on the Graduating Senior Survey has ranged from 42 to 82 percent of those who graduated over the last 6 academic years. Focused effort is essential to sustain an acceptable response rate.

TABLE I.3.1 BSCE GRADUATES BY YEAR AND SURVEYS COMPLETED

Academic Year	BSCE Graduates	Surveys Completed	
		Number Responding	% of Graduating
2009-2010	62	44	71.0%
2010-2011	70	56	80.0%
2011-2012	86	52	60.5%
2012-2013	72	59	81.9%
2013-2014	67	39	58.2%
2014-2015	62	26	41.9%

A number of noteworthy observations and conclusions may be derived from these data and are summarized in Table I.3.2. Of particular significance is the students' perception that they are prepared in the specified student learning outcomes. This corroborates similar findings from direct assessment measures, as summarized previously in Section 1.

TABLE I.3.2 OBSERVATIONS BASED ON CIVL RESPONSES TO THE SENIOR SURVEY

- Students generally reported adequate preparation in the full range of program learning outcomes. One exception was their ability to *design and execute test procedures*.
- Students were satisfied with the quality of teaching by and access to faculty in the CIVL department although they were dissatisfied with the availability of courses in the department.
- Students were dissatisfied with the quality of laboratories and equipment, and with the quality of computer facilities.
- Students reported low satisfaction with the quality of GE courses although they were satisfied with the availability of GE courses.
- Most students (96%) reported meeting with their major academic advisor at least once each year and were satisfied with the advising they received.
- Students were dissatisfied with the advising they received from the university advising office although most students did not regularly use the university advising office.
- Most students experienced an internship or other relevant work experience prior to graduation and most who did so found the experience valuable.
- Most students had experienced involvement in student societies and most who participated found value in the experience.
- Most students who participated found the FE/EIT review sessions helpful, although fewer than half participated.

- Most students did not use the career office, but for most who did it was helpful.
- Students were dissatisfied with the career information they received from the CIVL department.
- Most students would recommend the CIVL program at CSU, Chico and were also satisfied, although to a lower level, with the support they received from the department.
- Most students arrived at CSU, Chico as first-time freshmen and nearly 70% completed the BSCE degree in less than five years. All students reported completing the BSCE in six years or less.
- Few students plan to attend graduate school. Most plan to begin working immediately after graduation.
- Reported starting salaries range from \$51,000 to \$70,000.

#### 4. Alumni Survey (PIP Section II.2)

All known CSU, Chico BSCE alumni were surveyed during the Spring 2015 semester. A total of 228 alumni surveys were returned and processed. The tabulated survey data and analysis of these data are presented in Appendix B. A paper survey instrument was used, which may be viewed in the *Program Improvement Plan*. The last time alumni were surveyed was in 2009, when 152 surveys were returned.

General information about the alumni respondents from the Spring 2015 survey is shown in Table B.1.

Table B.2, which presents analysis of self-reported levels of academic preparation by subject area and by program educational objective, focuses only on alumni graduating in 1991 or later. A total of 141 respondents fell in this time period. The results are then further subdivided into four intervals of six years each, permitting observation of trends reflected by the survey results and potential correlation with recent changes to the academic program. Any level of preparation score that falls below 3.50 is highlighted in black. The value of 3.50 falls midway between 3.00 (a “neutral” response) and 4.00 (a response of “prepared”). Possible improvements will be considered for any category reflecting a level of preparation below 3.50 (see Table I.4.1, following).

Recurring written suggestions for possible improvements to the academic program are summarized in Table B.3. All respondents were included in the compilation of this summary.

TABLE I.4.1 ALUMNI RESPONSES WITH LEVEL OF PREPARATION BELOW 3.50  
(By year of graduation, in six-year intervals from 1991 – 2014.)

Subject Areas Yielding Low Preparation Scores

*Land Development:* Alumni from most time periods report low levels of preparation.

*Construction:* Alumni from all time periods report very low levels of preparation.

*Management:* Alumni from all time periods report very low levels of preparation.

*Education:* Older graduates (prior to 1997) report somewhat low levels of preparation, although more recent graduates report adequate preparation.

*Comprehensive Design:* Graduates from some time periods, including the most recent graduates, report somewhat low levels of preparation.

Program Educational Objectives Yielding Low Preparation Scores

*BSCE graduates will be:*

*Familiar with regulatory/professional issues:* Graduates from some time periods, including recent graduates, report somewhat low levels of preparation.

*Effective technical writers:* Older graduates (prior to 1997) report somewhat low levels of preparation, although more recent graduates report adequate preparation.

*Effective oral communicators:* Older graduates (prior to 1997) report somewhat low levels of preparation, although more recent graduates report adequate preparation.

## 5. Employer Survey (PIP Section II.3)

The responses provided in the alumni survey were used to update the department's database identifying the employers of our graduates. These employers were then surveyed late in the Spring 2015 semester. A paper survey instrument was used, which may be viewed in the *Program Improvement Plan*. The employer survey is very similar to the alumni survey and is intended primarily to provide information about our graduates' preparation by subject area and by program educational objective, as observed by their immediate supervisor. A total of 21 employer surveys were returned and processed. Employers were last surveyed in 2009, with an on-line survey instrument, when only eleven surveys were completed.

The survey results are displayed in Tables C.1 and C.2 and reflect all respondents. Table C.1 provides general information about employers of the CIVL program's alumni, while Table C.2 evaluates the level of preparation of alumni by subject area and by program educational objective. As with the alumni survey, possible improvements will be considered for any category reflecting a level of preparation below 3.50 (see Table I.5.1).

TABLE I.5.1 EMPLOYER RESPONSES WITH LEVEL OF PREPARATION BELOW 3.50  
(Year of graduation not specified.)

Subject Areas Yielding Low Preparation Scores

*Land Development*

*Management*

Program Educational Objectives Yielding Low Preparation Scores

None fell below 3.50

## 6. Professional Advisory Board Feedback (PIP Section II.4)

*This assessment measure was not used during the period addressed by this report.*

## 7. Accreditation Feedback (PIP Section II.5)

*This assessment measure was not used during the period addressed by this report.  
The next accreditation evaluation is scheduled during the 2015-2016 academic year.*

## II. Actions Planned as a Result of Assessment

The BSCE program faculty has reviewed the results from the various assessment measures provided in this report. In response, the department provides in Table II.1 a summary of ongoing and planned actions based on these findings.

**TABLE II.1 PLANNED ACTIONS**

- |                                 |   |
|---------------------------------|---|
| Associated Assessment Measures: | <ol style="list-style-type: none"> <li>1. Direct and Embedded Assessment</li> <li>2. Fundamentals of Engineering Examination</li> <li>3. Graduating Senior Exit Survey</li> <li>4. Alumni Survey</li> <li>5. Employer Survey</li> <li>6. Professional Advisory Board</li> <li>7. Accreditation</li> </ol> |
|---------------------------------|---|

Topic	Description	Intended Outcome(s)	Assessment Measure(s)						
			1	2	3	4	5	6	7
CIVL Students' Projects and Activities	CIVL students' design projects and group activities have become a vital part of the program. The department will continue to work to foster an environment for these academic and professional activities, both in terms of maintaining modern equipment and to improve student access.	Provide for a suitable computation, instruction, and design work environment for CIVL student group projects and activities.			<input type="checkbox"/>				
CIVL Physical Labs	The CIVL department operates three primary laboratory facilities for the college: a combined structures/concrete/soils lab, a hydraulics lab, and an environmental lab. The structures/concrete lab is also used by students in the construction management and the concrete industry management programs. The hydraulics lab is also used by students from the mechanical engineering program, and the environmental lab is used by any student on campus taking CIVL 175 to meet their GE Life Science requirement, as well as all civil engineering students. New and donated equipment were obtained for two of these laboratories over the past 5 years. However, the structures lab and the environmental lab are overcrowded to the point that their space can no longer be properly managed and maintained. A full time manager has been hired for the structure/concrete lab to ameliorate this problem. It is essential that the department and college find additional suitable space for these activities and CIVL is working on a renovation plan, especially as the California Pavement Preservation Center also needs access to suitable laboratory space. The environmental lab is also adversely impacted in the spring semesters when two courses use that space (CIVL 431, an upper level required environmental engineering course in addition to CIVL 175). This is currently being handled by offering fewer sections of CIVL 175 in the spring semesters, but this has the potential to create a bottleneck in our program.	Provide for a modern and effective experience for students in laboratory courses and, as a secondary benefit, provide facilities suitable for project work by faculty and students.		<input type="checkbox"/>					

**TABLE II.1 PLANNED ACTIONS, Continued**

Topic	Description	Intended Outcome(s)	Assessment Measure(s)						
			1	2	3	4	5	6	7
Student Chapters	The department will continue to support the various professional societies related to the program.	Enhance the professional aspects of the program, provide opportunities for student extracurricular activities and community service, and to improve student retention.		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
Major Course Availability	The department will continue to offer electives in topical areas as dictated by student demand, faculty expertise, the professional advisory board, and employer surveys.	Improve student progress through the program and provide for additional sub-discipline specialization.	<input type="checkbox"/>		<input type="checkbox"/>				<input type="checkbox"/>

#### *Relation to Previous Planned Actions*

The primary utility of this *Program Improvement Report* is to serve as a guide to the CIVL faculty for pursuing continuous program improvement. As such, planned actions may change yearly or, in some cases, continue over multiple years, depending on annual assessment findings, faculty response to those findings, and available resources for enacting change. There is little to be gained from compiling a comprehensive history of assessment-driven actions. Nevertheless, history can sometimes be important when it comes to assessment and program improvement. Consequently, all past editions of the *PIR* will continue to be archived at the CIVL department website:

[http://www.csuchico.edu/ce/menu\\_about/menu\\_program\\_assessment.shtml](http://www.csuchico.edu/ce/menu_about/menu_program_assessment.shtml)

## APPENDIX A: Graduating Senior Survey, Spring 2015

TABLE A.1 GENERAL RESPONSE DATA (CIVL MAJORS ONLY)

**Q3. Came to Chico State as a**

Year	First-time freshman	Transfer	Total
14-15	68%	32%	100%
15-16			
16-17			
17-18			
18-19			
19-20			
<b>14-15</b>	<b>68%</b>	<b>32%</b>	<b>100%</b>
	17	8	25

**Q4. Semesters attended Chico State**

Year	1-3	4-6	7-9	10-12	13+	Total
14-15	0%	36%	32%	32%	0%	100%
15-16						
16-17						
17-18						
18-19						
19-20						
<b>14-15</b>	<b>0%</b>	<b>36%</b>	<b>32%</b>	<b>32%</b>	<b>0%</b>	<b>100%</b>
	0	9	8	8	0	25

**Q5. Overall GPA**

Year	<2.25	2.25-2.49	2.50-2.74	2.75-2.99	3.00-3.24	3.25-3.50	3.51-3.74	3.75-4.00	Total
14-15	8%	4%	8%	44%	8%	8%	8%	12%	100%
15-16									
16-17									
17-18									
18-19									
19-20									
<b>14-15</b>	<b>8%</b>	<b>4%</b>	<b>8%</b>	<b>44%</b>	<b>8%</b>	<b>8%</b>	<b>8%</b>	<b>12%</b>	<b>100%</b>
	2	1	2	11	2	2	2	3	25

**Q6. Value of internship, co-op, or job if related to major**

Year	Not exper'd	Very Valuable	Valuable	Somewt valuable	Not Valuable	Total
14-15	28%	52%	16%	4%	0%	100%
15-16						
16-17						
17-18						
18-19						
19-20						
<b>14-15</b>	<b>28%</b>	<b>52%</b>	<b>16%</b>	<b>4%</b>	<b>0%</b>	<b>100%</b>
	7	13	4	1	0	25

**Q7. Value of involvement in societies, activities, clubs**

Year	Not exper'd	Very Valuable	Valuable	Somewt valuable	Not Valuable	Total
14-15	20%	40%	12%	16%	12%	100%
15-16						
16-17						
17-18						
18-19						
19-20						
<b>14-15</b>	<b>20%</b>	<b>40%</b>	<b>12%</b>	<b>16%</b>	<b>12%</b>	<b>100%</b>
	5	10	3	4	3	25

**Q8a. Plans after graduation: Attend grad school**

Year	Yes	No	Total
14-15	17%	83%	100%
15-16			
16-17			
17-18			
18-19			
19-20			
<b>14-15</b>	<b>17%</b>	<b>83%</b>	<b>100%</b>
	<b>4</b>	<b>20</b>	<b>24</b>

**Q8b. Plans after graduation: Begin working**

Semester	Yes	No	Total
<b>02-03</b>	<b>88%</b>	<b>12%</b>	<b>100%</b>
<b>03-04</b>			
<b>04-05</b>			
<b>05-06</b>			
<b>06-07</b>			
<b>07-08</b>			
<b>08-09</b>	<b>88%</b>	<b>12%</b>	<b>100%</b>
	<b>22</b>	<b>3</b>	<b>25</b>

**Q9. Number of job offers received**

Year	None	1	2	3	4+	Total
14-15	24%	43%	14%	10%	10%	100%
15-16						
16-17						
17-18						
18-19						
19-20						
<b>14-15</b>	<b>24%</b>	<b>43%</b>	<b>14%</b>	<b>10%</b>	<b>10%</b>	<b>100%</b>
	<b>5</b>	<b>9</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>21</b>

**Q10a. Likely to accept current job offer**

Year	Yes	No	Total
14-15	57%	43%	100%
15-16			
16-17			
17-18			
18-19			
19-20			
<b>14-15</b>	<b>57%</b>	<b>43%</b>	<b>100%</b>
	<b>12</b>	<b>9</b>	<b>21</b>

**Q10b. Current job offer: Starting salary**

Year	<\$30K	\$30-40K	\$41-50K	\$51-60K	\$61-70K	\$71K+	Total
14-15	0%	0%	0%	58%	42%	0%	100%
15-16							
16-17							
17-18							
18-19							
19-20							
<b>14-15</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>58%</b>	<b>42%</b>	<b>0%</b>	<b>100%</b>
	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>5</b>	<b>0</b>	<b>12</b>

**Q11. Interview at career planning office helpful**

Year	Didn't use	Very helpful	Helpful	Somewt helpful	Not helpful	Total
14-15	63%	11%	11%	16%	0%	100%
15-16						
16-17						
17-18						
18-19						
19-20						
<b>14-15</b>	<b>63%</b>	<b>11%</b>	<b>11%</b>	<b>16%</b>	<b>0%</b>	<b>100%</b>
	<b>12</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>19</b>

Q12. How did you find your job?

Year	Career Planning	Faculty referral	On-line posting	Mailed resume	Personal connect	Other	Total
14-15	28%	11%	22%	6%	22%	11%	100%
15-16							
16-17							
17-18							
18-19							
19-20							
14-15	28%	11%	22%	6%	22%	11%	100%
	5	2	4	1	4	2	18

Q13. Took a comprehensive exam

Year	No	Yes, and passed	Yes, and didn't pass	Yes, waiting for results	Total
14-15	21%	58%	8%	13%	100%
15-16					
16-17					
17-18					
18-19					
19-20					
14-15	21%	58%	8%	13%	100%
	5	14	2	3	24

Q14a. Took a review course prior to exam

Year	Yes	No	Total
14-15	42%	58%	100%
15-16			
16-17			
17-18			
18-19			
19-20			
14-15	42%	58%	100%
	10	14	24

Q14b. Value of the review course

Year	Very valuable	Somewt valuable	Valuable	Not Valuable	Total
14-15	30%	10%	40%	20%	100%
15-16					
16-17					
17-18					
18-19					
19-20					
14-15	30%	10%	40%	20%	100%
	3	1	4	2	10

**Q46. How often met with University Advising Office**

Year	>1 each semester	1 each semester	1 each year	<1 each year	Never	Total
14-15	0%	12%	32%	24%	32%	100%
15-16						
16-17						
17-18						
18-19						
19-20						
14-15	0%	12%	32%	24%	32%	100%
	0	3	8	6	8	25

**Q47. How often met with major advisor**

Year	>1 each semester	1 each semester	1 each year	<1 each year	Never	Total
14-15	60%	20%	16%	4%	0%	100%
15-16						
16-17						
17-18						
18-19						
19-20						
14-15	60%	20%	16%	4%	0%	100%
	15	5	4	1	0	25

**Q48. Quality of educational experience varied over time at Chico State**

Year	Improved Signif't	Improved Somew't	Fairly Constant	Declined Somew't	Declined Signif't	Total
14-15	24%	40%	24%	12%	0%	100%
15-16						
16-17						
17-18						
18-19						
19-20						
14-15	24%	40%	24%	12%	0%	100%
	6	10	6	3	0	25

TABLE A.2 SATISFACTION AND PROGRAM OUTCOMES (CIVL MAJORS ONLY)

<b>Educational Satisfaction for CE</b>	AY14-15	AY15-16	AY16-17	AY17-18	AY18-19	AY19-20	AY14-15	
Scale: 1=Very Dissatisfied; 5=Very Satisfied	Mean							
Q15. Quality of teaching by faculty in department	3.88						3.88	25
Q16. Quality of teaching by other faculty	3.28						3.28	25
Q17. Access to faculty in your department	4.00						4.00	24
Q18. Availability of courses in your department	3.40						3.40	25
Q19. Quality of courses in your department	3.67						3.67	24
Q20. Access to laboratory facilities and equipment	3.68						3.68	25
Q21. Quality of laboratories and equipment	3.12						3.12	25
Q22. Access to computer facilities	3.68						3.68	25
Q23. Quality of computer facilities	3.32						3.32	25
Q24. Academic advising from your major advisor	4.24						4.24	25
Q25. Academic advising from Univ. Advising Office	3.44						3.44	25
Q26. Career information from your department	3.40						3.40	25
Q27. Availability of GE courses	3.72						3.72	25
Q28. Quality of GE courses	3.00						3.00	25
Q29. Overall quality of your education	3.76						3.76	25
Q30. Overall experience at Chico State	4.08						4.08	25

<b>Program Outcome Trends for CE</b>	AY14-15	AY15-16	AY16-17	AY17-18	AY18-19	AY19-20	AY14-15	
Scale: 1=Very Unprepared, 5=Very Prepared	Mean							
Q31. Apply knowledge to solve problems	4.16						4.16	25
Q32. Design and execute test procedures	3.48						3.48	25
Q33. Analyze, access, interpret data from test procedures	4.12						4.12	25
Q34. Design component or system to meet needs	3.52						3.52	25
Q35. Function in multidisciplinary team	4.44						4.44	25
Q36. Identify, formulate, solve technical problems	4.04						4.04	25
Q37. Communicate technical matters in writing	4.00						4.00	25
Q38. Communicate technical matters orally	3.96						3.96	25
Q39. Understand, apply professional & ethical principles	4.36						4.36	25
Q40. Understand contemporary issues facing society	3.88						3.88	25
Q41. Use modern tools and technology	3.84						3.84	25
Q42. Appreciate impact solutions on society & environ.	4.04						4.04	25
Q43. Continue learning	4.28						4.28	25

<b>Other</b>	AY14-15	AY15-16	AY16-17	AY17-18	AY18-19	AY19-20	AY14-15	
	Mean							
Scale: 1=Strongly disagree; 5=Strongly agree								
Q44. Recommend major program at Chico State to others	4.36						4.36	25
Scale: 1=Very Dissatisfied; 5=Very Satisfied								
Q45. Satisfaction with department support	3.68						3.68	25

*Note: Current scores below 3.50 are highlighted.*

## APPENDIX B: Civil Engineering Alumni Survey, Spring 2015

TABLE B.1 GENERAL INFORMATION  
Total Respondents = 228

**1.2 The year you received the BSCE from CSU, Chico**

1991-1996	1997-2002	2003-2008	2009-2014	N
19.1%	19.9%	23.4%	37.6%	141

**1.3 Academic status upon entering CSU, Chico**

Freshman	CC transfer	4-year transf.	Post-bacc.	Other	N
33.2%	56.2%	8.8%	0.5%	1.4%	217

**1.5 Professional licensure attained (mark all that apply)**

FE/EIT	PE/CE	Other	N
48.7%	68.8%	13.4%	224

**1.9 Years in your current position**

0-3	4-6	7-9	10-12	>12	N
38.4%	18.9%	10.5%	7.4%	24.7%	190

**1.10 Current annual income**

<\$41K	\$41-60K	\$61-80K	\$81-100K	>\$100K	N
5.7%	9.4%	16.7%	22.4%	45.8%	192

**1.11 Nature of employment**

Gov't	Industry	Consulting	Education	Other	N
33.2%	17.6%	37.3%	1.6%	10.4%	193

**1.13 Have you completed additional education and/or training (mark all that apply)?**

Conferences	Workshops	Short Crs.	Grad. Studies	Other	N
58.0%	59.8%	48.7%	22.3%	9.8%	224

**1.14 How many professionally-related educational opportunities do you seek annually?**

None	1-2	3-4	5-6	>6	N
25.0%	41.8%	24.5%	3.6%	5.1%	196

**1.15 Please indicate how many professional and/or community groups you currently participate in?**

None	1-2	3-4	5-6	>6	N
30.2%	53.2%	14.6%	1.0%	1.0%	205

**1.16 How often do you present information to professional audiences?**

Daily	Weekly	Monthly	Annually	Seldom	N
5.4%	7.6%	23.4%	15.8%	47.8%	184

**TABLE B.2 LEVEL OF PREPARATION BY SUBJECT AREA  
AND BY PROGRAM EDUCATIONAL OBJECTIVE**  
Total Respondents = 141

**Level of Preparation by Year of Graduation**

Scale: 1=Very Unprepared; 5=Very Prepared

<b>Program Subject Areas Practiced</b>	<b>Range</b>				<b>N</b>
	<b>1991-1996</b>	<b>1997-2002</b>	<b>2003-2008</b>	<b>2009-2014</b>	
Land Surveying	4.27	3.78	4.00	3.83	101
Land Development	3.22	2.94	3.59	3.06	94
Construction	3.30	3.04	3.17	3.12	118
Structures	4.00	3.71	4.00	3.90	113
Geotechnical	3.83	3.76	4.14	3.60	114
Transportation	3.73	4.05	3.74	3.69	106
Environmental	3.77	3.85	3.50	3.51	105
Water Resources	3.86	4.05	3.65	3.71	105
Management	3.05	2.74	3.07	2.78	120
Education	3.47	4.00	3.96	3.64	103
Comprehensive Design	3.73	3.48	3.72	3.44	115
Other Engr. Related	3.81	3.67	3.80	3.65	110
Non-Engr. Related	3.79	3.74	3.69	3.50	108

<b>Program Educational Objectives</b>	<b>Range</b>				<b>N</b>
	<b>1991-1996</b>	<b>1997-2002</b>	<b>2003-2008</b>	<b>2009-2014</b>	
<i>BSCE graduates will be:</i>					
Effective Engineers	4.17	4.32	4.18	4.28	135
Effective Problem Solvers	4.33	4.25	4.27	4.45	134
Educated in Engineering Sciences	4.04	4.28	4.30	4.30	134
Able to Utilize Tools/Techniques	4.21	4.12	4.27	4.26	135
Familiar with Regulatory/Professional Issues	3.40	3.54	3.39	3.51	135
Effective Technical Writers	3.48	3.75	3.88	3.72	135
Effective Oral Communicators	3.42	3.76	3.78	3.72	134
Able to Function in Multi-Disc. Teams	4.20	4.09	4.18	4.11	134
Able to Appreciate Good Citiz./Service/Ethical Conduct	3.88	4.08	4.03	4.04	135
Aware of Impact of Designs on Humankind/Environ.	3.84	3.87	3.88	3.64	134

*Note: Scores below 3.50 are highlighted.*

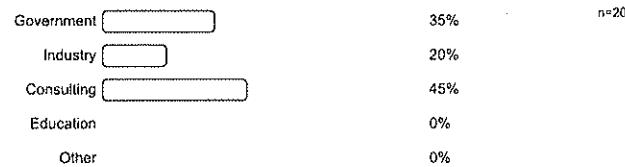
**TABLE B.3 RECURRING WRITTEN SUGGESTIONS FOR BSCE IMPROVEMENTS**  
Total Respondents = 228

- More emphasis on oral and written communication.
- More emphasis on land development, business, project management, regulations and codes, contracts and specifications, safety and liability, cost estimating.
- Greater emphasis on environmental science, storm-water quality, and sustainable solutions.
- Need comprehensive projects based on real world problems.
- More emphasis on construction engineering, construction management, construction estimating, and construction drawings.
- More integration of computer applications, particularly AutoCAD.
- More internship opportunities.

**APPENDIX C: Civil Engineering Employer Survey, Spring 2015**  
 Total Respondents = 21

**TABLE C.1 GENERAL INFORMATION**

<sup>1.2)</sup> Nature of employment



<sup>1.4)</sup> Years in your current position



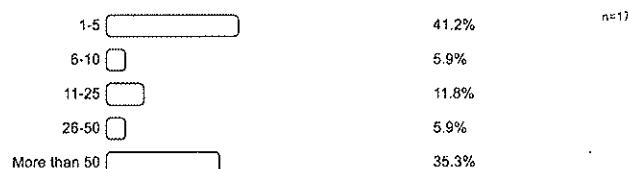
<sup>1.6)</sup> Are you an engineer?



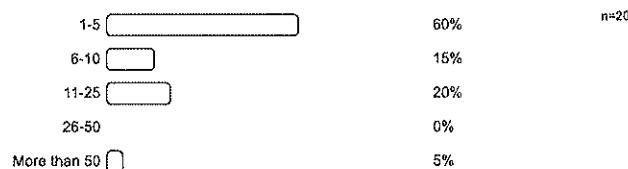
<sup>1.8)</sup> Are you a CSU, Chico CE graduate?



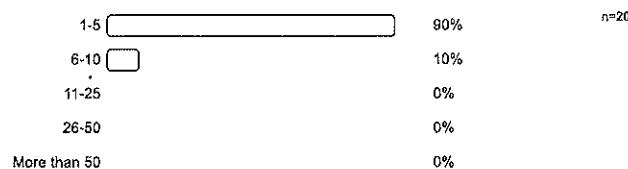
<sup>1.7)</sup> Approximate number of all CE graduates employed at your organization



<sup>1.8)</sup> Approximate number of all CE graduates you supervise



<sup>1.9)</sup> Approximate number of CSUC CE graduates you supervise



1.10) Does your organization have a rotation or other type of training program for new CE graduates?

Yes	[redacted]	57.1%	n=21
No	[redacted]	42.9%	

1.11) Does your organization provide support for continuing education of employees (including graduate studies)?

Yes	[redacted]	81%	n=21
No	[redacted]	19%	

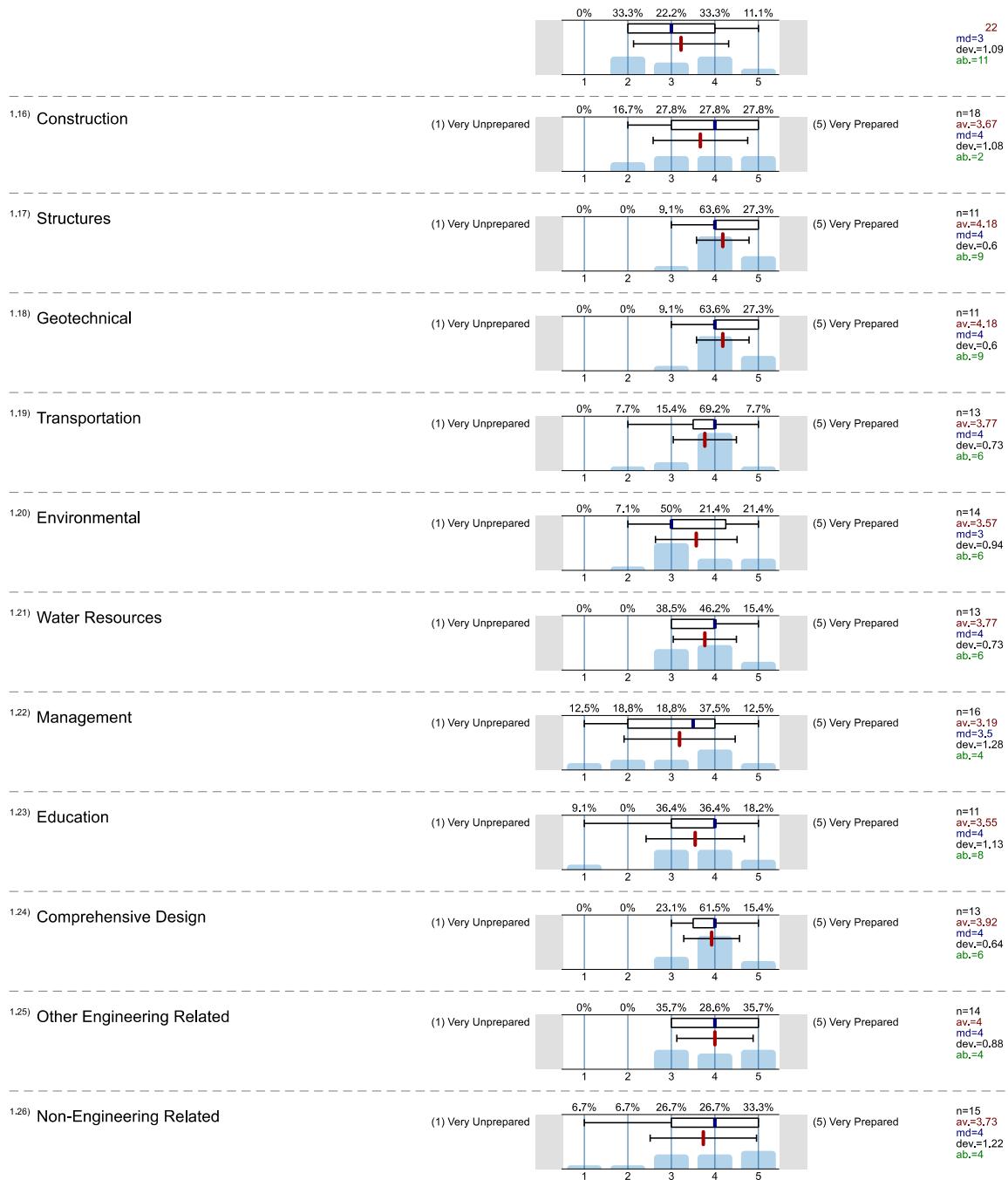
1.12) Does your organization encourage employees to seek professional licensure?

No	[redacted]	10.5%	n=10
Yes, it is encouraged	[redacted]	26.3%	
Yes, it is strongly encouraged	[redacted]	47.4%	
Yes, it is expected	[redacted]	15.8%	

1.13) Does your organization have a matching gift program for charitable donations by employees?

Yes	[redacted]	19%	n=21
No	[redacted]	81%	

TABLE C.2 LEVEL OF PREPARATION DEMONSTRATED BY GRADUATES



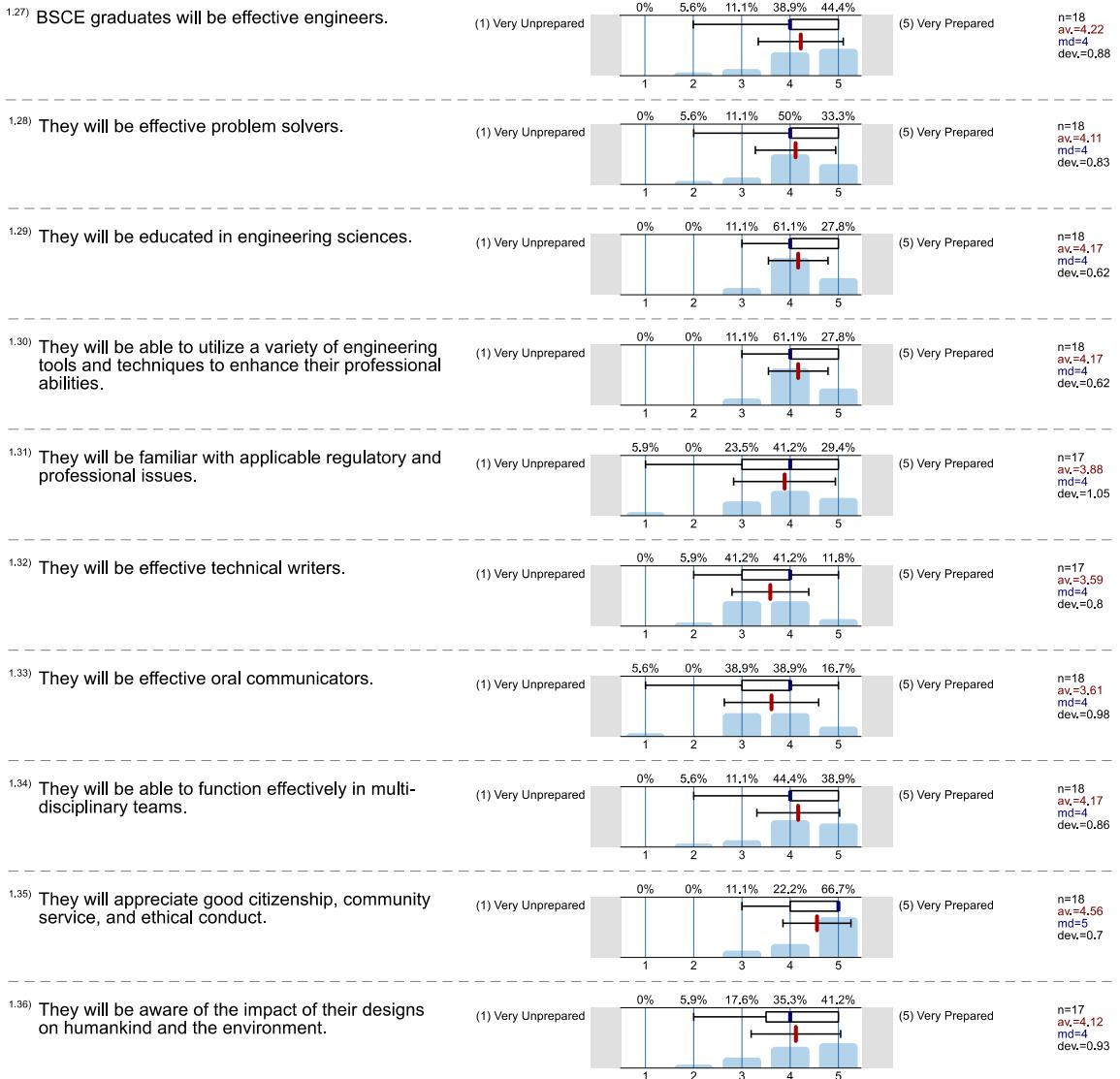


TABLE C.3 WRITTEN SUGGESTIONS FOR BSCE IMPROVEMENTS

- Provide more instruction on the environmental permitting process through State and Federal agencies, including CEQA and NEPA.
- More emphasis of project management, construction management, bridge design, and hot-mix asphalt.
- Additional “real-life” applications, including comprehensive projects from start to finish.
- Increased emphasis on creativity, including developing ideas and interacting in a team environment.
- Develop stronger understanding of CAD programs (CIVL 3D) and the effective use of CAD in design.
- Instill in graduates a practical sense for the reasonableness of their solutions and designs.
- Consider more course emphasis of leadership and communication.
- Consider a new program objective: graduates will be able to balance competing interests to reach a best solution for all stakeholders.
- Emphasize strong writing skills – technical and non-technical.