Program Self-Study Report
For the Degree of Bachelors of Science and
Masters Degree in

Civil and Environmental Engineering

Submitted by:

College of Engineering
San Jose State University
One Washington Square
San Jose, CA 95192

To

The Program Planning Review Committee
San Jose State University,
San Jose, CA 95192

November 17, 2006
Organization of the Self-Study Report for Civil and Environmental Engineering

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A. EXECUTIVE SUMMARY

A.1 Degree Titles

The Department of Civil and Environmental Engineering offers two degrees:

Bachelor of Science of Civil Engineering
Masters of Science of Civil Engineering

A.2 Contact Information

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A.3 Program Planning Review Summary

The Department of Civil and Environmental Engineering conducts systematic assessment of programs at both the undergraduate and graduate level. Assessment of the undergraduate and graduate programs is done every semester. Recent growth in student enrollments has allowed for offering all required undergraduate courses, supplemented with both additional undergraduate electives and graduate electives to allow students a wider choice of courses each term. Based on projected future growth, faculty recruitment is currently underway to hire two new full-time tenure-track faculty members to replace one faculty member who recently left the department and another who is to retire soon.

The undergraduate program’s assessment process is aligned with the requirements of the Accreditation Board of Engineering and Technology (ABET), the service that provides accreditation for the department. The department faculty members have defined a total of seven Program Educational Objectives. The ABET criteria defines thirteen outcomes that have been adjusted by the department to develop the Program Educational Outcomes. Data on all outcomes is collected each semester and two outcomes are discussed in a faculty retreat held on the day after the last day of classes each semester. Changes to program requirements, prerequisite requirements, and class content have been implemented as a result of this process.

The graduate program’s assessment process is aligned with the goals of the department. The department faculty members have defined a total of four Program Educational Objectives and five Program Educational Outcomes. Two graduate courses are evaluated each semester by a review of the course content and goals, a survey of students, and a review by an external content expert. The department Chair reports the results of the assessment to the department faculty each semester.

A.4 Program Planning and Strategies Summary

The primary goal of the department is to strengthen and enhance the undergraduate and graduate programs. Objectives identified by the department Chair and full-time faculty include: 1) continuous review of Program Educational Objectives and Outcomes, 2) continuous review of the program curriculum and faculty workload, 3) hiring and retaining three new full-time faculty members, 4) upgrade of laboratory equipment, and 5) hiring a new half-time technician.
This goal and set of objectives were established in Fall 2006 during discussion held by the full-time faculty members of the department. The resources to fund the work required to achieve these objectives is expected to come from three different sources during the next five years: $935,000 from the annual university allocation, $150,000 from outside funding raised by the department, and $635,000 from college or university support beyond the annual allocation. The justification for this investment is based on expected growth in student enrollment, approved by the full-time department faculty members after review of student enrollments over the last 15 years.
B. PROGRAM PLANNING REVIEW REPORT

B.1 Last Program Planning Review

B.1.1 Changes since the Last Program Planning Review

The initiation of a formal review process of the graduate program is the primary change since the last program planning review. The Chair and Graduate Coordinator developed an assessment process that reviews one graduate course in each of two of the six divisions each semester. Data collected from those two courses is reviewed and compiled into a report distributed to the department faculty members. Based upon the report, a discussion of possible changes to the graduate program is held.

The second major change has just been initiated in the form of the active search for two full-time tenure-track faculty members at the Assistant Professor level. One position will fill the vacancy in geotechnical engineering that has been open since 2001. The other position will replace the current professor in water resources who will retire within two years. The search for both positions has been approved by the university.

B.2.1 Actions to Correct Previous Weaknesses

The prior university review identified certain weaknesses in the graduate program assessment process. This review was completed in 2005. The conclusions of the university review was that the process lacked a cohesive design and was not based upon collection and review of data. To address these concerns, the department established a formal assessment process in Fall 2005 and initiated the collection of data in the form of student surveys and external review of courses in a cyclic process reviewing a graduate course in two divisions each semester.

In September 2006, the department received the results of their accreditation review of the undergraduate program by ABET. This review identified four weaknesses that need to be addressed in the near future: 1) a lack of formal review procedures for the Program Educational Objectives, 2) a lack of data-driven review and enhancement of Program Educational Outcomes, 3) a shortage of full-time faculty members in certain areas of instruction, and 4) a lack of evidence showing that students are meeting proficiency requirements. The department has begun to address these weaknesses in varying ways as discussed in Appendix B.

B.2 Program Planning Overview

B.2.1 Assessment Life-Cycle Processes

The undergraduate assessment process is based on a cyclic review of the 13 Program Educational Outcomes developed by the department to address the desires of the accreditation agency (ABET). Outcomes related data is collected each term for all outcomes. Each semester two outcomes are reviewed during a faculty retreat. Recent changes to the program implemented as a result of this assessment include: alteration to the choice of undergraduate electives, enhancement of oral communication skills in the culminating design experience, the removal of Geology 101 as a potential science elective, and the addition of engineering graphics as a prerequisite for many of the upper division civil engineering courses. Program Educational Objectives are reviewed by the Department Advisory Council, periodic anonymous surveys of the alumni, and periodic alumni focus group discussions.

The graduate assessment process is based on a cyclic review of the six divisions in the program: environmental, water resources, construction, transportation, geotechnical and structural. Each semester, two of the divisions are chosen for review and the review consists of a systematic review of one graduate course being offered during the term. Students are surveyed related to the ability of the course to meet the course learning objectives and contribute to the achievement of Program Educational Outcomes. An external review is conducted by a content expert recruited from the local engineering community. The external reviewer reviews the course outline, the course content, observes the instructor’s teaching skills,
holds discussion with students in the course and completes a formal checklist as part of the reviewer’s report.

B.2.2 Assessment Life-Cycle Matrix

The undergraduate program is assessed on a cycle based upon the outcomes. Each semester two outcomes are selected for review by the department faculty. Data for all outcomes is collected every semester.

Assessment Cycle of Undergraduate Outcomes

<table>
<thead>
<tr>
<th>Term</th>
<th>Outcomes Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2006</td>
<td>5. Engineering Problem Solving</td>
</tr>
<tr>
<td></td>
<td>11. Use of Modern Tools</td>
</tr>
<tr>
<td>Spring 2007</td>
<td>8. Global Impact</td>
</tr>
<tr>
<td></td>
<td>12. Proficiency in Divisions of Civil Engineering</td>
</tr>
<tr>
<td>Fall 2007</td>
<td>2. Experimental Testing Skills</td>
</tr>
<tr>
<td></td>
<td>13. Professional Issues</td>
</tr>
<tr>
<td>Spring 2008</td>
<td>3. Design Skills</td>
</tr>
<tr>
<td></td>
<td>10. Contemporary Issues</td>
</tr>
<tr>
<td>Fall 2008</td>
<td>1. Fundamentals of Math and Science</td>
</tr>
<tr>
<td></td>
<td>7. Communication Skills</td>
</tr>
<tr>
<td>Spring 2009</td>
<td>4. Teamwork Skills</td>
</tr>
<tr>
<td></td>
<td>6. Ethics</td>
</tr>
</tbody>
</table>

The graduate program is assessed on a cycle based upon courses in different divisions. Each semester one course from each of two divisions is selected for review by the department faculty.

Assessment Cycle of Graduate Courses

<table>
<thead>
<tr>
<th>Term</th>
<th>Division Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2006</td>
<td>Environmental Engineering</td>
</tr>
<tr>
<td></td>
<td>Transportation Engineering</td>
</tr>
<tr>
<td>Spring 2007</td>
<td>Structural Engineering</td>
</tr>
<tr>
<td></td>
<td>Water Resources Engineering</td>
</tr>
<tr>
<td>Fall 2007</td>
<td>Construction Engineering</td>
</tr>
<tr>
<td></td>
<td>Geotechnical Engineering</td>
</tr>
<tr>
<td>Spring 2008</td>
<td>Environmental Engineering</td>
</tr>
<tr>
<td></td>
<td>Transportation Engineering</td>
</tr>
<tr>
<td>Fall 2008</td>
<td>Structural Engineering</td>
</tr>
<tr>
<td></td>
<td>Water Resources Engineering</td>
</tr>
<tr>
<td>Spring 2009</td>
<td>Construction Engineering</td>
</tr>
<tr>
<td></td>
<td>Geotechnical Engineering</td>
</tr>
</tbody>
</table>

B.3 Students

B.3.1 Student Enrollment for the Last Five Years and Projection

Data for the current and projected enrollments is provided in Tables B.1 through B.4. Past enrollments are provided as the census date enrollments for each term. Projections are based upon the departments intended enrollment as the number of total students enrolled in the department, the so-called ‘head-count’. Historically, enrollment in the department rises and falls in a cyclic form. Projections are made in good faith, but concern has been expressed by some department faculty members about the challenge of accurately predicting future enrollment trends.
1. Undergraduate Students

### Table B.1. Undergraduate Enrollment for the Past Five Years

<table>
<thead>
<tr>
<th>Term</th>
<th>F02</th>
<th>F03</th>
<th>F04</th>
<th>F05</th>
<th>F06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male Undergraduate Students</td>
<td>186</td>
<td>198</td>
<td>263</td>
<td>334</td>
<td></td>
</tr>
<tr>
<td>Female Undergraduate Students</td>
<td>58</td>
<td>57</td>
<td>63</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>Total Undergraduate FTES</td>
<td>128.8</td>
<td>157.7</td>
<td>198.2</td>
<td>187.5</td>
<td></td>
</tr>
</tbody>
</table>

The College undergraduate student population of 3133 majors in Fall 2004 was 40.4% Asian, 16.6% White, 10.9% Filipino, 3.9% Hispanic, 28.3% Mexican-American, 3.9% African-American, 0.9% Pacific Islander and 0.3% American Indian/Alaskan. The remaining 14.1% declined to state an ethnic identity. Women made up 16.6% of the undergraduate student population.

Between 1999 and 2004, incoming freshmen class average composite SAT scores rose from 1016 to 1061 while enrollment dropped from 503 to 322.

The average student age is about 26 years and the average student class-load is approximately 12 semester units. A majority of the upper division-engineering students work part-time. Nearly all undergraduate students enter San Jose State University from Bay Area high schools and community colleges, and many are commuting to the University.

The Civil and Environmental Engineering undergraduate student population of 325 majors in Fall 2004 was 24.3% Asian, 20.9% White, 12.6% Filipino, 6.2% Hispanic, 14.2% Mexican American, 4.0% African-American, and 1.2% Pacific Islander and 0.6% American Indian/Alaskan. The remaining 16.0% declined to state an ethnic identity. Women made up 19.4% of the undergraduate student population.

The department actively provides students with leadership opportunities through its support of six student-engineering societies [American Association of Cost Engineers International (AACE), Associated General Contractors (AGC), The American Society of Civil Engineers (ASCE), Chi Epsilon, The Institute of Transportation Engineers, and The Environmental Engineering Organization]. In addition, the College of Engineering supports the Water Environment Federation, The Society of Women Engineers, The Black Alliance of Scientists and Engineers, The Society of Latino Engineers and Scientists, and Tau Beta Pi, and students are encouraged to join these societies. Professors also take students with them to attend monthly meetings of professional societies [American Concrete Institute (ACI), Structural Engineers Association of Northern California, ASCE, AACE, American Waterworks Association, and the Project Management Institute]. Finally the department provides financial, technician, and technical support for students entering regional and national design competitions such as the ASCE concrete canoe, the ACI cube competition, the AISC steel bridge and the National Timber Bridge Design Competition.

### Table B.2. Projected Undergraduate Enrollment for the Next Five Years

<table>
<thead>
<tr>
<th>Term</th>
<th>F07</th>
<th>F08</th>
<th>F09</th>
<th>F10</th>
<th>F11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Undergraduate Students</td>
<td>468</td>
<td>474</td>
<td>489</td>
<td>498</td>
<td>496</td>
</tr>
</tbody>
</table>

2. Graduate Students

Historically, graduate students in the department are a mixture of working professional engineers who take one or two courses per term and full-time graduate students who take three or four courses per term. In addition, a handful of Open University students take classes. These students are usually engineers working in one of the fields of civil engineering and in need of additional technical skills, but not pursuing a graduate level degree. Very few students not majoring in civil engineering take courses in the department. Undergraduate students are not allowed to use graduate courses as part of their undergraduate degree.
Undergraduate students occasionally take graduate level courses before completing their undergraduate program based upon their desire to increase their technical skills for future career or educational goals.

### Table B.3. Graduate Enrollment for the Past Five Years

<table>
<thead>
<tr>
<th>Term</th>
<th>F02</th>
<th>F03</th>
<th>F04</th>
<th>F05</th>
<th>F06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male Graduate Students</td>
<td>61</td>
<td>79</td>
<td>77</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>Female Graduate Students</td>
<td>43</td>
<td>48</td>
<td>48</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Total Graduate FTES</td>
<td>34.5</td>
<td>36.8</td>
<td>36.9</td>
<td>34.8</td>
<td></td>
</tr>
</tbody>
</table>

### Table B.4. Projected Graduate Enrollment for the Next Five Years

<table>
<thead>
<tr>
<th>Term</th>
<th>F07</th>
<th>F08</th>
<th>F09</th>
<th>F10</th>
<th>F11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Graduate Students</td>
<td>92</td>
<td>101</td>
<td>96</td>
<td>94</td>
<td>99</td>
</tr>
</tbody>
</table>

### B.3.2 Student Sources

#### B.3.2.1 Direct Entry:

1. Undergraduate Students

Freshman enrollment in the department has steadily grown over the past several years, with a large surge in the current term:

<table>
<thead>
<tr>
<th>Civil and Environmental Engineering</th>
<th>College of Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>AY 2002-03 39 freshmen</td>
<td>476 freshmen</td>
</tr>
<tr>
<td>AY 2003-04 41 freshmen</td>
<td>313 freshmen</td>
</tr>
<tr>
<td>AY 2004-05 41 freshmen</td>
<td>331 freshmen</td>
</tr>
<tr>
<td>AY 2005-06 43 freshmen</td>
<td>285 freshmen</td>
</tr>
<tr>
<td>Fall 2006 67 freshmen</td>
<td>295 freshmen</td>
</tr>
</tbody>
</table>

#### B.3.2.2 Process for Acceptance of New Students

1. Undergraduate Students

Transfer students make up a significant share of the department’s undergraduate students. Therefore, procedures for handling transfer students are formalized and systematic. Upon entry, the transfer student meets with the Department Chair for an initial evaluation of academic progress and courses are selected for the first term. After matriculation, the transfer student is assigned to the undergraduate academic advisor and receives evaluation, advising and monitoring as a regular student. A transfer student must have course equivalencies completed and filed for all transfer courses before approval of the transfer student’s Major Form.

All students have the option of taking approximately half of their academic credits at other institutions of higher education and having them count toward their SJSU degree. The vast majority of these transfer courses are from California institutions and most are pre-approved by the Articulation Office of the university. Courses without pre-approved articulation are evaluated on an individual basis by the SJSU course coordinator from the department providing the course in question. Unique situations involving credit from universities outside the U.S. have an additional requirement that they be evaluated for an appropriate level of units by the university.
2. Graduate Students

Graduate students apply to the College of Graduate Studies and Research. By identifying their interest in civil and environmental engineering their application is forwarded to the department Graduate Coordinator who reviews the application and, based upon the student’s expressed interests, assigns the student to an academic advisor in the student’s area of interest.

Students without undergraduate degrees in civil engineering are enrolled under Conditional Classification and are required to complete specific undergraduate courses before graduation.

B.3.2.3 Internal Transfer Students

San Jose State University students who change major from some other program to civil and environmental engineering initially meet with the department Chair. Based upon their interest in the program they are assigned to the undergraduate advisor and continue with the same process as any other student in the program.

B.3.3 Program Orientation for New Students

1. Undergraduate Students

Undergraduate students are oriented to the program through various means according to their interest. All students originally meet with the department Chair for their initial advising session. If the student chooses, they may meet with the undergraduate advisor for information about procedural issues or any of the faculty members for information about specific content questions. Orientation is also available through the university orientation programs. Freshmen students receive an orientation to engineering via the Engineering 10 course, a required course for all undergraduate engineering majors.

2. Graduate Students

Graduate students are oriented to the program through various means according to their interest. If the student chooses, they may meet with the Graduate Advisor for information about procedural issues or any of the faculty members for information about specific content questions. Orientation is also available through the university orientation programs.

B.3.4 Advising

1. Undergraduate Students

Faculty members, through advising, monitor a student’s progress towards graduation.

A student entering the program is assigned a faculty advisor who advises the student, monitors academic progress, and ensures that the student follows the civil engineering required curriculum and makes satisfactory progress towards graduation. A student is required to see his/her advisor at least once a semester. Prior to 2004, all full-time faculty members in the Department served as advisors to undergraduate students. In 2004, the department implemented a new approach to advising by assigning one faculty member to advise all undergraduate students in return for receiving partial release time from teaching. The department chair usually advises new students.

Each semester, just before the start of pre-registration for the next semester, each student is required to see the undergraduate advisor during a two-week formal advising period. A registration “hold” is placed on a student’s record and is removed after the student has been advised and this allows the student to register. Moreover, a student is required to work with the advisor to develop an acceptable program of study and document it on a major form normally 15 months prior to graduation. This ensures that the student receives early advice on the selection of electives and a formal review of his/her progress toward the degree. The advisor and the Department Chair approve the major form and then forward it, along with an application
for graduation from the student, to the College of Engineering and the Enrollment Services. Enrollment Services checks the major form to ensure that the student has met all of the requirements for graduation. Materials used to assist students in developing their educational plans are available at the civil engineering web site (http://www.engr.sjsu.edu/civil/).

2. Graduate Students

Faculty members, through advising, monitor a student’s progress towards graduation.

A student entering the program is assigned a faculty advisor who advises the student, monitors academic progress, and ensures that the student follows the civil engineering required curriculum and makes satisfactory progress towards graduation. A student is required to see his/her advisor at least once a semester. The department chair usually advises new students.

Each semester, just before the start of pre-registration for the next semester, each student is required to see the advisor. A registration “hold” is placed on a student’s record and is removed after the student has been advised and this allows the student to register. Moreover, a student is required to work with the advisor to develop an acceptable program of study. This ensures that the student receives early advice on the selection of electives and a formal review of his/her progress toward the degree. The advisor and the Department Chair approve the major form and then forward it, along with an application for graduation from the student, to the College of Engineering and the Enrollment Services. Enrollment Services checks the major form to ensure that the student has met all of the requirements for graduation. Materials used to assist students in developing their educational plans are available at the civil engineering web site (http://www.engr.sjsu.edu/civil/).

B.3.5 Monitoring Student Performance

1. Undergraduate Students

Student performance is monitored at both the University and Department levels. A student is placed on probation by the Registrar Services Office when his/her cumulative grade point average (GPA) falls below 2.0 (“C”). The CEE Department notifies the academic advisor of which students are on probation to allow them to discuss the student’s academic situation with the student before they enroll in courses for the following semester. Students are disqualified from the major if their GPA falls below a 2.0 during the semester they are on probation.

Finally, to ensure that students have a good grasp of fundamental concepts that serve as the basis for more advanced design and analysis courses, students are required to earn a C- or better in key mathematics and communication courses (Engl 1A, Engl 1B, Engr 100W, oral communication, Math 30) and a C- or better in key civil engineering courses (CE 99, CE 112, CE 121, CE 140, CE 150, CE 160 and CE 170). Students who do not earn the required minimum grade repeat the course before taking to more advanced courses.

Evaluation of students occurs in three phases, entry, on going, and exit. At the time of entry, new freshman are evaluated by meeting the university admission requirements and are tested for both language and math proficiency. Transfer students are evaluated at the time of entry by meeting the university admission requirements.

While enrolled, continuing students are evaluated on their performance in individual courses by the course instructor. Grading of courses is independent between courses, however it is expected that successful mastery of one course enhance the student’s performance in subsequent courses. Overall academic performance in terms of grade point average is monitored by the university and a sequence of underperformance can lead to disqualification. Writing proficiency is evaluated after completion of lower level writing courses by the Writing Skills Test administered by the university and the mandatory passing of Engr 100W, the College of Engineering Technical writing course.
2. Graduate Students

Student performance is monitored at both the University and Department levels. A student is placed on probation by the Registrar Services Office when his/her cumulative grade point average (GPA) falls below 3.0 (“B”). The CEE Department notifies the academic advisor of which students are on probation to allow them to discuss the student’s academic situation with the student before they enroll in courses for the following semester. Students are disqualified from the major if their GPA falls below a 3.0 during the semester they are on probation.

Evaluation of students occurs in three phases, entry, on going, and exit. At the time of entry, new students are evaluated by meeting the university admission requirements. While enrolled, continuing students are evaluated on their performance in individual courses by the course instructor. Grading of courses is independent between courses, however it is expected that successful mastery of one course enhance the student’s performance in subsequent courses. Overall academic performance in terms of grade point average is monitored by the university and a sequence of underperformance can lead to disqualification. Writing proficiency is evaluated by completion of a writing course approved by the College of Graduate Studies.

B.3.6 Process to Ensure All Students Meet All Program Requirements

1. Undergraduate Students

Starting 15 months prior to graduation, the exit phase evaluation begins with the approval of the Major Form at the advisor, department, college and university levels. This evaluation indicates successful advancement to the degree and outlines the remaining academic requirements. Completion of all academic requirements is determined by the university before graduation. Following the last ABET visit, the College of Engineering inserted two extra steps into the graduation approval process, described as follows:

1) All engineering major forms must route through the Dean’s office. Dean’s office’s staff verifies the accuracy and completeness of the forms before forwarding them to the Records Office and provides one final check that all of the graduation requirements have been completed by the students.

2) A graduation check is performed by the Registrar Services Office after the grades are posted at the end of the expected graduation semester. After the Registrar Services Office verifies graduation eligibility, a final clearance check is requested of the department. This final clearance check by the major department essentially eliminates any possibility for miscommunication between the major department and the Records Office.

Since the 1999 ABET visit, the following management information system changes took place that facilitate increased accountability and compliance with course, curricula and graduation requirements:

- In 2003, the university was converted to a PeopleSoft based databases program. Beginning Spring 2005, this system makes a degree audit function available to students and their advisor. This degree audit report tracks students’ progress toward meeting their graduation requirement. At this point, this function is used only for academic advising purposes.

- Starting Fall 2004, a real-time prerequisite check was implemented in most upper division engineering classes. This system blocks attempts to register into a course without the proper prerequisite(s).
2. Graduate Students

After completing at least three courses that can be used toward meeting their graduate degree a student can apply for candidacy. The Graduate Candidacy Form is completed by the student showing courses that have been completed, currently being taken, and those intended for future semester to meet all requirements of the graduate degree. The form is reviewed and approved by the student’s academic advisor, reviewed and approved by the department’s Graduate Advisor, and forwarded to the College of Graduate Studies for final approval. After completing the intended courses successfully and successfully completing a culminating experience, the student is approved for graduation. The culminating experience may be an exam, a successful CE298 individual study project with oral presentation, or a six-credit university thesis. Prior to Fall 2006, the culminating experience could be either a written or oral exam according to the full-time faculty member in each of the six department’s divisions. During Fall 2006, the faculty approved a common format for written exams and removed the option for oral examination.

B.4 Program Educational Objectives

B.4.1 Constituencies

The Civil and Environmental Engineering department has defined the following constituencies:
1. Civil Engineering Students
2. Civil Engineering Employers
3. Civil and Environmental Engineering Faculty
4. Engineering programs for which the Civil Engineering Program provides service courses
5. Graduate Schools that Admit SJSU B.S.C.E. graduates
6. Civil Engineering Alumni

B.4.2 Program Mission

The Department mission is defined in the following way:

To serve society, the public sector, and private industry by

- providing undergraduate and graduate civil engineering education that prepares students to apply engineering knowledge to the diverse issues of resources, infrastructure and the built environment;
- contributing to the development and codification of knowledge through faculty scholarship, and;
- meeting the needs of working professionals for continuing education.

The civil engineering curriculum is designed to reflect this mission. The undergraduate program was designed to provide students with a broad understanding of basic civil engineering concepts. This provides them with the knowledge required to focus on a particular specialty upon graduation either in the work environment or through attending graduate school. The coursework includes extensive laboratory experiences and many opportunities for students to complete applied projects and designs.
B.4.3 Program Educational Objectives

1. Undergraduate Program

The department approved the following Program Educational Objectives in May 2005:

The Program educational objectives are to prepare students to advance in their careers by providing them with knowledge to:

1. Carry out entry-level civil engineering practice
2. Continue graduate studies in civil engineering
3. Apply their acquired engineering knowledge to solve practical problems
4. Develop solutions that account for economic, environmental, ethical and societal considerations
5. Incorporate ethical and professional standards in making their decisions
6. Communicate effectively
7. Continue life-long learning

The department’s Program Educational Objectives are published in the university bulletin, the department website, and brochures that are available in the department office.

2. Graduate Program

The Masters of Science programs in Civil Engineering are intended to develop the high degree of professional competency and specialization required for the treatment of current engineering problems.

1. Prepare students for their professional careers and licensure by strengthening their knowledge in their specialization (depth) and extending their skills and knowledge base (breadth).
2. Provide students advanced proficiencies for professional practice to enable them to advance in the licensing process ad equip them for advancement in their career.
3. Improve students’ research skills and prepare them for further graduate study.
4. Provide students with experience and skills for multi-disciplinary and cross-CE disciplinary practice.

B.4.4 Program Outcomes

1. Undergraduate Program

The outcomes have been defined for the civil engineering program. These outcomes are the same as those defined in ABET 2000 Criterion 3, modified to include outcomes required by the program specific criteria as defined by the American Society of Civil Engineers. As of April 8, 2005, the program’s outcomes are:

1. Graduates have proficiency in and an ability to apply knowledge of engineering, mathematics through differential equations, probability and statistics, science including calculus-based physics and chemistry, and general engineering.
2. Graduates have an ability to design and conduct experiments, as well as to analyze and interpret data in more than one civil engineering area.
3. Graduates have an ability to design a civil engineering system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. Graduates have an ability to function on multi-disciplinary teams.
5. Graduates have an ability to identify, formulate, and solve engineering problems.
6. Graduates have an understanding of professional and ethical responsibility.
7. Graduates have an ability to communicate effectively.
8. Graduates have the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.
9. Graduates have a recognition of the need for, and an ability to engage in life-long learning.
10. Graduates have a knowledge of contemporary issues.
11. Graduates have an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
12. Graduates have proficiency in a minimum of four recognized major civil engineering areas.
13. Graduates have an understanding of civil engineering professional issues.

2. Graduate Program

Outcomes for the graduate program in Civil and Environmental Engineering are:
1. Students will be able to apply advanced theory and analysis for problem solving.
2. Students will be able to apply modern tools in doing computations, simulations, analysis, and design.
3. Students will be able to synthesize and integrate information in the engineering process.
4. Students will be able to work collaboratively.
5. Students will be able to communicate effectively.

B.4.5 Assessment of Program Objectives

Evaluation of achievement of educational objectives requires both a process, and the data to be evaluated in the process. The process is defined as including assessment (“How well are the objectives being achieved?”) and evaluation (“What changes need to be made to enhance achievement of the objectives?”) to produce enhancement (carrying out the requisite changes leading to increased achievement of the objectives), which is the overall goal. The data used by the department to monitor program objectives is from the alumni survey and alumni focus groups.

To achieve the educational objectives, the curriculum stresses problem solving and design skills. Students take a core course in each of five areas to provide breadth: environmental (CE 170), geotechnical (CE 140), structures (CE 160), transportation (CE 121), and water resources engineering (CE 150). In each of these courses, the students learn fundamental theories and apply these theories to design exercises. Students also take four technical electives that allow them to explore one civil engineering area in depth, or to take advanced courses in multiple civil engineering areas. Students intending to attend graduate school, often choose to explore one area in depth. Some of the technical electives require a significant design project.

While many of the engineering courses require oral presentations, and/or written reports, three upper division courses have been identified as having extensive communication components to ensure that students are given opportunities to practice their communication skills (Engr 100W, CE 105, and CE 162). Professional and ethical issues are discussed in many courses, but specific curricular units on these topics are provided in both the Civil Engineering Law and Scheduling course (CE 131) and the Professional Design course (CE 105).

The College of Engineering (COE) Curriculum Task Force worked from December 1994 to June 1996 to evaluate the curriculum of all programs in the COE. During this process, input was solicited from industry, alumni, students and all faculty members in the COE related to student preparation and performance, industry needs, student perceptions, student retention, professional licensing, general education and engineering accreditation criteria. Using this input, and a review of the educational objectives of other institutions as a basis, a draft set of educational objectives and outcomes was developed by the CEE faculty during the fall semester of 1997. These educational objectives were reviewed and approved by all the departments in the COE, the Dean, and members of the Department Advisory Board.

The department faculty members reviewed the Program Educational Objectives starting in May 2004. This review was in response to clarification from ABET about the time frame for which the objectives are directed. The review included an evaluation of the objectives and potential sources of data to evaluate each objective. This review resulted in adjustment of wording of the previous objectives but not the scope or intent. The Program Educational Objectives went thorough a more thorough analysis and review in November 2004 through January 2005 after discussion with the Associate Dean of Engineering. After a discussion by department faculty members and the Department Advisory Council a new set of objectives
were written and approved. After additional discussions by the department faculty members, the Associate Dean and the Department Advisory Council in May of 2005, the wording was adjusted for the Program Educational Objectives and the current set, as stated in Section B.2.1, were approved:

Program Educational Objectives are published in the University Bulletin and department website.

B.4.5.1 Department Advisory Committee (DAC) Evaluations

The DAC meets at least once a semester to provide feedback on the Program Educational Objectives at both the undergraduate and graduate level. This feedback is in the form of a discussion between the members of the DAC, the department Chair, and any department faculty that attend the DAC meeting.

B.4.5.2 Alumni Assessment

Alumni are surveyed approximately every three years in an anonymous survey sent to approximately 100 recent graduates. The results are tabulated and distributed to the faculty members. A new form of data collection has been identified in the use of alumni focus groups to allow for a richer discussion about key aspects of the program.

B.4.5.3 Employers

Data from employers of graduates is not collected in any formal means due to the variety of career paths that graduates may choose. Information from employers is obtained through various means: discussions with recruiters at Job Fairs, alumni surveys, surveys of supervisors of the undergraduate internship program, and discussions between faculty and industry contacts.

B.5 Program Outcomes and Assessment.

B.5.1 Curriculum and Professional Component

B.5.1.1 Undergraduate Program

1. Curriculum Content

In addition to the professional component criteria as specified by ABET in Engineering Criteria 2000, the American Society of Civil Engineers has developed Program Criteria for Civil and Similarly Named Engineering Programs that also contains the following criteria related to curriculum content:

- Proficiency in mathematics through differential equations, probability and statistics, calculus-based physics, and general chemistry
- A demonstration of proficiency in a minimum of four recognized major civil engineering areas
- Demonstration of an ability to conduct laboratory experiments and to critically analyze and interpret data in more than one of the recognized major civil engineering areas
- Demonstration of an understanding of professional practice issues
- Demonstration of the ability to perform civil engineering design by means of design experiences integrated throughout the professional component of the curriculum

The Department and College Curriculum Committees, the Curriculum Task Force, the Physics Task Force, the Calculus Task Force, the Chemistry Task Force, the Department Advisory Committee and the CEE Department faculty have all participated in reviewing the curriculum for relevance, adherence to program educational objectives, and fulfillment of the professional component as specified by ABET. These groups are responsible for ensuring that the curriculum in the program devotes adequate time and attention to each component of the program and that it is consistent with the objectives of the program and the institution.
In order to prepare students to work in any of the divisions of civil engineering, all students are required to take courses in each of the six division areas – structures (CE 160, CE 162), soil mechanics (CE 140), water resources (CE 150), transportation (CE 121), environmental (CE 170), and construction (CE 130, CE 131). Once students have completed these courses, they may then choose to concentrate their studies into a specific area by selecting electives from that particular area, or they may continue to pursue a broad perspective by taking courses in different areas to provide more depth to their program.

Contemporary issues are discussed in many of the courses in the CEE program and students also attend seminars presented by professional societies and student organizations. In addition to course materials, two presentations are organized for CE105 each semester that address graduate educational opportunities, resume writing, career issues, or professional licensing. Students are required to attend these panel lectures to receive credit for CE105.

The program provides many opportunities for students to use computers. In addition to the College of Engineering computer labs, the department has a computer lab for use by only civil engineering students. Students learn to use operating systems, the internet, electronic measurement and data acquisition equipment, spreadsheets, word processing software, presentation software, AutoCAD, simulation programs, and computational analysis and design software. Most of the courses in the program require students to use computers in problem solving and for their assignments.

2. Preparation for Engineering Practice

Design activities are integrated into courses throughout the program curriculum. Design projects are first introduced in preliminary forms in introductory courses and these concepts are continually built upon throughout the curriculum, culminating in major complex projects in advanced courses. For example, in Engr 10 students participate in three (3) comprehensive design projects. In each of these projects, they work in teams to design a product (system, component, or process) that meets a set of constraints (specifications). They present their results in written as well as in oral reports. In at least one of these projects, students have to build the product and test it to verify its performance. Examples of such projects include (a) the design and manufacture (using limited materials) of a cup to keep coffee hot for as long as possible, and (b) the design of a rubber-band powered airplane for maximum range and endurance. In CE 112, Mechanics of Materials, students are introduced to design fundamentals such as safety factors, and strength and serviceability criteria. Problems include the sizing and selection of beams and the design of bolt spacing. In CE 160, Structural Mechanics, students use the International Building Code to develop loads and load combinations for a truss and small frame. They analyze structures and develop preliminary sizes for design. During the senior year of the program, in CE 162, student teams are required to complete a design of a multi-story concrete building. This project includes structural design and detailing of a concrete structure utilizing the ACI and IBC or UBC codes of practice. Students complete additional design exercises in CE 121, CE 140, CE 150 and CE 170, and major designs in elective courses and internships providing students with the knowledge to design complex systems, components, and processes in several sub-discipline areas. Not only are students taught how to analyze specific problems, but they also learn how to synthesize appropriate data into a systematic approach for determining design solutions.

In the Spring of 2004, the faculty reviewed the requirement for all undergraduates to take a combination of electives that would provide a certain level of design skill. The understanding was that enforcement of the requirement was being applied inconsistently. As such, the faculty agreed to remove the requirement and allow students to take a selection of electives on their own choice. In Fall 2004, the faculty approved that starting in Fall 2005, graduates must have taken two electives from a defined list of electives that contain substantial design content (CE 123, CE 133, CE 141, CE 154, CE 163, CE 164, and CE 176).

Also in Fall 2004, the department reviewed required courses for their design content. The faculty coordinators prepared a self-review of the design content in the undergraduate courses. Courses were reviewed for the design skills they required students to use: design of components, design of systems, open-ended design problems or closed form designs. In addition, the coordinator provided an estimate of the percentage of the course that related to design skill.
ABET’s Criterion 4 explicitly requests that the program culminate in a major design experience. In the CEE program that is the Structural Concrete Design course, a three-credit required course usually taken in one of the last two semesters of the undergraduate program. The course has a long line of prerequisites (Math 30, Physics 50, CE99, CE112, CE160) providing students with a gradual increase in technical knowledge and design skill before the course. The course uses the American Concrete Institute’s current design standards as the basis of all course work. Students complete a team design project where they design a low-rise concrete building. The project contains a wide variety of constraint types including:

- Economic – design is to use a minimum amount of concrete and reinforcing steel to reduce cost.
- Manufacturability – columns must not contain more than 8% reinforcing steel to reduce potential joint congestion. Additionally all concrete must be of a uniform strength to allow for economies of scale on producing a concrete mix.

3. Societal Need

Civil engineers address physical infrastructure needs of society. Fulfilling one of the basic human needs, for shelter, civil engineers have been involved with the design and construction of infrastructure since the dawn of civilization. The built environment of structure, water supply and distribution, transportation systems and sewage treatment facilities have been developed over centuries of civil engineering achievement. In the local community, graduates of the undergraduate civil engineering program have found jobs with local engineering companies, municipal agencies, local utilities, and both large-scale multinational general contractors and local construction management firms.

The need for civil engineers and infrastructure has been identified by the state government as evidenced by the number of infrastructure bond measures in the November 2006 election.

B.5.1.2 Graduate Program

1. Curriculum Content

The Masters of Science in Civil Engineering allows for students to pursue a major emphasis in any of the six divisions of the program: Environmental Engineering, Water Resources Engineering, Construction Engineering, Transportation Engineering, Geotechnical Engineering and Structural Engineering. Students are required to take most of their graduate courses in the major division. A minor of two or three courses must be taken in one of the other five divisions, allowing for graduates to receive a wider understanding of the civil engineering community. Students may supplement their graduate program by taking any of the undergraduate civil engineering electives.

2. Preparation for Engineering Practice

The goal of the graduate program is to prepare graduates to take more senior roles in their career. Few graduates pursue doctoral degrees and so the courses and programs are intended to focus on work-related engineering skills as opposed to advanced research skills. Many of the graduate students are full-time employees of engineering companies while enrolled part-time in the program. These working professionals are served by providing all graduate classes in the evening. The training of working professionals requires constant update of course materials as students are in constant need of the latest in engineering codes and standards.

One of the expectations of the graduate degree is that the student should be prepared for the engineering licensing exam (Professional Engineering license). After completing an undergraduate and graduate degree in engineering, the state requires one year of professional engineering practice to sit for the licensing exam, a requirement that many students will have met by the time of graduation. As such, the program provides training that will allow students to understand the basic theories and subtle nuances of engineering subjects. In addition to the Professional Engineering license the State of California also licenses engineers in the specialty fields of Structural Engineering and Geotechnical Engineering. These two advanced engineering licenses are pursued by engineers already licensed as Professional Engineers and looking for advancement in the design field of the two specialties.
3. Societal Need

Civil engineers have met basic societal needs since the dawn of civilization. Recent graduates from the program have been involved in the design or construction of much of the local built environment: new East Span of the Oakland Bay Bridge, rehabilitation of Folsom Dam, housing developments on the peninsula, and commercial projects in San Jose. Recently the department began organizing a Career Fair that has attracted 20 to 40 local engineering employers to recruit and hire graduating students.

B.5.2 Program Outcomes for Undergraduate Program

B.5.2.1 Relationship between Program Educational Objectives and Outcomes

1. Undergraduate Program

<table>
<thead>
<tr>
<th>Program Educational Objectives</th>
<th>Program Outcomes</th>
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<tr>
<td>Program educational objectives are to prepare students to advance in their careers by providing them with knowledge to:</td>
<td></td>
</tr>
<tr>
<td>1. Carry out entry-level civil engineering practice,</td>
<td>1 through 13</td>
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<td>2. Continue graduate studies in civil engineering,</td>
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<td>3. Apply their acquired engineering knowledge to solve practical problems,</td>
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<td>4. Develop solutions that account for economic, environmental, ethical and societal considerations,</td>
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<td>5. Incorporate ethical and professional standards in making their decisions,</td>
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<td>6. Communicate effectively,</td>
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<td>7. Continue life-long learning.</td>
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B.5.2.2 Matrix Mapping of Course Learning Objectives to Outcomes

Most courses in the program provide training in each of the outcomes to some extent. To control the scope of work of the assessment process, certain courses are identified for primary assessment of the program. Primary assessment and documentation of student learning is performed for each outcome at various courses as listed in the table.

<table>
<thead>
<tr>
<th>Course</th>
<th>Outcome</th>
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<tbody>
<tr>
<td>8</td>
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B.5.3 Assessment Process Overview

B.5.3.1 Undergraduate Program Assessment Summary

The figure below shows a visualization of the overall assessment process, including program, and course-level, assessment and enhancement cycles. Through this process, the department assesses and assures that BSCE graduates have achieved the Program Outcomes. Program Educational Objectives are achieved primarily through the curriculum (technical and general education) by the design and control of the contributions made by individual courses as well as their (“vertical”) integration into a cumulative growth for the student. The following discussion describes the assessment plan in detail, including assessment of the curriculum (technical and general education), and its integration into assessment of achievement of Program Outcomes.

B.5.3.1.1 Outcome Assessment Process Overview

An early conclusion from the initial use of the assessment process was that the process was not sustainable in terms of scope of work. Initially, the intent was that student work in all courses would be collected and archived for program assessment work. This resulted in a large collection of documents that were difficult to organize and proved rather unwieldy in providing anyone working on assessment the ability to locate the
student work that was deemed appropriate. In 2004, after the process had been initially implemented, consensus was that the collection of student work should be targeted to meet specific needs. In the Spring of 2004, the department held a retreat where a Student Work Collection Matrix was compiled for the required undergraduate courses. The matrix shows the outcome and outcome criteria for which selected courses are designated to provide written documentation of the student’s abilities. This documentation may be: homework solutions, exam solutions, excerpts from reports, written peer-evaluations by classmates or written evaluations by the instructor.

B.5.3.1.2 Outcome Assessment—Design

Evaluation of achievement of educational outcomes requires both a process, and the data to be evaluated in the process. The process is defined as including assessment (“How well are the outcomes being achieved?”) and evaluation (“What changes need to be made to enhance achievement of the outcomes?”) to produce enhancement (carrying out the requisite changes leading to increased achievement of the outcomes), which is the overall goal. The CEE Department’s process addresses achievement of educational outcomes through addressing the Program Outcomes. The sources of data used in the undergraduate program assessment process are summarized in Table B.5.

Table B.5. Data Types used for Evaluation of Different Outcomes

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B.5.3.1.3 Outcome Assessment—Methodologies

Each technical course in the curriculum has specified course goals and student learning objectives, as indicated in the course outlines contained in Appendix C. The documents identify the relationship of these objectives to the Program Educational Objectives as well as the Program Outcomes. When the department initiated the ABET 2000 process, two worksheets were developed for each course. The Course Assessment Matrix (CAM) described the required major technical topics, expected level of treatment, and student learning assessment methods involved in the course. The Program Assessment Matrix (PAM) indicated the intended contribution of the course to appropriate Program Outcomes (and hence Educational Objectives), the course assessable components, achievement level, and assessment methods. Together, the two worksheets set the requirements for course content, achievement level and assessment, and relate the course to Program Outcomes. The worksheets were valuable in the initial design of the assessment process in that they provided a suitable summary of courses to allow the department faculty to more fully review the entire curriculum. However, over time, the brevity of these documents limited their value in providing a
complete view of the program. Due to the large workload involved in maintaining these documents and their replacement by alternative information formats, their use was formally discontinued in summer 2004.

The guidelines of ABET for Criterion 3 requires that the, “assessment process should include direct and indirect measures and does not rely only on self-report surveys and evidence that the material is “covered” in the curriculum.” Toward this end, the department reviews a wide variety of assessment data. In order to determine whether the civil engineering program at SJSU is achieving its educational objectives, and to be able to improve the effectiveness of the program, several different types of data are being continuously collected and used to evaluate the program. The data evaluated for this report include the following:

- Evaluations prepared by Course Instructor
- Student exit surveys
- Internship supervisor surveys
- Evaluations prepared by Department Advisory Committee members
- Student scores on the Fundamentals of Engineering Examination
- Student performance in courses
- Engr 10 survey
- Alumni Surveys

1. Course Surveys

Before graduating from the civil engineering program each student must work a minimum of 120 hours in a civil engineering internship position. Every supervisor participating in the internship program must return a letter verifying the hours the student worked and evaluating the performance of the student in a written statement and an a survey form. In addition, each supervisor uses a rubric to evaluate the performance of the student.

Each semester, faculty members receive student evaluation of their teaching effectiveness through computerized questionnaires that are standardized and mandated by the University. Questions cover the professor’s knowledge, organization, grading, use of class time, quality of class presentations, and availability, as well as if he/she helped the student learn the material and finally, if the student felt he/she gained a better understanding of the subject matter. The department chair receives a copy of these each semester. If there is a noticeable problem, the department chair provides guidance to the faculty member to improve his/her effectiveness. Since these are confidential documents they cannot be shared with the reviewer at the visit.

2. Junior and Senior Surveys

Students complete the exit surveys during their last semester in the civil engineering program. The surveys contain a variety of questions designed to provide insight into students’ perceptions of their preparation to work in the industry and their opinions of the program, along with suggestions for improvements to the program.

3. Alumni Survey Results

A five-page alumni survey is sent to recent graduates to obtain data about the success of young graduates to achieve the Program Educational Objectives. Questions are self-reported and cover both perceptions of the degree of preparation that the engineer received from the undergraduate program as well as a rating of the importance of the outcome to the engineer’s career. Other questions address the status of professional licensure, graduate degrees pursued and basic demographics. Approximately 100 surveys were sent to graduates of the last ten years that have addresses filed with the department. Typical return rates are 10~15%. The results are compiled and a written report distributed to the faculty and filed in the department office.
4. Employers Survey Results

Before graduating from the civil engineering program each student must work a minimum of 120 hours in a civil engineering internship position. Every supervisor participating in the internship program must return a letter verifying the hours the student worked and evaluating the performance of the student in a written statement and an a survey form. In addition, each supervisor uses a rubric to evaluate the performance of the student.

5. Exit Exam Results and Interpretations

Civil engineering traditionally has a large number of students taking the Fundamentals of Engineering (FE) Exam each term. This exam has been used as a basis for this assessment tool. All students are required to take CE105 before graduation. In the Fall of 2004 this internship course was enhanced by the addition of a mock Fundamentals of Engineering exam. During the semester the student is enrolled in CE105, they are required to take an exam that duplicates the content of the FE Exam. Questions for the mock exam are taken from sample exam review manuals available in the engineering community. The CE105 instructor assigns the review manual as a required text for the course, selects a sampling of questions that represents the actual exam, administers the exam on one day of the term, and compiles the student’s score as well as a report of the number of correct answers for each question. This mock exam is given each semester and provides continuous feedback to the department about the capabilities and limitations of senior level students. In addition, the mock exam is expected to serve the students in providing them an opportunity to evaluate their abilities before taking the FE exam.

6. Culminating Design Experience Project Outcomes Assessment

In 1999, a member of the Department Advisory Committee worked with the instructor of one of the required courses (CE162, Concrete Design) in evaluating the design project for both its expansion to consider global engineering issues and the ability of students to professionally document their work. Over a five-year span, the DAC member and the course instructor met and discussed various aspects of the design project. The DAC member wrote a final report documenting weaknesses seen in the project and presentations at the beginning of the process, the changes made in course instruction during the five-year period and the enhancement of student learning seen at the end of the process.

7. DAC Evaluations of the Program

The Department Advisory Committee is made up of practitioners in all six areas of civil engineering that are included in the program. Members of the Civil and Environmental Engineering Department Advisory Committee participate in evaluating student presentations and projects. They provide suggestions for improving student projects and presentations and these suggestions are then incorporated into the next semester’s projects.

In 1999, a member of the Department Advisory Committee worked with the instructor of one of the required courses (CE162, Concrete Design) in evaluating the design project for both its expansion to consider global engineering issues and the ability of students to professionally document their work. Over a five-year span, the DAC member and the course instructor met and discussed various aspects of the design project. The DAC member wrote a final report documenting weaknesses seen in the project and presentations at the beginning of the process, the changes made in course instruction during the five-year period and the enhancement of student learning seen at the end of the process.

8. Other Assessments

Evaluations prepared by Course Instructor

In Fall 2004, the department initiated the use of an assessment instrument in the form of an evaluation report written by each course instructor and reviewed by the course coordinator. An evaluation is written for each required course offered that semester. The evaluation consists of a table with each row
representing a course-learning objective. The instructor is to indicate whether the course-learning objective addresses the outcome of interest, whether the student performance was satisfactory, and any comments and/or recommendations for enhancing the course or program. At the bottom of the table is a general comment area for an evaluation of the overall student performance on the specific outcome and an explanation as to how the instructor made the judgment of the success of the students. The table is accompanied with the course syllabus and any representative student work the instructor deems appropriate.

Fundamentals of Engineering Exam Results
Every semester the department receives a composite summary of scores for students and alumni who take the Fundamentals of Engineering (FE) Exam. This report shows the performance of examinees that identify San Jose State University as the program that they have received their baccalaureate civil engineering degree or the university that they presently attend. The report provides the average number of correct answers in different categories of engineering, math and science. Average scores for comparable examinees for the state and/or nation are provided. A significant portion of civil engineering students at San Jose State takes the exam and the results represent the average student. The reports are distributed for the faculty to review and filed in the department office.

The purpose of the assessment process is to improve the skills and content knowledge of graduates of the CEE program. As such, continuous improvement is made incrementally. Each change has three phases: 1) identification of a weakness, 2) revision of the program to address the weakness, and 3) monitoring of the impact of the revision. In this section, major implemented changes related to program outcomes are described.

B.5.3.1.4 Outcome Assessment—Results

**Outcome 1.** *Graduates have proficiency in and an ability to apply knowledge of engineering, mathematics through differential equations, probability and statistics, science including calculus-based physics and chemistry, and general engineering.*

**Performance Criteria**

1A) Demonstrate an ability to apply calculus, vector algebra, statistics, probability theory and differential equations to model the physical processes necessary to perform engineering calculations.

1B) Demonstrate an ability to use fundamental engineering theory and science to perform design calculations and evaluate systems.

1C) Demonstrate an ability to use fundamental principles of science to perform engineering calculations.

1D) Demonstrate a proficiency in math and science.

Students take three courses in calculus (Math 30, 31 and 32), one course in differential equations (Math 133A), one course in chemistry (Chem 1A), two courses in calculus-based physics (physics 70 and 71), a course in probability and statistics (CE 192) and a course in numerical methods (CE 190). In addition, students take an elective course in mathematics or science. Choices are linear algebra (Math 129A), chemistry (Chem 1B) or geology (Geology 101). Students’ proficiency in mathematics and science is assessed as part of Outcome #1.
Data Collected

FE Results Data Collected for Chemistry

<table>
<thead>
<tr>
<th>Results from FE Exam</th>
<th>Data Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SJSU CE Average</td>
</tr>
<tr>
<td>1997</td>
<td>April 55</td>
</tr>
<tr>
<td></td>
<td>November 69</td>
</tr>
<tr>
<td>1998</td>
<td>April 43</td>
</tr>
<tr>
<td></td>
<td>October 50</td>
</tr>
<tr>
<td>1999</td>
<td>April 57</td>
</tr>
<tr>
<td></td>
<td>October 64</td>
</tr>
<tr>
<td>2000</td>
<td>April 61</td>
</tr>
<tr>
<td></td>
<td>October 46</td>
</tr>
<tr>
<td>2002</td>
<td>April 52</td>
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<tr>
<td></td>
<td>October 46</td>
</tr>
<tr>
<td>2003</td>
<td>April 60</td>
</tr>
<tr>
<td>2004</td>
<td>April 49</td>
</tr>
</tbody>
</table>

Notes. 1. n/r indicates data not reported due to change in methods used by licensing board in distributing data.

FE Results Data Collected for Mathematics

<table>
<thead>
<tr>
<th>Results from FE Exam</th>
<th>Data Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SJSU Average</td>
</tr>
<tr>
<td>1997</td>
<td>April 53</td>
</tr>
<tr>
<td></td>
<td>November 54</td>
</tr>
<tr>
<td>1998</td>
<td>April 56</td>
</tr>
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<td></td>
<td>October 48</td>
</tr>
<tr>
<td>1999</td>
<td>April 46</td>
</tr>
<tr>
<td></td>
<td>October 63</td>
</tr>
<tr>
<td>2000</td>
<td>April 46</td>
</tr>
<tr>
<td>2002</td>
<td>April 50</td>
</tr>
<tr>
<td></td>
<td>October 55</td>
</tr>
<tr>
<td>2003</td>
<td>April 47</td>
</tr>
<tr>
<td>2004</td>
<td>April 43</td>
</tr>
</tbody>
</table>

Notes. 1. n/r indicates data not reported
Alumni Survey Results for Outcome 1

Self Reported Response to: My ability to apply knowledge of mathematics, science and engineering
(self-rating from 0 to 100).

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Graduated within Four Years</th>
<th>Graduated Between Four and Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Responses</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Assessment of Undergraduate Education at SJSU</td>
<td>95</td>
<td>84</td>
</tr>
<tr>
<td>Importance to Career</td>
<td>85</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>78</td>
<td>78</td>
</tr>
</tbody>
</table>

Recommendations and Enhancement

The outcome champion reported in the 2003 in the outcome report that none of the four performance criteria were concerned with how the specific courses help in satisfying the outcome. This resulted in an inability to accurately assess student work. In Fall 2003 the department faculty selected Outcome 1 as a priority for revision.

Since 1999, the following enhancements to courses have been made to strengthen student performance for this outcome:

- CE20 Detailed course learning objectives written to define course content.
- CE20 Course learning objectives reviewed for effectiveness. Objectives to be revised and course materials to be altered in response to the review. See ASCE Journal of Professional Issues, July 2005.
- CE113 Laboratory Manual revised.
- CE140 New equipment, students present one lab, lab project.
- CE150 A manual for Hydraulic Laboratory, written by Dr. R. Singh, was adopted and is being used in the laboratory. CE150 Lab instruction has now become systematic and better organized.
- CE150 Topics on hydraulics of pumps and pumping stations have been augmented.
- CE150 A lecture on ethics and professionalism has been included.
- CE150 Experiments on pipe friction, orifice and tubes, and centrifugal pump have been added to the laboratory experiments.
- CE150 Computer use has been increased through use of Haested Methods
- CE150 Use of Bakhmeteff’s integration method for solution of varied flow problems has been discontinued. Now emphasis is placed by numerical methods, which are adaptable to computer applications.
- CE163 Detailed course learning objectives written to define course content.
- CE164 Detailed course learning objectives written to define course content.
- CE165 Detailed course learning objectives written to define course content.
- CE165 Course reader prepared to provide materials for students aligned with course learning objectives.

Prerequisites requiring a C- or better in mathematics and physics courses are part of the engineering program.
Outcome 2. Graduates have an ability to design and conduct experiments, as well as to analyze and interpret data in more than one civil engineering.

Performance Criteria

2A) Demonstrate an ability to conduct experiments through collecting data and operating testing equipment

2B) Demonstrate an ability to design an experiment by determining ranges of parameters to be monitored, determining which data is to be collected, or using statistical methods to design a hypothetical experiment.

2C) Demonstrate an ability to analyze and interpret data by using graphs, tables and reports to present data, compare data to theoretical predictions, and make conclusions and recommendations about the phenomena tested.

The curriculum provides opportunities to conduct laboratory experiments and to critically analyze and interpret data in the areas of structural mechanics (CE 113), materials (CE 120), transportation (CE 121), soil mechanics (CE 140), fluid mechanics and hydraulics (CE 150), and environmental engineering (CE 170). In each of these courses, students perform a variety of experiments in which they make theoretical predictions, operate testing equipment, collect data and present data in tabular and graphical formats. Students compare theoretical results with experimental results and make conclusions about the phenomena tested. Students learn the skills needed to perform statistical tests on data, to fit data with curves and probabilistic distributions, and to design experiments in the course in statistics and probability (CE 192). Service courses also require laboratory experimentation (Chem 1A, Phys 70 and 71, Engr 10 and MatE 25). The performance of students is assessed through Outcome #2 (see Appendix I-H and Table B.3.1).

Data Collected

Alumni Survey Results for Outcome 2

Self Reported Response to: My ability to design and conduct experiments, as well as to analyze and interpret data.
(Self-reported evaluation on a scale of 0 to 100).

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Graduated within Four Years</th>
<th>Graduated Between Four and Ten Years Prior</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Responses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment of Undergraduate Education at SJSU</td>
<td>82</td>
<td>84</td>
</tr>
<tr>
<td>Importance to Career</td>
<td>72</td>
<td>89</td>
</tr>
</tbody>
</table>
Recommendations and Enhancements

Since 1999, the following enhancements to courses have been made to strengthen student performance for this outcome:

- CE105 Students gather and assess engineering data in the technical report.
- CE113 Laboratory Manual revised.
- CE113 Experiments 1, 2 and 3 revised to include electronic data monitoring and collection.
- CE113 One testing machine has been renovated with new loading mechanism and to include electronic control system.
- CE113 Experiment 4 report requirements revised to include discussion about experimental design related to collection of data during experiment.
- CE150 A manual for Hydraulic Laboratory, written by Dr. R. Singh, was adopted and is being used in the laboratory. CE150 Lab instruction has now become systematic and better organized.
- CE165 Writing assignment where students design an experimental research project and write a two-page proposal added to course assignment.

Outcome 3. Graduates have an ability to design a civil engineering system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

Performance Criteria

3A) Demonstrate an ability to design a component to meet certain constraints.
3B) Demonstrate an ability to design a system to meet certain constraints.
3C) Demonstrate an ability to integrate social, political, economic, environmental and other considerations into design of a system.
3D) This criteria eliminated on March 19, 2005. To eliminate confusion about work referenced to specific criteria, alphanumeric identifiers are not re-used.
3E) Demonstrate an ability to design a process to meet certain constraints.

Design activities are integrated into courses throughout the program curriculum. Design projects are first introduced in preliminary forms in introductory courses and these concepts are continually built upon throughout the curriculum, culminating in major complex projects in advanced courses. Table B.8.1 summarizes design problems and projects in the professional component of the curriculum. Students complete design projects in many required courses and then must take at least six units of design (two courses) in their electives. This combined with experience during the internship provides students with the knowledge to design complex systems, components, and processes in several sub-discipline areas. Not only are students taught how to analyze specific problems, but they also learn how to synthesize appropriate data into a systematic approach for determining design solutions.
<table>
<thead>
<tr>
<th>Class</th>
<th>Problem or Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engr 10</td>
<td>Three comprehensive design projects which students have to build and test to verify performance. (a) the design and manufacture (using limited materials) of a cup to keep coffee hot for as long as possible, (b) the design of a rubber-powered airplane for maximum range and endurance., (c) the efficient design of a ship power plant.</td>
</tr>
<tr>
<td>CE 105</td>
<td>Students perform a variety of design projects depending on the internship they complete.</td>
</tr>
</tbody>
</table>
| CE 121      | 1. Determine the number of lanes for a freeway, given the freeway’s basic geometric and traffic characteristics.  
2. Layout of a vertical curve, given the required sight distance.  
3. Layout of horizontal curve, given the required sight distance.  
4. Design of the profile of the superelevation diagram.  
5. A comprehensive design problem combining horizontal and vertical alignment. |
| CE 123 (elective) | The design elements of streets and highways are studied as follows:  
1. The underlying geometry is analyzed.  
2. The basis for the applicable standards is analyzed.  
3. Published standards are examined.  
4. The constraints, or range of applicability of the standards, are examined.  
5. The standards are applied to specific situations. |
| CE 133 (elective) | 1) Students design and detail a concrete formwork system including determination of design pressures, design of ties, sheathing, studs, wales and bracing.  
2) Students design a falsework to support the construction of a bridge or overpass. This involves design of sheathing, joists, beams, girders and columns to resist gravity and lateral loads due to construction, wind, seismic, and traffic according to the Caltrans Falsework Manual.  
Temporary soil pads are also designed. |
| CE 141 (elective) | Students perform the structural design of square and rectangular single column footings; rectangular, trapezoidal and strap combined footings; and retaining walls. They develop shear and moment diagrams for sheet piles, determine pile capacity from pile geometry and soil parameters, and produce a design chart using a computer program to determine bearing capacity as a function of strength and settlement. |
| CE 150      | Students use San Jose City code design a storm sewer system. Students use the Hydraulic Institute Design Manual to design a water distribution system and to determine the required height of flood protection levees.  |
| CE 154 (elective) | Students design spillways, dams, outlet works, and energy dissipation basins according to the recommendations of the US Bureau of Reclamation. They design pumping stations according to the Hydraulic Institute Design Manual. |
| CE 162      | Student teams complete a design of a multi-story concrete building. This project includes structural design and detailing of a concrete structure utilizing the ACI and IBC or UBC codes of practice.  |
| CE 163 (elective) | Homework problems require the students to design components of structures: hangers, columns, beams, beam-columns, and connections.  
1) A six-week project requires a team to design a truss bridge. The project requires the analysis, evaluation and design of a complete structural system according to the AISC Design Specifications. |
| CE 164 (elective) | Homework problems require the students to design components of structures: columns, beams, shear walls, and connections.  
1) A six-week project requires the students to design, analyze and evaluate a small shear wall building structural system to NDS and IBC requirements.  |
| CE 170      | Student teams design components of a water treatment plant or a wastewater treatment plant such that water quality objectives or discharge criteria are met. Design criteria are based on State or local standards.  |
| CE 176 (elective) | Students learn about effluent limits of pollutants in treated wastewater and drinking water set by the U.S. EPA or local Environmental Agencies. Problems include using biochemical kinetics to design biological reactor systems that will produce required effluent characteristics.  |
Data Collected

FE Results Data Collected for Structural Design

<table>
<thead>
<tr>
<th>Results from FE Exam</th>
<th>Data Type</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SJSU CE Average</td>
<td>State of California Average</td>
<td>National Average</td>
<td>Carnegie Masters Average</td>
</tr>
<tr>
<td>1997</td>
<td>April 44</td>
<td>40</td>
<td>47</td>
<td>n/r</td>
</tr>
<tr>
<td></td>
<td>November 42</td>
<td>43</td>
<td>47</td>
<td>n/r</td>
</tr>
<tr>
<td>1998</td>
<td>April 31</td>
<td>30</td>
<td>33</td>
<td>n/r</td>
</tr>
<tr>
<td></td>
<td>October 59</td>
<td>51</td>
<td>57</td>
<td>n/r</td>
</tr>
<tr>
<td>1999</td>
<td>April 34</td>
<td>37</td>
<td>41</td>
<td>n/r</td>
</tr>
<tr>
<td></td>
<td>October 30</td>
<td>33</td>
<td>42</td>
<td>n/r</td>
</tr>
<tr>
<td>2000</td>
<td>April 46</td>
<td>43</td>
<td>51</td>
<td>n/r</td>
</tr>
<tr>
<td></td>
<td>2002</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>April 38</td>
<td>n/r</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>October 38</td>
<td>n/r</td>
<td>48</td>
<td>46</td>
</tr>
<tr>
<td>2003</td>
<td>April 38</td>
<td>n/r</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>2004</td>
<td>April 50</td>
<td>n/r</td>
<td>55</td>
<td>52</td>
</tr>
</tbody>
</table>

Notes: 1. n/r indicates data not reported

Alumni Survey Results for Outcome 3

Self Reported Response to: My ability design a system, component or process to meet a desired need.
(Self-evaluation rating based on scale of 0 to 100)

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Graduated within Four Years</th>
<th>Graduated Between Four and Ten Years Prior</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Responses</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Assessment of Undergraduate Education at SJSU</td>
<td>88</td>
<td>75</td>
</tr>
<tr>
<td>Importance to Career</td>
<td>68</td>
<td>93</td>
</tr>
</tbody>
</table>

One goal of the department is that students become familiar with the incorporation of engineering standards and realistic constraints. Students use current codes and standards in design projects, while also being taught to understand the underlying theories that control designs. This provides students with a diverse design experience and exposure to the design issues and solutions in the many professional areas of civil engineering. This is consistent with the departmental objectives of preparing students for professional practice.

In Spring 2005, the department faculty reviewed the required courses to determine the types of design constraints used in the required courses. As an outcome of that review, Table 3.4.3-4 was compiled from the information provided by the course coordinators.
Realistic Design Constraints in Required Civil Engineering Courses.

<table>
<thead>
<tr>
<th>Course</th>
<th>Type of Design Constraints used in Course</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Economic</td>
</tr>
<tr>
<td>CE112</td>
<td>X</td>
</tr>
<tr>
<td>CE121</td>
<td>X</td>
</tr>
<tr>
<td>CE130</td>
<td>X</td>
</tr>
<tr>
<td>CE131</td>
<td>X</td>
</tr>
<tr>
<td>CE160</td>
<td>X</td>
</tr>
<tr>
<td>CE162</td>
<td>X</td>
</tr>
</tbody>
</table>

CE105 is a engineering internship course that all students must take. One of the requirements of the course is that the student’s internship must include a design experience. Each student works in a different internship and their design experience varies thus having a variety of constraints that the design engineer must address. Over the full range of design experiences that students have undertaken, constraints in all of the categories have been considered.

Recommendations and Enhancements

In February 2004, the faculty removed the requirement that students take electives with a combined total of six design units. This was done out of concern that design units appeared to have been inconsistently assigned to each course and that confusion led to non-uniform enforcement of the requirement. In September 2004, the course coordinator for each course prepared a short narrative summarizing the design content of each course. These summaries were reviewed by the faculty to identify which courses of Table 1 in Appendix I-A contained significant design content. In October 2004, the faculty altered the requirement for students taking electives, effective for students graduating in May 2005. Students are required to take two of their four electives from the following list of design-oriented electives:

- CE123
- CE133
- CE141
- CE154
- CE163
- CE164
- CE176

In March 2005, the department faculty held a retreat to discuss Outcome 3. The following recommendations were made:

- A new criteria, 3E, was written to specifically address the design of processes.
- Criteria 3D, referring to assessment of design documentation, was eliminated as it appears redundant with Outcome 7. The course assessment matrix was revised in light of this change.
- CE154 would be reviewed by the course coordinator for possible improvements in light of the poor ratings the course received in the Fall 2004 Exit Survey. *(CE154 course coordinator reports in June 2005: Lately, CE154 has been taught by different instructors. A better guideline is being prepared on design problems to be included and the selection of textbooks.)*
- CE20 would become a prerequisite for several courses involving design. This recommendation was made as a result of the course evaluations completed in Fall 2004 when it was observed that students were often weak in drawing skills. Courses to have this prerequisite added are: CE 121, CE140, CE150, CE160, CE170 and electives CE123, CE133, CE134, CE141, CE154, CE163,
CE164 and CE 176. An increased emphasis on manual sketching will also be added to CE20. In addition, the faculty chose to place on the agenda for AY05/06 a discussion about methods of approving articulation for students who take alternative drawing courses to fulfill the CE20 requirement.

- After reviewing the evaluation of course objectives completed in Fall 2004, course objectives were revised for CE112, CE140, CE150, CE160, CE162 and CE170.

Since 1999, the following enhancements to courses have been made to strengthen student performance for this outcome:

- CE20 Semester project revised to include some design requirements based upon geometric constraints.
- CE121 Created new lab for understanding superelevation.
- CE121 Created new lab to understand combination of design elements.
- CE121 Removed the labs on superficial understanding of general transportation problems.
- CE164 Design project revised to provide student learning more aligned with course learning objectives.
- CE165 Design feature added to semester project.

**Outcome 4. Graduates have an ability to function on multidisciplinary teams.**

**Performance Criteria**

- 4A) Demonstrate an ability as a member of a team to interact and communicate in a professional manner with other members on the team.
- 4B) Demonstrate an ability to contribute discipline-specific input to a multi-disciplinary project.
- 4C) Demonstrate an ability to identify project issues that are beyond one’s expertise or the collective expertise of the team.

**Data Collected**

**Results from Exit Survey**

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Response F99</th>
<th>S00</th>
<th>F00</th>
<th>S01</th>
<th>S02</th>
</tr>
</thead>
<tbody>
<tr>
<td>The program has provided you with the opportunity to become proficient working on a team.</td>
<td>82</td>
<td>75</td>
<td>86</td>
<td>88</td>
<td>82</td>
</tr>
</tbody>
</table>

Notes. 3. Percentage responding adequate or in-depth.

**Alumni Survey Results for Outcome 4**

*Self Reported Response to: My ability to function on multidisciplinary teams. (Self-rating on scale of 0 to 100.)*

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Graduated within Four Years</th>
<th>Graduated Between Four and Ten Years Prior</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Responses</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Assessment of Undergraduate Education at SJSU</td>
<td>77</td>
<td>89</td>
</tr>
<tr>
<td>Importance to Career</td>
<td>100</td>
<td>98</td>
</tr>
</tbody>
</table>
Recommendations and Enhancements

Since 1999, the following enhancements to courses have been made to strengthen student performance for this outcome:

- **CE105** Students include a discussion of their experience working in a multidisciplinary environment and the social impacts of the project they worked on during their internship.
- **CE113** Student teams formally required to have a student leader for each experiment. The person taking the leadership role must rotate during the semester to allow each student to be leader at least once.
- **CE163** Self-evaluation of team dynamics added to design project.
- **CE164** Grading rubric for team skills developed for course design project.
- **CE164** Student notebooks added for design project to allow for documentation of team meetings. Grading of team skills based upon student’s ability to document their contribution.

Outcome 5. *Graduates have an ability to identify, formulate, and solve engineering problems.*

Performance Criteria

5A) Demonstrate an ability to identify the known and unknown information from a problem and to be able to set up a solution.
5B) Demonstrate an ability to analyze and solve engineering problems.
5C) Demonstrate an ability to evaluate alternative solutions for engineering problems.

Data Collected

**FE Results Data Collected for Overall Passing**

<table>
<thead>
<tr>
<th>Results from FE Exam</th>
<th>Data Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SJSU CE Average</td>
</tr>
<tr>
<td>1997</td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>53</td>
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<tr>
<td>April</td>
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<td>October</td>
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<td>2000</td>
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<td>2004</td>
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<tr>
<td>April</td>
<td>76</td>
</tr>
</tbody>
</table>

Notes. 1. n/r indicates data not reported
Alumni Survey Results for Outcome 5

*Self Reported Response to: My ability to identify, formulate and solve engineering problems. (Self rating on scale of 0 to 100.)*

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Graduated within Four Years</th>
<th>Graduated Between Four and Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Responses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment of Undergraduate Education at SJSU</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Importance to Career</td>
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<td>83</td>
</tr>
<tr>
<td>65</td>
<td>98</td>
<td>87</td>
</tr>
</tbody>
</table>

Recommendations for Enhancement

A suitable method for evaluating student content knowledge was identified as a concern for the faculty during the process of writing the outcome assessment reports. The department’s faculty members were concerned about the ability of multiple evaluators (the faculty) to give consistent evaluation of a wide variety of student content skills. In addition, the department has consistently looked for ways to assist students in passing the Fundamentals of Engineering exam. All students are required to take CE105 before graduation. In fall 2004 this internship course has been enhanced by the addition of a mock Fundamentals of Engineering exam administered and used as part of the student’s ability to pass the course. During the semester the student is enrolled in CE105, they are required to take exams that duplicate the content matter of the FE Exam. Questions for the mock exam are taken from sample exam review manuals available in the engineering community. The CE105 instructor assigns the review manual as a required text for the course, selects a sampling of questions that represents questions on the actual exam, administers the exams on two days of the term, and compiles the student’s score as well as a report of the number of correct answers for each question. This mock exam is given each semester and provides continuous feedback to the department about the capabilities and limitations of our seniors. In addition, the mock exam is expected to serve the students in providing them an opportunity to evaluate their abilities before taking the actual exam.

**Timeline of Student Content Knowledge Assessment via Mock FE Exam**

<table>
<thead>
<tr>
<th>Date</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2003</td>
<td>After reviewing several outcomes assessment reports, the faculty chose to use the Fundamentals of Engineering exam as a benchmark for student content knowledge</td>
</tr>
<tr>
<td>May 2004</td>
<td>Course coordinators evaluated a review manual of FE problems to identify which required courses covered various topics and questions.</td>
</tr>
<tr>
<td>May 2004</td>
<td>Two courses (CE99 and CE113) included example FE questions as part of their Final examination to determine student capabilities.</td>
</tr>
<tr>
<td>June 2004</td>
<td>CE105 was selected to contain a mock FE exam as part of the course requirements. In addition, the review manual would be assigned a required text for the course.</td>
</tr>
<tr>
<td>July 2004</td>
<td>The course instructor for CE105 developed the procedures for conducting the FE mock exam.</td>
</tr>
<tr>
<td>October, Dec. 2004</td>
<td>F04 FE mock exam taken by students in CE105.</td>
</tr>
<tr>
<td>March, May 2005</td>
<td>S05 FE mock exam taken by students in CE105.</td>
</tr>
</tbody>
</table>
Since 1999, the following enhancements to courses have been made to strengthen student performance for this outcome:

- **CE20** Course learning objectives written and distributed to class to more clearly define scopes of knowledge and skills students are expected to demonstrate.
- **CE20** Course learning objectives reviewed for effectiveness. Objectives to be revised and course materials to be altered in response to the review. See ASCE Journal of Professional Issues, July 2005.
- **CE105** Students must pass sample FE exams taken during class.
- **CE121** Created new lab for understanding of superelevation.
- **CE121** Created new lab to understand the combination of design elements.
- **CE121** Removed the labs on superficial understanding of general transportation problems.
- **CE130** Discussing the application of engineering economics to actual engineering problems.
- **CE130** New edition of the textbook with updated examples and homework assignments.
- **CE163** Prerequisite changed from being a co-requisite of CE162 to CE160 being a prerequisite to reflect knowledge skills required for course.
- **CE163** Course learning objectives written and distributed to class to more clearly define scopes of knowledge and skills students are expected to demonstrate.
- **CE164** Course learning objectives written and distributed to class to more clearly define scopes of knowledge and skills students are expected to demonstrate.
- **CE164** Course reader written to provide additional resources to students, and to particularly address specific learning objectives.
- **CE164** Prerequisite changed from being a co-requisite of CE162 to CE160 being a prerequisite to reflect knowledge skills required for course.
- **CE165** Course learning objectives written and distributed to class to more clearly define scope of knowledge and skills students are expected to demonstrate.
- **CE165** Course reader written to provide additional resources to students, and to particularly address specific learning objectives.
- **CE165** Prerequisite changed from being a co-requisite of CE162 to being a prerequisite of CE160 to reflect knowledge skills required for course.

**Outcome 6. Graduates have an understanding of professional and ethical responsibility.**

**Performance Criteria**

6A) Demonstrate an ability to analyze and evaluate a situation in which personal or professional ethics are involved.

6B) Demonstrate a knowledge of codes, standards, and regulations.

6C) Demonstrate an understanding of the impact of engineering decisions on public safety, the environment and other social impacts.

**Data Collected**

**Results from Exit Survey**

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Average Response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F99</td>
</tr>
<tr>
<td>The program exposed you to issues of personal and professional ethics and responsibility. ³</td>
<td>52</td>
</tr>
</tbody>
</table>

Notes. ³ Percentage responding adequate or in-depth.
Percentage of Ethics Questions Answered Correctly on Fundamentals of Engineering Exam

<table>
<thead>
<tr>
<th>Results from FE Exam</th>
<th>Data Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SJSU CE Average</td>
</tr>
<tr>
<td></td>
<td>State of California Average</td>
</tr>
<tr>
<td></td>
<td>National Average</td>
</tr>
<tr>
<td></td>
<td>Carnegie Masters Average</td>
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<tr>
<td>1997</td>
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<td>79</td>
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<td></td>
<td>74</td>
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<tr>
<td></td>
<td>81</td>
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<td></td>
<td>n/r</td>
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<td>1999</td>
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<tr>
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<td></td>
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<td>75</td>
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<tr>
<td>April</td>
<td>69</td>
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<tr>
<td></td>
<td>n/r</td>
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<tr>
<td></td>
<td>65</td>
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</tbody>
</table>
| Notes. 1. n/r indicates data not reported

Alumni Survey Results for Outcome 6

Self Reported Response to: My understanding of professional and ethical responsibility.
(Self rating on scale of 0 to 100.)

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Graduated within Four Years</th>
<th>Graduated Between Four and Ten Years Prior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment of Undergraduate Education at SJSU</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Importance to Career</td>
<td>78</td>
<td>80</td>
</tr>
<tr>
<td>Importance to Career</td>
<td>72</td>
<td>88</td>
</tr>
</tbody>
</table>

Recommendations and Enhancements

Since 1999, the following enhancements to courses have been made to strengthen student performance for this outcome:

- **CE105** Students include an ethical issue discussion in their technical report.
- **CE131** Showing contemporary videos on current ethical issues.
- **CE131** Starting every lecture with an article on current ethical and legal issues.
- **CE131** Having students write an analysis of an ethical situation presented in a video and what they would do related to whistle blowing.
- **CE150** A lecture on ethics has been added.
- **CE165** Course content updated to 2003 International Building Code.
Outcome 7. **Graduates have an ability to communicate effectively.**

Performance Criteria

7A) Demonstrate an ability to give an oral, individual or group, presentation that is organized and uses effective visuals.
7B) Demonstrate an ability to write documents that effectively convey a specific concept.
7C) Demonstrate an ability to convey technical information through the use of data plots, graphs, calculations, drawings and equations.

Data Collected

**Results from Exit Survey**

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F99 S00 F00 S01 S02</td>
</tr>
<tr>
<td>The program has provided you with opportunities to gain confidence in writing a technical report.</td>
<td>70 75 66 77 85</td>
</tr>
<tr>
<td>You have given an oral presentation in one of your engineering classes, or for your internship.</td>
<td>91 94 97 97 97</td>
</tr>
<tr>
<td>The program has provided you with opportunities to improve your oral communication skills.</td>
<td>71 81 57 80 80</td>
</tr>
</tbody>
</table>

Notes. 1. Percentage of responses that were yes.
3. Percentage responding adequate or in-depth.

**Alumni Survey Results for Outcome 7**

_Self Reported Response to: My ability to communicate effectively. (Rated on scale from 0 to 100.)_

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Graduated within Four Years</th>
<th>Graduated Between Four and Ten Years Prior</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Responses</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Assessment of Undergraduate Education at SJSU</td>
<td>80</td>
<td>86</td>
</tr>
<tr>
<td>Importance to Career</td>
<td>100</td>
<td>98</td>
</tr>
</tbody>
</table>

Recommendations and Enhancements

A University policy, effective Spring 2000, requires a C or better in the three required writing courses (Engl 1A, Engl 1B and Engr 100W) and the oral communication course.

At the department level, in 1999, an external reviewer participated in the evaluation of student presentations in the Concrete Design Course (CE162). The evaluator identified a weakness indicating that presentations were below professional quality. During the following semesters, several revisions to the course instruction were made:

- Video lecture on speaking skills was shown during one lab period.
- Assessment tools were developed to allow for consistency of evaluation.
- Presentation graphics were evaluated for effectiveness.
In Spring 2004, the same external evaluator returned to the class and observed presentations on a similar project. He wrote a report outlining the process and the improvement of the student skills.

At the college level, the requirements for technical writing have been standardized by changes to Engr 100W, the technical writing course. ENGR100W - Engineering Reports is an upper division technical writing course. This course is required for all engineering students. Completion of core GE courses and passing the Writing Skills Test (WST, a lower division college level writing test) are required prior to enrollment in ENGR100W. Students typically take this course in their Junior year. Multiple sessions of this course are offered every semester. In-class writing, assessment, and feedback are provided on a weekly. The COE also offers a writing clinic (ENGR 90W) that is open to all engineering students. This clinic was implemented in order to assist students needing basic English skills. ENGR 100W is coordinated by the College of Engineering Technical Communication director. The instructors meet regularly and continue to evaluate student progress, teaching techniques, textbooks, guest speakers and implement changes every semester. The following is a record of recent ENGR100W assessment and improvement.

**Fall 2003**

**GE Status Re-certification**

In 2003, ENGR 100W course evaluations were completed and submitted to both the university Writing Requirements Committee and the Board Of General Studies. Both committees granted another 3-year approval for ENGR100W to meet university Area R (earth and environment) and Area Z (communication) advanced GE requirements.

**Pre and Post Exams**

All three sections of 100W students took a pre-test the first week in class (one essay question), then the same 75 students took a post-test the week before finals. An official grader of the WST exams graded and assigned scores (1-12) on both sets. The results showed a significant improvement of the average scores.

- Pre test score average: 7.04
- Post test score average: 8.20

**Spring 2004**

**New Exit Exam Policy**

The College of Engineering implemented an exit exam policy for ENGR100W in Spring 2004. The policy requires an exit exam administered at the end of each semester. The exams will be graded by an external evaluator. The evaluator will assess the single-topic general essays based on features such as organization, clarity, consistency of point of view, cohesiveness, appropriateness of diction and syntax, and correctness of mechanics and usage. Scores will be 0 – 12. Students who receive a 6 or less must be given a No Credit in the course.

A great deal of time and effort was put into making the test fair.

- **Evaluation:** An independent, professional evaluator graded all of the exams. The score was based on the writing skills, not technical knowledge.
- **Safeguards:** The same topic could not be used for all sections, since exams were administered during the E100W lab sessions. With multiple sections, the topics were equivalent in nature but could not be the same. Therefore, each instructor selected the overall topic for his or her course. This topic was then woven into a memo or letter assignment, with very clear instructions.
• Instructions: All teachers read the same instructions to their classes and had the same time limit.
• Time allotted:
  5 minutes for the instructor to read the instructions
  15 minutes for the students to read the assignment, take notes, and prepare an outline for their responses
  60 minutes for writing
  10 minutes at the end for printing ques
• Anonymity: All exams had the names removed by the instructor before they were delivered to the evaluator. [To keep a record of the student’s work the instructor coded each paper with the class code and the last four digits of the student’s ID. Example: 26667-5643. In this case the class code is 26667 and the last four digits of the student’s ID is 5643.]
• Passing Score: A score of 7 or higher determined passing. If less than 7, the student will be issued a grade of No Credit (NC) in E100W. (To pass the Writing Skills Test to enter 100W a student can earn a 6.)

In Spring 2004, out of 287 students, 37 received less than a passing score. In Fall 2004, out of 248 students, 31 received less than a passing score. Out of the 31 receiving less than a passing score, 10 had passing grades going into the exam.

**Fall 2004**

**Faculty Survey**

A 7-page survey was distributed to all 100W and 90W instructors. With a 100% return rate, a dinner meeting was held on February 4, 2005, to begin discussions and work on further improving our technical writing program. All of our 100W, 200W, and 90W faculty members were in attendance. We have scheduled several more meetings to refine our next steps in assessing 100W and implementing changes to better reach our goals and objectives. (Survey attached.)

Turnitin.com is being used in most, but not all, 100W courses. The results will be analyzed at the completion of Spring 2005. This is an excellent service that SJSU subscribes to that teaches proper documentation and then checks papers for plagiarism.

Since 1999, the following enhancements to department courses have been made to strengthen student performance for this outcome:
• CE105 Use of figures, tables, graphs and appendices in the technical report.
• CE140 Project.
• CE160 Project.
• CE164 Reflective writing assignment added to design project.
• CE164 Formal requirement for design notebook added to course for design project.
• CE165 Written assignments added to course homework – evaluated for organization, grammar and spelling.
• CE165 Student-developed research proposal added to course assignment.
Outcome 8. Graduates have the broad education necessary to understand the impact of engineering solutions in global, economic, environmental and societal context.

Performance Criteria

8A) Demonstrate an ability to quantify the economic benefits and costs of projects and systems.
8B) Demonstrate an ability to understand the social beneficial and deleterious impacts of projects and systems.
8C) Demonstrate an ability to evaluate the economic and social benefits and costs of projects.

Data Collected

Percentage of Questions Answered Correctly about Engineering Economics on the Fundamentals of Engineering Exam

<table>
<thead>
<tr>
<th>Results from FE Exam</th>
<th>Data Type</th>
</tr>
</thead>
<tbody>
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<td>SJSU Average</td>
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<tr>
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<tr>
<td>April</td>
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<td>November</td>
<td>75</td>
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<tr>
<td>1998</td>
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<td>October</td>
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<td>1999</td>
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<td>October</td>
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<td>2002</td>
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<td>2003</td>
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<td>April</td>
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<td>2004</td>
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</tr>
<tr>
<td>April</td>
<td>54</td>
</tr>
</tbody>
</table>

Notes. 1. indicates data not reported

Alumni Survey Results for Outcome 8

Self Reported Response to: My understanding of the impact of engineering solutions in a global and societal context. (Scale from 0 to 100).

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Graduated within Four Years</th>
<th>Graduated Between Four and Ten Years Prior</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Responses</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Assessment of Undergraduate Education</td>
<td>67</td>
<td>71</td>
</tr>
<tr>
<td>Importance to Career</td>
<td>73</td>
<td>78</td>
</tr>
</tbody>
</table>
Recommendations and Enhancements

Since 1999, the following enhancements to courses have been made to strengthen student performance for this outcome:

- CE105 Students include a discussion of their experiences working in a multidisciplinary environment and the social impacts of the project they worked on during their internship.
- CE130 Relating engineering economics to daily news on economics and finance by presenting current event articles.

There is an ongoing process to enhance the Environmental Engineering Program. This process includes:

1. A decision by the department, and the Environmental Engineering Program coordinator, to offer environmental undergraduate electives courses that will serve undergraduate students. Implementation of this effort resulted in moving existing undergraduate elective courses in Environmental Engineering to the graduate level with appropriate modification of the affected courses. The affected courses are those that tend to enroll environmental engineering graduate students with limited undergraduate enrollment. These courses include: (1) CE 172: Applied Limnology, (2) CE 175: Physical-Chemical Processes in Environmental Pollution Control, and (3) CE 176: Biological Processes in Environmental Pollution Control. At present, both CE 175 and CE 176 have been moved to the graduate level in Environmental Engineering.

2. New undergraduate elective courses are being developed to replace the above courses as they are deleted from the undergraduate program. To replace CE 175, an experimental course was offered in the Fall of 2004 titled "Impact Assessment Engineering Projects on the Environment". This course will be offered again in the Fall of 2005 as a permanent course titled "Engineering for the Environment" (our new CE 173). The major objective of this new course is to address pollution prevention, environmentally conscious engineering and sustainability of the environment.

3. In the Spring of 2006, we will offer an undergraduate course will be offered in "Solid Waste Management Engineering" as an experimental course that will replace the existing CE 176.

4. It is anticipated that the development of the new courses in "Engineering for the Environment" and in "Solid Waste Management Engineering" will result in some modification of the existing core undergraduate course in Environmental Engineering (CE 170). For example, the one lecture on solid waste management will be moved to the new course on Solid Waste Management Engineering. In addition, one lecture on hazardous waste and two lectures on risk assessment will be moved to the new CE 173. This will create room in CE 170 to cover lecture materials on the fundamentals of water and wastewater treatment in more detail and to introduce the students to pollution prevention.

Outcome 9. Graduates have a recognition of the need for, and an ability to engage in life-long learning.

Performance Criteria

9A) Demonstrate strong analytical skills and knowledge of engineering tools as a foundation for future learning.
9B) Demonstrate an ability to gather and assess information using external sources specific to a given engineering issue.
9C) Demonstrate recognition of the need for professional licensure.
9D) Demonstrate participation in professional societies and meetings.
Data Collected

Results from Exit Survey

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Average Response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F99</td>
</tr>
<tr>
<td>I have taken the FE. ¹</td>
<td>54</td>
</tr>
<tr>
<td>I have passed the FE. ¹</td>
<td>28</td>
</tr>
<tr>
<td>Indicate if you are an active member of any student society. ¹</td>
<td>-</td>
</tr>
<tr>
<td>How many professional meetings have you attended while a student at SJSU. ⁵</td>
<td>70</td>
</tr>
<tr>
<td>I am comfortable performing research in the library. ¹</td>
<td>78</td>
</tr>
</tbody>
</table>

Notes. 1. Percentage of responses that were yes.
5. Percentage responding that they have attended at least one meeting.

Alumni Survey Results for Outcome 9

Self Reported Response to: Recognition of the need for and an ability to engage in lifelong learning.

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Graduated within Four Years</th>
<th>Graduated Between Four and Ten Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Responses</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Assessment of Undergraduate Education at SJSU</td>
<td>82</td>
<td>84</td>
</tr>
<tr>
<td>Importance to Career</td>
<td>75</td>
<td>83</td>
</tr>
</tbody>
</table>

Recommendations and Enhancements

Since 1999, the following enhancements to courses have been made to strengthen student performance for this outcome:

- CE131 Having students locate contemporary articles related to ethics and law and sharing them in class.
- CE164 Abstracting of published materials related to design project added to course assignment.
- CE165 Student-developed research proposal added to course to require students to obtain information about an area of earthquake engineering that needs additional research and to determine a suitable means of conducting the experiment.

Outcome 10. Graduates have a knowledge of contemporary issues.

Performance Criteria

10A) Demonstrate an ability to synthesize and analyze information related to contemporary issues.
10B) Demonstrate an ability to work on projects that address contemporary issues such as legal issues, current codes, new technology, the environment, traffic, and other social issues.
Data Collected

**Alumni Survey Results for Outcome 10**  
*Self Reported Response to: My knowledge of contemporary issues.*

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Graduated within Four Years</th>
<th>Graduated Between Four and Ten Years Prior</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Responses</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Assessment of Undergraduate Education at SJSU</td>
<td>77</td>
<td>66</td>
</tr>
<tr>
<td>Importance to Career</td>
<td>83</td>
<td>83</td>
</tr>
</tbody>
</table>

**Recommendations and Enhancements**

Since 1999, the following enhancements to courses have been made to strengthen student performance for this outcome:

- CE130 Relating engineering economics to daily news on economics and finance by presenting current event articles.
- CE130 Demonstrating engineering economics concepts related to students personal economics through examples and assignments.
- CE162 Course updated to new ACI Code 318-05.
- CE162 Utilize new version of SAP and compare results with simpler methods (ACI Coefficient Method).
- CE165 Learning objectives, lecture and reading material added to course to discuss base isolation, active and passive control and other new technologies in structural response modification.

**Outcome 11. Graduates have an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.**

**Performance Criteria**

11A) Demonstrate an ability to use Internet to locate pertinent information.
11B) Demonstrate an ability to use computer programs and computer skills to organize and present information, to analyze problems, and to design components and systems.
11C) Demonstrate an ability to use other modern tools and instruments for engineering applications.

**Data Collected**

**Results from Exit Survey**

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Average Response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F99</td>
</tr>
<tr>
<td>The exposure to computers and software has been.</td>
<td>56</td>
</tr>
</tbody>
</table>

Notes. 4. Percentage responding helpful or very helpful.
Alumni Survey Results for Outcome 11

*Self Reported Response to: My ability to use the techniques, skills and modern tools necessary for engineering practice. (Rating from 0 to 100)*

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Graduated within Four Years</th>
<th>Graduated Between Four and Ten Years Prior</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Responses</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Assessment of Undergraduate Education at SJSU</td>
<td>80</td>
<td>89</td>
</tr>
<tr>
<td>Importance to Career</td>
<td>70</td>
<td>91</td>
</tr>
</tbody>
</table>

The CEE Department maintains one computer laboratory with a total of 20 Pentium computers that contain software applications specific to civil engineering. This laboratory has a local area network to share printing, scanning, and plotting facilities and that is linked to the Internet. This lab is accessible to the students seven days a week through the use of electronic door codes. Faculty members may reserve the labs periodically during the semester so that they can work with the entire class on computer assignments. In addition, the College of Engineering maintains computer labs with general software such as word processing, spreadsheets, Matlab, and web browsers for all students in the college.

In all laboratories students, under the guidance of a faculty member, operate instruments, equipment and testing machines. Funding has been allocated in the last five years to purchase electronic total stations, theodolites, computers and software. Students taking the surveying classes (CE 8 and CE 108) gain substantial experience using electronic surveying equipment as well as the software used to download and analyze the data. Students enrolled in the required environmental engineering course (CE170) use balances, pipettes and other analytical instruments.

Students are exposed to a variety of standard software packages in their courses, with which they complete analysis and design projects. Table B.6 lists some of the applications of computer software.
<table>
<thead>
<tr>
<th>Class</th>
<th>Software</th>
<th>Application</th>
</tr>
</thead>
</table>
| Engr 10   | Matlab Excel Word | Various introductory problems requiring graphing, curve fitting and solution of simultaneous equations.  
|           |                   | Create an engineering graph, calculate and plot a linear regression of data, calculate and plot a curve through a set of data.  
|           |                   | Write an engineering report.  
|           |                   | Prepare and give an engineering presentation.                                                                                                                                                                |
| CE 20     | AutoCAD2002 Excel | 2 dimensional multi-view drawings of various engineering products, a multi-sheet, multi-view project developing a set of engineering plans produced using AutoCAD2002.  
|           |                   | Computer programming using VBA.                                                                                                                                                                                                 |
| CE 113    | Excel Word        | Analysis of laboratory data.  
|           |                   | Writing of laboratory report.                                                                                                                                                                                  |
| CE 121    | Highway Capacity Software (HCS Excel | The students use HCS to determine the Level of Service for an existing freeway and the number of lanes for a new freeway.  
|           |                   | Students find graphical solutions for planning problems.                                                                                                                                                        |
| CE 130    | Excel             | The students utilize computers to calculate all of the engineering economic functions along with using spreadsheets to organize and perform the calculations. |
| CE 134    | Primavera Planner Project (P3) | Students create 150-activity CPM critical path method schedules with Primavera, and compare results with hand calculations. | |
| CE 140    | Excel             | Excel to plot.                                                                                                                                                                                               |
| CE 150    | Excel Hausted Method | Excel used to design open channel flow profiles computation.  
|           |                   | Solve pipe network problems, design pipe network, and design storm sewer.                                                                                                                                       |
| CE 160    | Excel SAP2000     | Students analyze a truss and a frame for different loads and load combinations.                                                                                                                             |
| CE 162    | Excel PCA-Beam PCA-Column Pframe or SAP2000 | Students create their own spreadsheets for design and analysis of rectangular and T-beam sections.  
|           |                   | Used for analysis and design of reinforced concrete beams, slabs and columns.  
|           |                   | Calculate the moment and shear distribution in a skeleton structure.                                                                                                                                          |
| CE 163    | SAP 2000 AutoCAD2002 | Linear analysis of steel structure to provide demand values for use in the structural design.  
|           |                   | AutoCAD drawings of final project.                                                                                                                                                                           |
| CE 164    | Excel AutoCAD2002 | Student developed spreadsheets used to perform design calculations and organize work.  
|           |                   | AutoCAD drawings of final project.                                                                                                                                                                           |
| CE 170    | Word, Excel       | Students use word processing and analysis tools for writing laboratory reports and term papers.  
|           |                   | Some students use AutoCAD in the preparation of their design projects.                                                                                                                                         |
| CE 190    | Excel             | Students design spreadsheets to perform numerical integration, interpolation, and curve fitting; solve linear and non-linear systems of equations, ordinary differential equations, and finite difference equations. |
| CE 192    | Excel             | Students use spreadsheet to perform statistical analysis and graphical display of date such as histogram, frequency distribution and line-graphs. |
**Recommendations and Enhancements**

Since 1999, the following enhancements to courses have been made to strengthen student performance for this outcome:

- **CE20** Drafting software updated to AutoCAD 2002.
- **CE20** Visual Basic for Applications added for computer programming language.
- **CE113** Experiments 1, 2 and 3 revised to include electronic data monitoring and collection.
- **CE113** One testing machine has been renovated with new loading mechanism and to include electronic control system.
- **CE121** Introduced new Highway Capacity Software.
- **CE150** Computer applications have been increased through the use of Haested Methods.
- **CE160** SAP2000 instead of P-Frame.
- **CE162** Utilize City of San José to obtain information on application for permits.
- **CE163** Semester project report required to be drawn using AutoCAD with writing and plotting done using common computer based word-processing and spreadsheets.
- **CE164** Semester project report required to be drawn using AutoCAD with writing and plotting done using common computer based word-processing and spreadsheets.
- **CE165** Plotting required for homework required to be done using computer graphing software.

**Outcome 12. Graduates have proficiency in a minimum of four recognized major civil engineering areas.**

**Performance Criteria**

12A) Apply concepts from at least four major CE areas in solving engineering problems 121, 140, 150, 160, 170.

In the Spring of 2005, the department faculty approved the following statements about proficiency. Students will be considered to meet the proficiency standards when they have passed the mandatory courses (CE121, CE140, CE150, CE160, CE170) in each of the five areas, consisting of: transportation, geotechnical, water resources, structural and environmental engineering. Each one of these courses requires the application of concepts relevant to that area. Descriptions of the main concepts that are applied in these courses follow.

**Environmental**

Environmental engineering encompasses the use of sound engineering thought and practice in solving the problems of environmental sanitation, including the provision of safe, potable, and adequate public water supplies; the proper collection, treatment, recycle/reuse and disposal of wastewater and solid wastes; the control of water, soil and air pollution. In addition, environmental engineering utilizes engineering principles to provide solutions to public health problems, such as the control of pathogen-borne diseases, the elimination of industrial health hazards; the provision of environmentally sound recreational facilities; and the control of the impact of technological advances on environmental degradation. The concepts basic to environmental engineering include the following:

- Chemical equilibria
- Reactor kinetics
- Types and sources of pollutants
- Water quality parameters
- Reactor analysis
- Water treatment processes and design
- Waste water treatment processes and design
- Principles of industrial and hazardous materials and wastes
- Industrial and hazardous waste management and treatment
Principles of air pollution
Solid waste collection and disposal
Recycling and reuse of materials

Standards of practice are established and regulated by Federal and State Environmental agencies. These may include water, air, and safety standards established by the USEPA and State Water Resources Control Board. It also includes discharge criteria for wastewater. The standards are reported in various documents published by the USEPA, State Water Boards and the Federal Register.

Instruction in environmental engineering requires fundamental topics learned in Chemistry (Chem 11A), Fluid Mechanics (ME 111), Soil Mechanics (CE 140) and Water Resources Engineering (CE 150) where students learn fundamental concepts of chemical reactions; flow of water in pipes, design of piping systems, open channels and soil mechanics.

The core environmental course, CE 170, covers a wide range of topics. Students learn fundamentals of water quality, materials balance, reaction kinetics, and reactor analysis. The apply the fundamentals to practical problems in water and waste treatment. The development of reaction kinetics for application to reactor design is introduced. The processes and operations for treating water and wastes are learned. In addition, students are introduced to hazardous waste issues, air pollution and solid waste collection and disposal. In homework assignments and design projects, students are required to design unit operations and/or processes such that state and local treatment standards or discharge criteria are met. Typical codes and standards that apply are those designated in the State Basin Plans for water quality objectives and for discharge criteria. Currently, following completion of CE 170, interested students can select from 4 environmental engineering electives, namely: (1) Applied Limnology (CE 172) applies principles of water quality to the operation and management of watersheds and reservoirs, (2) Hazardous Materials (CE 174) focuses on hazardous waste regulations, identification, transport, treatment options, (3) Physical/Chemical Processes in Environmental Pollution Control (CE 175) provides fundamental knowledge on the theory and application of physico-chemical processes in environmental pollution control, (4) Biological Processes in Environmental Pollution Control (CE 176) provides fundamental knowledge on the theory and application of biological processes in environmental pollution control.

Course Materials from Chem 11A, ME 111, CE 140, CE 150 and CE 170 will be available to the reviewer to show proficiency in environmental engineering.

Geotechnical
Geotechnical engineering is the area in civil engineering that deals with natural materials found near the surface of the earth. It involves the application of the principles of soil mechanics to the design of foundations, retaining structures, and earth structures. The concepts basic to geotechnical engineering are:

- Soil Formation
- Phase relationships
- Soil classification
- Compaction
- Groundwater flow
- Stresses in a soil mass
- Consolidation and settlement analysis
- Shear strength of sands and clays
- Slope stability analysis
- Lateral earth pressures
- Bearing capacity

The standards of practice are established by various professional engineering societies and government agencies. Examples of standards and codes used in geotechnical engineering are the American Society for Testing and Materials (ASTM), Uniform Building Code and NAVFAC Design Manual 7.
Instruction in geotechnical engineering begins with Mechanics of Materials (CE 112) and Fluid Mechanics (ME 111), where students learn the fundamental concepts such as normal and shear stress, Mohr’s circle, failure planes, hydrostatic pressure, and fluid flow that underlie basic concepts in Soil Mechanics (CE 140). In the core course in soil mechanics, CE 140, students learn the major concepts in soil mechanics and apply these concepts to practical problems in geotechnical engineering including estimating the settlement of a building, analyzing the stability of a slope, and estimating the earth pressures acting on a retaining wall. Students follow ASTM Standards for all soil tests and soil classification. The factors of safety for static and pseudostatic conditions for the slope stability project are those commonly required in practice, and are within the limits recommended by various regulatory agencies. Bearing capacity concepts and foundation design are covered in an upper division elective - Foundation Design (CE 141). Course materials from ME 111, CE 112, CE 140 will be used to show proficiency in soil mechanics.

**Structural**

Structural engineering encompasses the planning, designing and construction of structures such as buildings, bridges and towers. Structural engineering activities may be directed toward construction of new structures or the rehabilitation of existing ones. Design and construction of structures are governed by concerns for public safety, economy, and serviceability. The concepts basic to structural engineering are the following:

- static equilibrium
- origins of loads
- load path through structures
- minimum loads for public safety as specified by standards and codes
- common configurations for structures
- stability of structures
- analysis for reactions, internal forces and deformations
- design for strength and serviceability

The standards of practice are established through the efforts of structural engineers working on design projects, analytical studies and research projects. Examples of standards and codes used in structural engineering are the American Concrete Institute Standard 318-05 and the International Building Code.

Instruction in structural engineering begins with Statics (CE 99), where students learn to obtain reactions and internal forces using static equilibrium. The instruction continues in Mechanics of Materials (CE 112, CE 113), introducing students to the analysis of stress, deformations, strains and stability. Here students learn about strength and serviceability criteria and factors of safety. Structural Mechanics (CE 160) expands the concepts of analysis for reactions, internal forces and deformations. CE 160 teaches determination of loads through small design projects requiring use of the loads chapter of the International Building Code (IBC). In Structural Concrete Design (CE 162), students complete the design of a multi-story concrete frame structure using the IBC2003 and ACI 318-05. Course materials from CE99, CE 112, CE 113, CE 160 and CE 162 will be available to show proficiency in structural engineering.

**Transportation**

The objectives of the practice of transportation engineering are to plan, design, construct, maintain, operate and administer efficient and effective transportation systems. The students are first introduced to transportation engineering in the mandatory class: “CE 121: Transportation Engineering”. They have to pass this class with a C- to demonstrate proficiency in transportation engineering. The emphasis is on the planning and design elements, with a focus on road design. For students to be proficient in transportation engineering, they must understand some of the human and vehicular characteristics underlying planning and design and be able to demonstrate their understanding and knowledge of planning and design through solving relevant problems.

**Water Resources**

Water Resources engineering encompasses hydrology, water law and economics, water resources systems engineering, fluid mechanics and hydraulics involving the design of pipe systems, channels, pumping plants, reservoirs, dams, navigational and harbor facilities, hydroelectric plants, drainage facilities and many other hydraulic structures and appurtenances. It involves planning, analysis, design, construction,
operation and management of these facilities. Major projects require years of planning involving consideration of social and political demands, feasibility studies of alternatives, economic and financing considerations and environmental and regional impacts. The basic elements of water resources engineering are as follows:

- Conservation of mass, energy and momentum
- Fluid properties
- Flow properties with respect to viscosity, time and space variations
- Hydrostatics and stability
- Frictional considerations
- Relationship between precipitation and runoff
- Movement of flood waves
- Probabilistic characteristics of natural event
- Open channel and pipe networks
- Pump plants
- Storm and waste water drainage systems
- Flood mitigation
- Hydroelectric generation
- Navigation, harbors
- Erosion and sedimentation mitigation
- Planning, design, economic and system analysis

Design practices are based upon well-established procedures documented by the Bureau of Reclamation and U.S. Corps of Engineers and other agencies. Government agencies provide many regulations governing drainage design, dam safety and flood mitigation, water transfer, navigation, and other areas.

Instruction in water resources engineering begins with Statics (CE 99) and Fluid Mechanics (ME 111) where students learn fundamental concepts of equilibrium, hydrostatic pressure; fluid properties, continuity and Bernoulli’s equations, boundary layer theory, dimensional analysis, flow of water in pipes, drag, pumps and turbines. The core water resources engineering course, CE 150, covers complex open channel problems, reservoirs, spillways, dams, design of pipe networks, drainage design and a number of laboratory projects using flumes, pumps and turbines. In this course students use the City of San Jose code to design a storm sewer system. Students use the Hydraulic Institute Design Manual to design pumping facilities and to determine the required height of flood protection levees. Materials from CE99, ME 111, and CE 150 will be available to show proficiency in water resources engineering.
Recommendations and Enhancements

Since 1999, the following enhancements to courses have been made to strengthen student performance for this outcome:

- CE20 Detailed course learning objectives written to define course content.
- CE20 Course learning objectives reviewed for effectiveness. Objectives to be revised and course materials to be altered in response to the review. See ASCE Journal of Professional Issues, July 2005.
- CE20 Semester project revised to include some design requirements based upon geometric constraints.
- CE20 Drafting software updated to AutoCAD 2002.
- CE20 Visual Basic for Applications added for computer programming language.
- CE20 AutoCAD course added as prerequisite for core content and design courses.
- CE105 Students gather and assess engineering data in the technical report.
- CE105 Students must pass sample FE exams taken during class.
- CE112 New updated text book used. Different HW problems assigned each semester.
- CE113 Laboratory Manual revised.
- CE113 Experiments 1, 2 and 3 revised to include electronic data monitoring and collection.
- CE113 One testing machine has been renovated with new loading mechanism and to include electronic control system.
- CE113 Experiment 4 report requirements revised to include discussion about experimental design related to collection of data during experiment.
- CE121 Created new lab for understanding of superelevation.
- CE121 Created new lab to understand the combination of design elements.
- CE121 Removed the labs on superficial understanding of general transportation problems.
- CE121 Introduced new Highway Capacity Software.
- CE140 New equipment, students present one lab, lab project.
- CE150 A manual for Hydraulic Laboratory, written by Dr. R. Singh, was adopted and is being used in the laboratory. CE150 Lab instruction has now become systematic and better organized.
- CE150 Topics on hydraulics of pumps and pumping stations have been augmented.
- CE150 Use of Bakhmeteff’s integration method for solution of varied flow problems has been discontinued. Now emphasis is placed by numerical methods, which are adaptable to computer applications.
- CE150 Computer applications have been increased through the use of Haested Methods.
- CE160 SAP2000 instead of P-Frame.
- CE162 Course updated to new ACI Code 318-05.
- CE162 New version of SAP utilized. Results compared with simpler methods (ACI Coefficient Method)
- CE163 Detailed course learning objectives written to define course content.
- CE163 Prerequisite changed from being a co-requisite of CE162 to being a prerequisite of CE160 to reflect knowledge skills required for course.
- CE163 Semester project report required to be drawn using AutoCAD with writing and plotting done using common computer based word-processing and spreadsheets.
- CE164 Semester project report required to be drawn using AutoCAD with writing and plotting done using common computer based word-processing and spreadsheets.
- CE164 Detailed course learning objectives written to define course content.
- CE164 Design project revised to provide student learning more aligned with course learning objectives.
- CE164 Course reader written to provide additional resources to students, and to particularly address specific learning objectives.
- CE164 Prerequisite changed from being a co-requisite of CE162 to being a prerequisite of CE160 to reflect knowledge skills required for course.
- CE165 Detailed course learning objectives written to define course content.
• CE165 Course materials updated to 2003 International Building Code.
• CE165 Course reader prepared to provide materials for students aligned with course learning objectives.
• CE165 Student-developed experimental research proposal added to course assignment.
• CE165 Prerequisite changed from being a co-requisite of CE162 to being a prerequisite of CE160 to reflect knowledge skills required for course.
• CE165 Learning objectives, lecture and reading material added to course to discuss base isolation, active and passive control and other new technologies in structural response modification.

Outcome 13. Graduates have an understanding of civil engineering professional issues.

Performance Criteria

13A) Understand civil engineering professional issues such as: procurement of work; bidding versus quality based selection processes; demonstrate ability to identify different types of bids, construct a project schedule, implement contracts and specifications, and identify issues governing liability.

13B) Understand how design professionals and construction professionals interacts to construct a project.

13C) Understand the impact of professional licensure and continuing education, and/or professional practice issues.

In CE 131 students study the U.S legal system, contract law, labor law, liability, and arbitration. They have an entire unit on professional ethics issues including professional engineering codes of ethics, discrimination and harassment issues, engineering professional societies, and whistle blowing. They study different types of engineering and construction contracts, formation principles of contracts, performance and breach of contracts, and contract obligations. They learn about partnerships and corporations, agency relationships and professional liability, and contracting for construction and engineering services including advertisements for bids and proposals. They learn how to develop specifications for workmanship, materials, and design drawings. Each semester a representative from the California State Licensing Board visits the CE 105 class to discuss all the aspects of professional licensure. In CE 131 they learn how to plan and schedule a project.

Data Collected

Alumni Survey Results for Outcome 13

Self Reported Response to: My understanding of professional practice issues such as procurement of work, importance of professional licensure, and interaction of design and construction professionals. (Scale of 0 to 100).

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Graduated within Four Years</th>
<th>Graduated Between Four and Ten Years Prior</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Responses</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Assessment of Undergraduate Education at SJSU</td>
<td>-</td>
<td>70</td>
</tr>
<tr>
<td>Importance to Career</td>
<td>-</td>
<td>95</td>
</tr>
</tbody>
</table>

Note: question was not asked on the 1998 survey.
Recommendations and Enhancements

Since 1999, the following enhancements to courses have been made to strengthen student performance for this outcome:

- **CE105** Lectures provided by members of the State of California State Board of Registration.
- **CE131** Added an entire lecture on professional licensing, one on agency, and one on the liability of engineers.
- **CE131** Present public safety issues and relate them to the responsibility of civil engineers – using actual situations.
- **CE131** Added lectures on bidding, the bidding process, contractual relationships and responsibilities.

### B.5.4 Program Outcomes for Graduate Program

#### B.5.4.1 Relationship between Program Educational Objectives and Outcomes

1. Graduate Program

<table>
<thead>
<tr>
<th>Program Educational Objectives</th>
<th>Program Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program educational objectives are to prepare students to advance in their careers by providing them with knowledge to:</td>
<td></td>
</tr>
<tr>
<td>1. Prepare students for their professional careers and licensure by strengthening their knowledge in their specialization (depth) and extending their skills and knowledge base (breadth).</td>
<td>1 through 5</td>
</tr>
<tr>
<td>2. Provide students advanced proficiencies for professional practice to enable them to advance in the licensing process and equip them for advancement in their career.</td>
<td>1 through 5</td>
</tr>
<tr>
<td>3. Improve students’ research skills and prepare them for further graduate study.</td>
<td>1 through 5</td>
</tr>
<tr>
<td>4. Provide students with experience and skills for multi-disciplinary and cross-disciplinary practice.</td>
<td>1 through 5</td>
</tr>
</tbody>
</table>

#### B.5.4.2 Graduate Program Assessment Summary

Outcomes are assessed via course assessment. Each term two graduate courses are chosen for assessment using student surveys and outside expert evaluations. Data is analyzed by the department faculty and suitable enhancements to the program are made to alleviate identified concerns. To date significant changes have been made to the graduate minor requirements, acceptance of courses outside the department and format of examination for the culminating experience.

#### B.5.4.2.1 Outcome Assessment Process Overview

Assessment is conducted by the faculty members on an on-going basis. Two courses each term are selected to be evaluated to collect data for review. Student surveys are used to collect anonymous student input about the ability of the course to achieve course objectives, program outcomes and program educational objectives. External evaluators are recruited by the department Chair to provide independent review of the curricular content of the course and effectiveness of the instructor. Data is compiled by the department Chair who prepares a summary report to the department faculty. During at least one faculty meeting during the semester, the Chair provides the report to the faculty members, discussion follows on the meaning of the data, and potential enhancements to the program or course are considered.
B.5.4.2.2 Outcome Assessment—Design

An assessment process was designed for the graduate program by the department Chair and Graduate Coordinator in 2005. This design was based upon input from the course coordinators, course instructors, and members of the Department Advisory Council.

Two graduate level courses are assessed each term according to the cycle defined below:

<table>
<thead>
<tr>
<th>Semester</th>
<th>Division</th>
<th>Course Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2005</td>
<td>Structural</td>
<td>CE212</td>
</tr>
<tr>
<td></td>
<td>Water Resources</td>
<td>CE255</td>
</tr>
<tr>
<td>Spring 2006</td>
<td>Construction</td>
<td>CE233</td>
</tr>
<tr>
<td></td>
<td>Geotechnical</td>
<td>CE243</td>
</tr>
<tr>
<td>Fall 2006</td>
<td>Environmental</td>
<td>CE281</td>
</tr>
<tr>
<td></td>
<td>Transportation</td>
<td>CE221, CE225</td>
</tr>
<tr>
<td>Spring 2007</td>
<td>Structural</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water Resources</td>
<td></td>
</tr>
<tr>
<td>Fall 2007</td>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Geotechnical</td>
<td></td>
</tr>
<tr>
<td>Spring 2008</td>
<td>Environmental</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transportation</td>
<td></td>
</tr>
</tbody>
</table>

The intent is that over time all courses in all divisions will be assessed under this method.

A standard evaluation form was developed for the external reviewer so that common definitions could be used between all courses and divisions of the department.

B.5.3.2.3 Outcome Assessment—Methodologies

Linkage between courses and outcomes was completed by course coordinators in 2005. Most courses in the program provide training in each of the outcomes to some extent. To control the scope of work of the assessment process, certain courses are identified for primary assessment of the program. Primary assessment and documentation of student learning is performed for each outcome at various courses as listed in the table.

<table>
<thead>
<tr>
<th>Course</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>210</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>212</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>216</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>220</td>
<td>1, 3</td>
</tr>
<tr>
<td>221</td>
<td>1, 3, 5</td>
</tr>
<tr>
<td>222</td>
<td>1, 3, 5</td>
</tr>
<tr>
<td>223</td>
<td>1, 3, 5</td>
</tr>
<tr>
<td>224</td>
<td>1, 3, 5</td>
</tr>
<tr>
<td>225</td>
<td>1, 3, 5</td>
</tr>
<tr>
<td>226</td>
<td>1, 3, 5</td>
</tr>
<tr>
<td>230</td>
<td>1, 2, 3, 4, 5</td>
</tr>
<tr>
<td>232</td>
<td>1, 2, 3, 4, 5</td>
</tr>
<tr>
<td>233</td>
<td>4, 5</td>
</tr>
<tr>
<td>234</td>
<td>4, 5</td>
</tr>
<tr>
<td>235</td>
<td>1, 2, 3, 4, 5</td>
</tr>
<tr>
<td>236</td>
<td>1, 2, 3, 4, 5</td>
</tr>
</tbody>
</table>
The assessment methods have been used since 2005 and will continue until changed by the department. At the beginning of each semester, the Chair identifies two courses to be evaluated. Based on discussion with the course instructor and coordinator, the Chair prepares a suitable survey for students and recruits a content expert to act as an external reviewer. The Chair meets with the external reviewer to explain the purpose and scope of the evaluation. The anonymous survey is administered to all students in the course by the instructor.
B.6 Data Analysis and Recommendations for Improvement

B.6.1 Undergraduate Program

B.6.1.1 Data Analysis

Full-time faculty members conduct data analysis during a four-hour outcomes assessment retreat each semester. Two outcomes are assessed each semester based on a rotating cycle. The department’s assessment coordinator compiles data relevant to the outcomes under review and distributes the data to the full-time faculty members before each retreat. During the retreat, the faculty analyze the data, discuss any identified areas of concern, and formulate and approve recommendations to address the concerns. These recommendations may be alterations to individual courses or the overall program.

B.6.1.2 Recommendations for Improvement

Starting in 2005, a new method of documenting the assessment process was initiated. Each enhancement is tracked according to the outcome it addresses, the assessment process phase the enhancement has reached, and the final evaluation of whether the enhancement addressed the original concern or not. Three phases of the assessment cycle were defined: Recommendation, faculty members agree to a specific recommendation to address a concern; Implementation, specific alterations to program or course are implemented to address recommendation; and Evaluation, the ability of the enhancement to address the concern is evaluated.

As of October 2006, the database of enhancements is:

<table>
<thead>
<tr>
<th>Outcome No.</th>
<th>Enhancement</th>
<th>Current Phase</th>
<th>Final Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Common final exam in CE99</td>
<td>Implementation</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Removal of Geology 101 as science elective</td>
<td>Implementation</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Graphical skills enhancement</td>
<td>Implementation</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Upgrade of lab testing equipment</td>
<td>Implementation</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Alter design units of electives</td>
<td>Implementation</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Graphics prerequisite for CEE courses</td>
<td>Implementation</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Minimum score required on CE162 design project</td>
<td>Implementation</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oral presentations in CE162</td>
<td>Evaluation</td>
<td>Enhancement addressed concern – added as permanent feature of course.</td>
</tr>
</tbody>
</table>

B.6.2 Graduate Program

B.6.2.1 Data Analysis

The Chair and department faculty members complete data analysis. A report written by the department Chair is reviewed and discussed each semester during a department faculty meeting. Any concerns identified are discussed and when applicable, specific recommendations to alterations of courses and/or programs is made. A final report summarizing the department’s assessment is compiled by the Chair and forwarded to the College of Graduate Studies and Research.

B.6.2.2 Recommendations for Improvement

In Spring 2006, the department agreed to a common definition of suitable minors for all graduate students in the program. It was decided that the minor must be two or three courses taken in one of the divisions.
outside of the student’s major emphasis and that the minor must be in a division of the department. This requirement is to be implemented for all graduate students starting in Fall 2006 or later.

In Spring 2006, the department agreed that courses outside the department could only be used in a student’s degree program if the course was from a list approved by the department faculty. This restriction on course selection was effective starting in Fall 2006, for any courses taken after the date of implementation.

In Fall 2006, the department approved a standard format for administering the culminating experience for graduate students. Students meeting the culminating experience via examination are to successfully complete a written exam with questions from both their major and minor areas of emphasis. This change is to take place as of Fall 2006.

B.7 Faculty

The department has six full-time tenured faculty members and one tenured faculty member on early retirement resulting in a half-time appointment. All seven tenured faculty members hold Ph.D. degrees in their respective subject areas. Three are registered professional engineers, two others have other forms of professional registration. Several have had two or more years of industrial experience. Experienced practicing engineers are used as lecturers to teach specific courses. Many of these lecturers have had a sustained affiliation with the University and have been active in updating the curriculum and the laboratories. The lecturers bring an additional element of professional practice and on-the-job realism to classroom instruction. The size of the faculty is adequate to cover all of the curricular areas in the program, as well as responsibilities to the students, the College of Engineering, the University and the profession.

Faculty members have excellent educational credentials, extensive industrial experience, and they are from a diverse set of academic and professional backgrounds. Members of the faculty have been recognized for the quality of their teaching. Faculty members have been active in experimenting with alternative teaching styles and have delivered and participated in College of Engineering professional development seminars. In addition, faculty members have received SJSU, NSF, and Department of Education grants for curriculum and laboratory development. The faculty enjoys an excellent reputation and working relationship within the civil engineering profession. Individual faculty members have been recognized as fellows of engineering societies, served on boards of directors of societies and national centers, served on national committees of societies, served as editors of journals, and as authors of textbooks.

B.7.1 Full-Time Faculty

The department has six full-time tenured faculty members and one tenured faculty member on early retirement resulting in a half-time appointment. All seven tenured faculty members hold Ph.D. degrees in their respective subject areas. Several have had two or more years of industrial experience.

The ASCE requests an additional requirement for Civil Engineering programs in that, “faculty teaching courses that are primarily design in content are qualified to teach the subject matter by virtue of professional licensure, or by education and design experience.” In the CEE program, various courses are identified as containing major design experiences and the instructors who teach the courses have the following design experience:

- CE123 – Botha (P.E. South Africa)
- CE133 – Merrick (P.E. California)
- CE141 – Oskorouchi (G.E. California)
- CE154 – Singh (P.E. California)
- CE162 – Al-Manaseer (P.Eng. Saskatchewan, Chartered Structural Engineer United Kingdom), McMullin (P.E. California)
- CE163 – McMullin (P.E. California), Vukazich (S.E. California)
- CE164 – McMullin (P.E. California), Vukazich (S.E. California)
- CE176 – Ndon (about two years of industrial experience in water/wastewater consulting firm)
The faculty maintains a close association with students through advising and counseling, classroom contact, and extra-curricular activities and continues a close relationship with alumni. Faculty members serve as advisors to student societies as follows:

- American Association of Cost Engineers International: Janet Yates
- American Society of Civil Engineers: Akthem Al-Manaseer
- Associated General Contractors: Janet Yates
- Chi Epsilon: Steve Vukazich
- Institute of Transportation Engineers: Jan Botha
- Water Environment Engineering Organization: Udeme Ndon

### B.7.2 Part-Time Faculty

Experienced practicing engineers are used as lecturers to teach specific courses. Many of these lecturers have had a sustained affiliation with the University and have been active in updating the curriculum and the laboratories. The lecturers bring an additional element of professional practice and on-the-job realism to classroom instruction.

### B.7.3 New Faculty

New faculty are hired based upon their qualifications. New part-time faculty are assisted in developing teaching practices through discussion with course coordinators and/or the department Chair.

#### B.7.3.1 Reduced Teaching Load

Since Fall 1994, the College of Engineering policy has been to assist new faculty members in developing their teaching repertoires and initiate research programs by reducing their teaching loads by one-half during their first year and by one-quarter during their second year. This policy pertains to all newly-graduated PhD faculty members. More experienced faculty members also receive some initial release-time support depending on their needs and qualifications. After this induction period, a new faculty member can secure external or internal funding to reduce his/her teaching load.

### B.7.4 Faculty Professional Development

Professional development plans are defined by each faculty member. All faculty members are notified of university-delivered professional development opportunities. Clearly defined professional development workshops are funded by the department or college on an ad-hoc basis.

### B.7.5 Faculty Research and Scholarship

Faculty members are actively engaged in research and scholarship. All full-time faculty members and some part-time faculty members conduct both experimental and analytical research and publish in peer-reviewed journals or professional society conferences. Recent publication lists are included in the faculty vitae in the Appendix.

### B.8 Facilities

#### B.8.1 Teaching Classrooms

The Engineering building contains ten lecture rooms (capacity of 35 to 100 students) and five teaching labs (capacity of 50 to 100 students), all of which are scheduled for lectures and non-equipment type labs. Additionally, overflow lecture sections are scheduled in other facilities on campus through the Academic Scheduling office.
B.8.2 Teaching Laboratories

Table B.6.1 provides a summary of the laboratory facilities used for instruction by the CEE Department. Included in the table are the physical location of each laboratory, the purpose and use, condition, adequacy for use in instruction, number of student stations, and room size, as appropriate. In all cases, the condition of the laboratory facilities and the adequacy for use in instruction are considered good to excellent by the department faculty and Ad-Hoc Industrial review committees. Most labs are furnished with electronic locks to allow students to enter the labs on an as-needed basis. In addition to the laboratories listed in Table B.6.1, the College of Engineering maintains two open computer laboratories with standard software applications such as word processing, spreadsheets, plotting software, programming languages, AutoCAD and access to the Internet. These labs are staffed full-time with student assistants to maintain the equipment and provide assistance with using the software.

The CEE Department maintains a student clubroom that serves as the headquarters for the student chapters of the American Society of Civil Engineers, the Associated General Contractors, and Chi Epsilon. The clubs are invited to maintain their own web pages linked to the Department web page. Space is allocated for the student chapter of the Institute of Transportation Engineers to maintain a lending library.
Laboratory Facilities Used for Instruction by the Department.

<table>
<thead>
<tr>
<th>Laboratory Location/Name</th>
<th>Purpose of Laboratory Including Undergraduate Courses Taught</th>
<th>Laboratory Condition</th>
<th>Adequacy for Instruction</th>
<th>Number of Student Stations</th>
<th>Area, (sq. ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E106 - Structures</td>
<td>Structural Research and Instruction CE 105, CE164, CE165</td>
<td>Good</td>
<td>Good</td>
<td>N/A</td>
<td>2,070</td>
</tr>
<tr>
<td>E127 - Structures</td>
<td>Structural Research and Instruction CE 105, CE 162, CE163, CE164</td>
<td>Good</td>
<td>Good</td>
<td>N/A</td>
<td>2,400</td>
</tr>
<tr>
<td>Engineering Courtyard</td>
<td>Structural and Hydraulics; Research &amp; Instruction. For Surveying, CE 105, CE 120, CE 150, CE 180 Projects</td>
<td>Good</td>
<td>Good</td>
<td>N/A</td>
<td>12,000</td>
</tr>
<tr>
<td>E131 - Structures</td>
<td>Undergraduate structures and material testing CE 113, CE163, CE164, CE165</td>
<td>Good</td>
<td>Good</td>
<td>N/A</td>
<td>2,544</td>
</tr>
<tr>
<td>E129 - Concrete</td>
<td>Instruction CE 120, CE 162</td>
<td>Good</td>
<td>Good</td>
<td>N/A</td>
<td>1,456</td>
</tr>
<tr>
<td>E134 - Bituminous Materials</td>
<td>Instruction CE 120</td>
<td>Good</td>
<td>Good</td>
<td>N/A</td>
<td>2,360</td>
</tr>
<tr>
<td>E 150 – Water Resources</td>
<td>Instruction CE 150</td>
<td>Good</td>
<td>Good</td>
<td>N/A</td>
<td>2,800</td>
</tr>
<tr>
<td>E 132 - Surveying</td>
<td>Instruction and Storage, CE 8, CE 108</td>
<td>Very Good</td>
<td>Very Good</td>
<td>N/A</td>
<td>800</td>
</tr>
<tr>
<td>E 207 – Geotechnical</td>
<td>Instruction and Research CE 140, CE 242</td>
<td>Very Good</td>
<td>Good</td>
<td>N/A</td>
<td>1,410</td>
</tr>
<tr>
<td>E 209 – Geotechnical</td>
<td>Instruction CE 140, CE 242</td>
<td>Very Good</td>
<td>Good</td>
<td>N/A</td>
<td>1,400</td>
</tr>
<tr>
<td>E 211 - Computer</td>
<td>Design, analysis and reports. Many courses</td>
<td>Excellent</td>
<td>Excellent</td>
<td>16</td>
<td>1,410</td>
</tr>
<tr>
<td>E 227 - Environmental</td>
<td>Instruction and Research, CE 170, CE 274, CE 281, CE 282</td>
<td>Very Good</td>
<td>Good</td>
<td>10 groups</td>
<td>1,400</td>
</tr>
<tr>
<td>E 228 - Environmental</td>
<td>Instruction and Research, CE 170, CE 274, CE 281, CE 282</td>
<td>Good</td>
<td>Good</td>
<td>N/A</td>
<td>1,600</td>
</tr>
</tbody>
</table>

N/A = not applicable

Laboratory Directors coordinate with one full-time technician in the Department and the central service technicians in the College to perform regular and special maintenance and service of laboratory equipment and computers. Supplies for laboratory uses are handled in the same manner to assure that instructional and research needs are met. Students also receive assistance from the technician in their class projects. Periodic calibrations of specific equipment are performed (e.g., balances, testing machines) by outside contracts with equipment suppliers. Since 1999, the department has received $140,000 in donations for the upgrade of laboratories.
CEE Department has built up good laboratory facilities over the last 20 years. Equipment and instruments available are adequate for instructional needs in all areas including mechanics, surveying, structures, geotechnical, concrete, transportation, water resources and environmental engineering.

The CEE Department obtained new space and updated the geotechnical, structures and computer laboratories in 1989. Additional updates are still required for the structural laboratories. Additional space (approximately 600 square feet) was acquired in 1997 for the expansion of an existing environmental engineering laboratory. The redesigned laboratory includes a room used for bioreactor research and instruction, new cabinets and changes to the infrastructure of the lab.

### Laboratory Directors for each Designated Laboratory Area

<table>
<thead>
<tr>
<th>Designated Laboratory Area</th>
<th>Laboratory Room Numbers</th>
<th>Laboratory Co-Directors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer</td>
<td>E-211</td>
<td></td>
</tr>
<tr>
<td>Concrete</td>
<td>E-129</td>
<td>Dr. Akthem Al-Manaseer</td>
</tr>
<tr>
<td>Environmental</td>
<td>E-227, E-228, E-229</td>
<td>Dr. Udeme Ndon</td>
</tr>
<tr>
<td>Geotechnical</td>
<td>E-207, E-209</td>
<td>Dr. Steve Vukazich</td>
</tr>
<tr>
<td>Structures</td>
<td>E-106, E-127, E-131</td>
<td>Dr. Kurt McMullin</td>
</tr>
<tr>
<td>Surveying</td>
<td>E-132</td>
<td>Dr. Akthem Al-Manaseer</td>
</tr>
<tr>
<td>Asphalt</td>
<td>E-134</td>
<td>Dr. Jan Botha</td>
</tr>
<tr>
<td>Water Resources</td>
<td>E-150</td>
<td>Dr. Ram Singh</td>
</tr>
</tbody>
</table>

### B.8.3. Other Facilities

Off campus facilities are not used by the department.

### B.9 Institutional Support and Financial Resources

#### B.9.1 Financial Resources

**B.9.1.1 General Fund**

The annual budget allocation for each program is made by the Dean of Engineering with assistance from the Associate Deans and the Assistant to the Dean. For the most part, the allocation is made by a set formula, especially in the areas of supplies and services, travel, postage, telephone, and equipment. The formulas for supplies and services, postage, telephone and equipment are based on each program’s fraction of the College’s Full-Time Equivalent Students (FTES). Travel allocations, however, are based on the numbers of tenure-track faculty in each program.

The College’s budget, in turn, is established by the University, which itself uses FTES as a basis for determining the allocation for each college. There are, however, three factors that influence University allocations. First, each program is assigned an FTES target and a Student-Faculty Ratio (SFR). Historically, Engineering programs have been assigned an SFR of approximately 16, which is considerably less than other University programs in Humanities and the Arts. This SFR assignment is in recognition that engineering programs, because of their heavy emphasis on laboratory and project work, require a lower SFR than is appropriate for disciplines whose courses are taught almost entirely in the lecture mode.
Second, the University allocates a disproportionately higher percentage of funding for equipment replacement and maintenance to the laboratory-based disciplines.

Finally, the University budget for faculty provides an allocation for tenure-track faculty that is essentially “salary blind”. In other words, once the assigned FTES and SFR for the College have been translated into the number of Full-Time Equivalent Faculty (FTEF) required, the sum of the salaries of the entire tenure track faculty become the base part of the faculty allocation budget. The difference between the FTEF provided by tenure-track faculty and the amount needed by the College is generally provided by temporary faculty members hired from the pool of technically-qualified engineers in the Silicon Valley. These temporary lecturers are all budgeted at a specified salary, but department chairs have the flexibility to hire at higher levels, provided they do not exceed their overall faculty allocation budget. This budgeting process is helpful to the College because the salaries paid to Engineering Faculty members are generally higher than those paid to professors in most other disciplines.

B.9.1.2 Endowment Funds

The department holds several endowment accounts with the Foundation. These include endowments for faculty chairs, faculty professional development and student scholarships.

The Davidson Endowment has been established by our alumnus Charles Davidson. His gift of $500,000 was the largest single donation the university had ever received from an individual. This donation has been used as the basis to develop an endowed Professorship in Construction Management and Engineering. Current revenue from the account is used to fund at least two courses each year.

The Lorell Endowment has been fully funded since 2000. This fund provides small stipends for faculty professional development each year.

The department owns several endowments that pay for student scholarships ranging from $500 to $2000 each. These scholarships are awarded each spring semester after review of applications. Scholarships are available based on need, merit or a combination of the two.

B.9.1.3 Contracts and Grants

Department full-time faculty members raise money for research and curriculum development from the pursuit of grants with external funding programs. These grants range in value according to the scope of research work or extent of course enhancement. Recent grants have been awarded by the National Science Foundation, the California Department of Transportation, and local water districts.

The College also derives support from funding provided by the Continuing Education programs, such as Open University, where qualified students who are not matriculated may be permitted on a space-available basis, to take a course being offered. Open University enrollments are realized primarily in graduate courses, and the resulting funds are divided among several units of the University. The College of Engineering, to the present time, does not distribute these funds directly to the Academic Departments, but uses them to support activities that would otherwise not be funded, such as travel for faculty to present papers at professional meetings, moving expenses for new faculty members, faculty interviewing expenses, matching support for equipment grants, and so forth. Funds derived from Continuing Education programs have averaged approximately $100K per year for the past several years.

The Department and College also derive support from the return on indirect charges collected by the San Jose State University Foundation in connection with Grants and Contracts. The funding distributed to the College, which is used to support research-related activities, is divided into three equal portions: one-third goes to the Dean, one-third to the principal investigator’s department, and one-third to a research account controlled by the PI. Over the past five years the funds available to the Dean, Departments, and PIs have been approximately $80K – $90K each per year. These funds are used to provide matching support for research equipment, release time or summer support to enable faculty to write grant proposals, travel to visit potential grant sponsors, etc.
B.9.1.4 Donations and Gifts

The State of California had a deep and prolonged recession in the early 90’s which badly eroded support for the universities in the State. The last two or three years have seen a gradual increase in funding support, but without external support, it would be virtually impossible to reach the College’s goals. Several laboratories and the College’s network infrastructure have been upgraded with these funds. Fortunately, being located where we are and with the strong linkages to industry we have, external support has been forthcoming. Since 1999, the department has received $140,000 of external support for laboratory upgrades. In recognition that reliance on significant external support will continue, the University allocated a position for the College to add a Development Officer. This individual is now in place and is formulating a development plan for the College. This development plan includes major efforts to continue and expand industry partnerships to supplement institutional funds in implementing departmental laboratory plans.

B.9.2 Instructional Support

B.9.2.1 Endowment Chairs

The department does not currently have any endowed chairs.

B.9.2.2 Sabbatical Leave

Faculty professional development is a high priority in the College of Engineering. The College essentially allocates 7% to 10% of its annual budget to professional development activities for faculty. This is made possible by slightly increasing the teaching loads, in terms of FTES, for each faculty member. The professional development funds are used primarily for two purposes: the award of sabbatical leaves, and reduced teaching assignments for new faculty members during their first two years. The tenure-track faculty of the department have been awarded one sabbatical or Difference-In-Pay Leaves (DIPs) for each of AY 01-02, AY 02-03, and AY 05-06 and two in AY 03-04. Difference-In-Pay leaves are similar to sabbaticals, but are funded differently. Virtually all faculty members who have applied for a sabbatical or DIP leave during the academic years beginning in Fall 1994 have now received one.

B.9.2.3 College Faculty Development Grants

The College of Engineering awards development grants to promising faculty members based upon proposals for innovative research or teaching. Department faculty members have competed successfully for these in the past and expect to pursue such funds in the future.

B.9.2.4 Student Scholarships

The department awards various scholarships to promising students each year. These range from $500 to $2000 and may be awarded for merit, need or a combination of the two. Scholarships applications are reviewed by a committee of faculty members who recommend suitable candidates. The department Chair notifies the student winners and awards the individual scholarships.

B.10 Interdependence of Programs

B.10.1 Service to the SJSU

All courses in the undergraduate and graduate program are open to any students in the university who meet the prerequisite requirements. Occasionally engineering students from outside the department enroll in courses to broaden their expertise. In addition, engineers working in the local community enroll in specific courses when deemed appropriate via the Open University procedures.
B.10.2 Service to Programs of College of Engineering

All courses in the undergraduate and graduate programs are open to any students in the university who meet the prerequisite requirements. Certain undergraduate courses are required by other departments in the college according to the table below.

<table>
<thead>
<tr>
<th>Course</th>
<th>Majors outside of Civil and Environmental Requiring Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 99</td>
<td>Mechanical Engineering, Aerospace Engineering, Materials Engineering</td>
</tr>
<tr>
<td>CE112</td>
<td>Mechanical Engineering, Aerospace Engineering</td>
</tr>
<tr>
<td>CE113</td>
<td>Mechanical Engineering</td>
</tr>
</tbody>
</table>

B.10.3 Service to the MSE Program

Certain courses are identified by the MSE Program as suitable for students. Instruction in these courses is coordinated with the director of the MSE Program.

B.10.4 Service to the Off-Campus Programs

The department is not involved in any formal off-campus program.
C. PROGRAM PLANNING AND STRATEGIES

C.1 Five-Year Plan and Strategies Overview

The primary goal of the department is to strengthen and enhance the undergraduate and graduate programs. Objectives identified by the department Chair and full-time faculty include: 1) continual review of Program Educational Objectives and Outcomes, 2) continued review of the program curriculum and faculty workload, 3) hiring and retaining three new full-time faculty members, 4) upgrade of laboratory equipment, and 5) hiring a new half-time technician.

This goal and set of objectives were established in Fall 2006 during discussion held by the full-time faculty members of the department. The resources to fund the work required to achieve these objectives is expected to come from three different sources during the next five years: $935,000 from the annual university allocation, $150,000 from outside funding raised by the department, and $635,000 from college or university support beyond the annual allocation. The justification for this investment is based on expected growth in student enrollment, approved by the full-time department faculty members after review of student enrollments over the last 15 years.

C.1.1 Goals and Alignment with Department and College Missions

The department is committed to aligning their goals with the mission of both the university and college.

C.2 Strategies and Actions Plan

The department sees three sources of financial support in the development of this plan:

1. University allocation based upon FTES each semester. In Fall 2006, the General Fund budget allocation to the department was $1,103,512.
2. Funds raised by the department from department-initiated grant-writing or fund-raising. One major source of funding in this source is the Davidson Endowment.
3. Funds received from outside the department from either the college or university level. This included funds obtained from the state budget in line-item funding accounts, grants received by the university or college and funds raised through either the university or college advancement pursuits.

C.2.1 Goal 1: Strengthen and enhance undergraduate and graduate programs

C.2.1.1 Objective 1: Continued review of Program Educational Objectives and Outcomes

C.2.1.1.1 Action 1: Continuous review and enhancement of Program Educational Objectives and Outcomes.

Responsibility: Chair and ABET Coordinator
Resources: Full-time faculty service allocation
Timeline: Continuous throughout five-year plan
Success Metric: Receive 6-year ABET accreditation in AY11/12

C.2.1.2 Objective 2: Continued review of Program Curriculum and Faculty Workload

C.2.1.2.1 Action 1: Continuous review of program course and laboratory offerings, and content.

Responsibility: Chair
Resources: Full-time faculty service allocation
Timeline: Continuous throughout five-year plan
Success Metric: Review of course content and laboratory offerings and make changes as best fit in the program.
C.2.1.3 Objective 3: Hire and Retain New Full Time Faculty

C.2.1.3.1 Action 1: Hire and Retain New Full Time Faculty in Water Resources
Responsibilities: Chair of Department
Resources: Annual university allocation ($100,000)
Timeline: AY06/07 recruitment and hiring. AY07/08 Start-up year with 50% release time, AY08/09 release time of 25%, AY09/10 full teaching load.
Success Metric: Faculty member hired and retained at end of five-years.

C.2.1.3.2 Action 2: Hire and Retain New Full Time Faculty in Geotechnical Engineering
Responsibilities: Chair of Department
Resources: Annual university allocation ($100,000)
Timeline: AY06/07 recruitment and hiring. AY07/08 Start-up year with 50% release time, AY08/09 release time of 25%, AY09/10 full teaching load.
Success Metric: Faculty member hired and retained at end of five-years.

C.2.1.3.3 Action 3: Hire and Retain New Full Time Faculty in Construction Management and Surveying
Responsibilities: Chair of Department
Resources: Davidson Foundation Account ($50,000 ~ $75,000); Annual university allocation ($25,000 ~ $50,000)
Timeline: AY08/09 recruitment and hiring. AY09/10 Start-up year with 50% release time, AY10/11 release time of 25%, AY11/12 full teaching load.
Success Metric: Faculty member hired and retained at end of five-years.

C.2.1.4 Objective 4: Upgrade Laboratory Equipment

C.2.1.4.1 Action 1: Upgrade laboratory testing equipment.
Responsibilities: Chair and lab coordinators
Resources: $200,000 required from non-departmental funds, $50,000 paid in AY05/06 from college funds
Timeline: AY07/08 – conduct lab equipment prioritization study. AY08/09 to AY11/12 $50,000 of equipment purchased and installed each year.
Success Metric: Number of items from equipment needs list purchased and money spent each year.

C.2.1.4.2 Action 2: Upgrade computer equipment in computer labs and faculty offices every three years.
Responsibility: Department Chair
Resources: $10,000 from department funds in AY08/09 and 11/12; $30,000 in AY08/09 and $35,000 in AY11/12 required from non-departmental funds
Timeline: AY08/09 purchase and install new computers. AY12/13 purchase and install new computers
Success Metric: Number of new computers purchased and installed each year.

C.2.1.5 Objective 5: Hire Half-time Technician

C.2.1.5.1 Action 1: Hire new technician to oversee environmental labs, hazardous waste, and computer facilities
Responsibility: Department Chair
Resources: $45,000 required from non-departmental funds in AY/10/11 and on-going afterward.
Timeline: AY09/10 recruit and hire half-time technician
Success Metric: Technician hired and retained at end of five years.
### C.3 Strategies and Actions Plan Summary Matrix

<table>
<thead>
<tr>
<th>Academic Year(s)</th>
<th>Goals, Objectives and Actions</th>
<th>Resources Required</th>
<th>University Allocation</th>
<th>Department Raised Funds</th>
<th>College or University Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006/12</td>
<td><strong>Goal 1 – Strengthen and enhance undergraduate and graduate program.</strong></td>
<td></td>
<td>$935,000</td>
<td>$150,000</td>
<td>$635,000</td>
</tr>
<tr>
<td></td>
<td>Objective 1: Continued review of Program Educational Objectives and Outcomes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Action 1: Continuous review and enhancement of Program Educational Objectives and Outcomes.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007/08</td>
<td>Continue assessment work</td>
<td></td>
<td>--</td>
<td>90,000</td>
<td></td>
</tr>
<tr>
<td>2008/09</td>
<td>Continue assessment work</td>
<td></td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>2009/10</td>
<td>Continue assessment work</td>
<td></td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>2010/11</td>
<td>Continue assessment work</td>
<td></td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>2011/12</td>
<td>Continue assessment work</td>
<td></td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Objective 2: Continued review of curriculum and faculty workload</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Action 1: Continuous review of course offerings, content and faculty workload.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007/08</td>
<td>Continue review work</td>
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<td></td>
</tr>
<tr>
<td>2008/09</td>
<td>Continue review work</td>
<td></td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>2009/10</td>
<td>Continue review work</td>
<td></td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>2010/11</td>
<td>Continue review work</td>
<td></td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>2011/12</td>
<td>Continue review work</td>
<td></td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Objective 3 – Hire and retain new full-time faculty.</td>
<td></td>
<td>$925,000</td>
<td>$150,000</td>
<td>$270,000</td>
</tr>
<tr>
<td></td>
<td><strong>Action 1 – Hire new Water Resources faculty member.</strong></td>
<td></td>
<td>$425,000</td>
<td>--</td>
<td>$90,000</td>
</tr>
<tr>
<td>2006/07</td>
<td>Recruit</td>
<td></td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>2007/08</td>
<td>50% teaching assignment</td>
<td></td>
<td>$50,000</td>
<td>--</td>
<td>$65,000</td>
</tr>
<tr>
<td>2008/09</td>
<td>75% teaching assignment</td>
<td></td>
<td>$75,000</td>
<td>--</td>
<td>$25,000</td>
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<tr>
<td>2009/10</td>
<td>100% teaching assignment</td>
<td></td>
<td>$100,000</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2010/11</td>
<td>100% teaching assignment</td>
<td></td>
<td>$100,000</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2011/12</td>
<td>100% teaching assignment</td>
<td></td>
<td>$100,000</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td><strong>Action 2 – Hire new Geotechnical faculty member.</strong></td>
<td></td>
<td>$425,000</td>
<td>--</td>
<td>$90,000</td>
</tr>
<tr>
<td>2006/07</td>
<td>Recruit</td>
<td></td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>2007/08</td>
<td>50% teaching assignment</td>
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<td>$50,000</td>
<td>--</td>
<td>$65,000</td>
</tr>
<tr>
<td>2008/09</td>
<td>75% teaching assignment</td>
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<td>$25,000</td>
</tr>
<tr>
<td>2009/10</td>
<td>100% teaching assignment</td>
<td></td>
<td>$100,000</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2010/11</td>
<td>100% teaching assignment</td>
<td></td>
<td>$100,000</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2011/12</td>
<td>100% teaching assignment</td>
<td></td>
<td>$100,000</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Action 1: Upgrade laboratory testing equipment</td>
<td>$10,000</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2007/08</td>
<td>Conduct lab prioritization study.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2008/09</td>
<td>Purchase and install equipment.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>$50,000</td>
</tr>
<tr>
<td>2009/10</td>
<td>Purchase and install equipment.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>$50,000</td>
</tr>
<tr>
<td>2010/11</td>
<td>Purchase and install equipment.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>$50,000</td>
</tr>
<tr>
<td>2011/12</td>
<td>Purchase and install equipment.</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>$50,000</td>
</tr>
<tr>
<td>Objective 5: Hire Half-time Technician</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>$45,000</td>
<td>$45,000</td>
</tr>
<tr>
<td>Action 1: Hire new technician to oversee environmental labs, hazardous waste, and computer facilities</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>$135,000</td>
</tr>
<tr>
<td>2007/08</td>
<td>--</td>
<td>--</td>
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<td>--</td>
<td>--</td>
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<tr>
<td>2008/09</td>
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<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2009/10</td>
<td>Recruit and hire half-time technician</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>$45,000</td>
</tr>
<tr>
<td>2010/11</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>$45,000</td>
<td>$45,000</td>
</tr>
<tr>
<td>2011/12</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>$45,000</td>
<td>$45,000</td>
</tr>
</tbody>
</table>

**C.4 Five Year Faculty and Staff Hiring Plan**

In the next five years, the department will consider the addition of three new full-time tenure-track faculty members and one half-time technician based upon the expectation that all current faculty members and staff continue with the department until retirement.

**C.4.1 Faculty Hiring Plan and Justification**

**Curricular Responsibilities/Faculty Competencies**

The objective of this section is to develop a profile of faculty competencies required to meet current curricular responsibilities. You should assume that the number of equivalent full-time faculty will remain approximately the same over the next five years. Please reference or attach any documents explaining
anticipated changes in curricular responsibilities, and describe responsibilities at the level of specificity required to identify faculty competencies (i.e., by major, concentration, or course level).

<table>
<thead>
<tr>
<th>Curricular Responsibilities</th>
<th>Equivalent Full-Time Faculty</th>
<th>Names of Faculty</th>
<th>Retirement Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Engineering</td>
<td>1</td>
<td>Janet Yates</td>
<td>Beyond 5 years</td>
</tr>
<tr>
<td>Environmental Engineering</td>
<td>1</td>
<td>Udeme Ndon</td>
<td>Beyond 5 years</td>
</tr>
<tr>
<td>Geotechnical Engineering</td>
<td>0.5</td>
<td>Steven Vukazich (1/2)</td>
<td>Beyond 5 years</td>
</tr>
<tr>
<td>Structural Engineering</td>
<td>2.5</td>
<td>Akthem Al-Manaseer, Kurt McMullin, Steven Vukazich (1/2)</td>
<td>Beyond 5 years</td>
</tr>
<tr>
<td>Transportation Engineering</td>
<td>1</td>
<td>Jan Botha</td>
<td>Beyond 5 years</td>
</tr>
<tr>
<td>Water Resources</td>
<td>0.5</td>
<td>Ram Singh</td>
<td>2 years (On FERP)</td>
</tr>
</tbody>
</table>

Anticipated Needs

To allow flexibility for changes in course offerings and enrollments, the number of regular (tenure-track and tenured) faculty should be limited to a maximum of 80 percent of the of full-time faculty equivalent. Although FERP faculty need not be counted in calculating this percentage, they must be considered in deciding if 80 percent is a reasonable norm: assignments for all FERP faculty must be covered in departmental/school allocations. All new participants in FERP represent faculty competencies that will need to be replaced after the five-year term in the program has expired.

Without any further recruitment, the currently allocated FTEF exceeds the number of full-time tenured and tenure-track faculty. The department is therefore already under the 80 percent limitation.

The Spring 2006 FTES in the department is 234 (108 approx. five years ago). ABET visiting team in the Fall of 2005 indicated that few faculty constitute a weakness in the Department in the final ABET report. The EAC in its final report requested documentation of the completed hiring process by July 2007 before the weakness is removed. This include documentation of the new faculty member’s areas of expertise and how the new faculty members complements the existing faculty members to provide the range of expertise needed to cover all the major areas of civil engineering (Water Resources ad Geotechnical)

The Department lost five faculty members in the last eight years and the enrollment doubled in the last six years and no replacement was made. The Department needs full time faculty to continue the growth and address the ABET weakness.
Dr. Ram Singh is on FERP and will retire after 2 years. He is the only faculty member representing the water resources discipline and replacement for him is very important for AY07/08. We should like Dr. Singh to train the new faculty before retirement. The current Geotechnical undergraduate classes are currently taught by one of the structural faculty and two other part time faculty. These are the two positions for which the department wishes to recruit and were considered a weakness by ABET visiting team and the EAC.

Annual Request and Program Review Documentation

1.a Using the following formula, calculate the percentage of equivalent full-time faculty positions filled by tenure-track and tenured faculty if recruitment is successful.

\[
\text{Present year’s allocation} = (1) \text{ Number of full-time tenured faculty (FERP Faculty not included)} + (2) \text{ Number of tenure-track faculty} + (3) \text{ Number of tenure-track searches extended} + (4) \text{ Number of tenure-track searches proposed} + (5) \text{ Present year’s allocation (in equivalent full-time positions)} + (6) \text{ Present year’s allocation for chair} + (7) \frac{[(1) through (4)]}{(5)}
\]

1.b Identify other factors affecting actual or potential use of allocation.

\[
(1) \text{ Number of faculty on Pre-Retirement or FERP} + (2) \text{ Number of full-time administrators with retreat rights} + (3) \text{ Number of faculty regularly teaching outside the department/ school (note time fraction and department)} + (4) \text{ Amount of administrative time and assigned time currently allocated to department chair/school director}
\]

C.4.2 Staff Hiring Plan and Justification

Responsibilities/Staff Competencies

The objective of this section is to develop a profile of staff competencies required to meet current department goals.

<table>
<thead>
<tr>
<th>Responsibilities</th>
<th>Equivalent Full-Time Staff Appointment</th>
<th>Names of Staff</th>
<th>Retirement Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office Administrator</td>
<td>1.0</td>
<td>Ester Burton</td>
<td>Beyond 5 years</td>
</tr>
<tr>
<td>Laboratory Technician</td>
<td>1.0</td>
<td>Patrick Joice</td>
<td>Beyond 5 years</td>
</tr>
<tr>
<td>Office Administrator</td>
<td>0.75</td>
<td>Rebecca Orozco</td>
<td>Beyond 5 years</td>
</tr>
</tbody>
</table>

Anticipated Needs

The maintenance of department computer systems, support for the environmental engineering labs, and the handling of hazardous materials are needs of the department that are continually growing. Maintenance of our computer network, faculty computers, and student computer room has been provided by the college IT staff with support from department student assistants. The complexities of these systems have grown significantly and current resources are unable to provide the service that the department needs to maintain.
teaching and research capabilities. The environmental lab requires wet lab skills that the department’s technician does not have. A part-time specialist in these skills has been a long-term request of the department. Similarly, the growth in proper storage and disposal of hazardous materials is a critical safety need of the department. A part-time specialist with experience and knowledge of current campus, state and federal guidelines is critical.
APPENDIX A.I

Background Information Relative to College of Engineering
A. General Information

College of Engineering
One Washington Square • San José, California USA, 95192-0080
Tel: 408-924-3800
Fax: 408-924-3818
E-mail: coe@email.sjsu.edu

Dean: Dr. Belle Wei
Associate Dean of Graduate and Extended Studies: Dr. Ahmed Hambaba
Associate Dean of Research: Dr. Kevin Corker
Associate Dean of Undergraduate Studies: Dr. Ping Hsu

B. College of Engineering’s Mission

We will provide empowering educational opportunities to students for their technical, professional and social development in a competitive and dynamic global society. We will build a vibrant community of students, faculty, staff, alumni, and industry professionals through strategic collaborations with Silicon Valley, California, national and global partners.

College of Engineering Goals
The College has identified three goals to achieve its vision and mission.

• To be preeminent among undergraduate engineering institutions in the U. S.
  ▪ Nationally recognized for engagement with local and global industries
  ▪ Preferred California State University campus for undergraduate engineering education
  ▪ Nationally recognized for curriculum and quality of undergraduate experience

• To be a nationally recognized, professionally oriented graduate engineering program
  ▪ Nationally recognized for an applied technological curriculum
  ▪ Coordinated graduate and outreach programs responsive to regional industry

• To be the preferred partner for applied research and development
  ▪ Initiating centers of excellence and programs

C. Alignment with University Mission and Goals

University Mission

In collaboration with nearby industries and communities, SJSU faculty and staff are dedicated to achieving the university's mission as a responsive institution of the State of California. To enrich the lives of its students, to transmit knowledge to its students along with the necessary skills for applying it in the service of our society, and to expand the base of knowledge through research and scholarship.
“Goals-

For both undergraduate and graduate students, the university emphasizes the following goals:

- In-depth knowledge of a major field of study.
- Broad understanding of the sciences, social sciences, humanities, and the arts.
- Skills in communication and in critical inquiry.
- Multi-cultural and global perspectives gained through intellectual and social exchange with people of diverse economic and ethnic backgrounds.
- Active participation in professional, artistic, and ethnic communities.
- Responsible citizenship and an understanding of ethical choices inherent in human development.”

“Character and Commitment-

San José State University is a major, comprehensive public university located in the center of San José and in the heart of Silicon Valley. SJSU is the oldest state university in California. Its distinctive character has been forged by its long history, by its location, and by its vision - a blend of the old and the new, of the traditional and the innovative. Among its most prized traditions is an uncompromising commitment to offer access to higher education to all persons who meet the criteria for admission, yielding a stimulating mix of age groups, cultures, and economic backgrounds for teaching, learning, and research. SJSU takes pride in and is firmly committed to teaching and learning, with a faculty that is active in scholarship, research, technological innovation, community service, and the arts.”

D. Faculty and Students

Table A-1 provides a summary of the faculty and student counts for the Fall Semester of 2005 for the College and each program under evaluation.

<table>
<thead>
<tr>
<th></th>
<th>HEAD COUNT</th>
<th></th>
<th>TOTAL STUDENT CREDIT HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FT</td>
<td>PT</td>
<td>FTE</td>
</tr>
<tr>
<td>Tenure Track Faculty</td>
<td>66</td>
<td>5</td>
<td>60.53</td>
</tr>
<tr>
<td>Other Teaching Faculty (excluding student assistants)</td>
<td>2</td>
<td>99</td>
<td>31.26</td>
</tr>
<tr>
<td>Student Teaching Assistants</td>
<td>0</td>
<td>42</td>
<td>8.15</td>
</tr>
<tr>
<td>Undergraduate Students</td>
<td>2367</td>
<td>647</td>
<td>2593.45</td>
</tr>
<tr>
<td>Graduate Students</td>
<td>513</td>
<td>1022</td>
<td>645.86</td>
</tr>
<tr>
<td>Professional Degree Students</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table A-1 Faculty and Student Head Counts, Fall 2005

FTE: Full-time Tenure Track Faculty = Tenured & Probationary. Part-time Tenure Track Faculty = Faculty Early Retirement Program (FERP). Full-time Other Teaching faculty = Lecturer at 1.00. Part-time Other Teaching Faculty = Lecturer < 1.00. Student Teaching Assistants = Grad. Assistants & Teaching Associates, which we only considered as part-time only.
E. Engineering Personnel and Policies

Personnel – See Table A-2.

<table>
<thead>
<tr>
<th></th>
<th>HEAD COUNT</th>
<th>FTE</th>
<th>RATIO TO FACULTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative</td>
<td>2</td>
<td>7</td>
<td>5.2</td>
</tr>
<tr>
<td>Faculty (tenure-track)</td>
<td>82</td>
<td>5</td>
<td>70</td>
</tr>
<tr>
<td>Other Faculty (excluding student Assistants)</td>
<td>5</td>
<td>120</td>
<td>42</td>
</tr>
<tr>
<td>Student Teaching Assistants</td>
<td>0</td>
<td>42</td>
<td>9.15</td>
</tr>
<tr>
<td>Student Research Assistants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technicians/Specialists</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office/Clerical Employees</td>
<td>14</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undergraduate Student Enrollment</td>
<td>2367</td>
<td>647</td>
<td>2214</td>
</tr>
<tr>
<td>Graduate Student Enrollment</td>
<td>513</td>
<td>1022</td>
<td></td>
</tr>
</tbody>
</table>

Table A-2. Personnel and Students

F. Non-Academic Support Units

a. The College of Engineering Computing Systems

The College of Engineering Computing Systems (ECS) is comprised of five full-time employees. Each individual is assigned an area of interest or specialization. The areas of interest and specialization are: faculty and staff desktop support, networking, World Wide Web (WWW), UNIX laboratories, and academic instructional laboratories. Several student assistants are shared by all ECS personnel.

a-1. Faculty and Staff Support

ECS develops and supports laboratory, faculty, and staff computer systems; implements, configures and maintains application software; network operating systems; provides Internet connectivity, and manages hardware and software licenses. ECS ensures the functionality, applicability, and maximum uptime of laboratory servers and workstations. As well, ECS ensures operational, reliable, secure, and optimal computer systems for academic computer laboratories and desktops.

The following list outlines specific work activities performed by ECS support personnel:

(1) Scott Pham, Information Systems Analyst, Career Level

Plan, design, specify, evaluate select, order, install, configure, maintain, and administer software and hardware for servers, clients, and peripherals in academic computer laboratories. (See Exhibit II-3a)

As needed, plan, specify, evaluate select, order, install, configure, and maintain software and hardware for faculty and staff desktop computers and peripherals.

Troubleshoot laboratory and user operating systems and application software. Diagnose and repair computers and peripheral equipment. Develop procedures for secure and efficient laboratory use.

Development of quick-recovery procedures to restore corrupt laboratory computer systems.
Support faculty and staff as technical consultants for software, operating systems, and Internet connectivity issues.
Maintain currency of virus protection. Maintain FTP server with current virus software and updates.
Maintain frequent email and personal contact with faculty and staff.

(2) William Black, Operating Systems Analyst, Career Level

Design, implement, and maintain UNIX laboratory hardware and software for the purpose of coursework and research. (See Exhibit II-3b)

Provide supplemental support to department technicians.
Assist in developing department and college-wide systems and policies.
Investigate and evaluate new products and solutions.
Assist the Network Administrator with developing and implementing network configuration changes.
Work directly with faculty and staff to resolve individual computer issues. (Help Desk)

(3) In the Process of Hiring, Information Systems Analyst, Career Level, Webmaster

Creates and manages the information content (words and pictures) and organization of the COE Web site (http://www.engr.sjsu.edu).
Manages the computer server and technical programming aspects of the Web site.
Educates and supports faculty and staff with Web related functions.
Works with ECS staff, department Chairs and Dean to establish the overall COE Web site design and policies.
The College of Engineering Webmaster typically "does it all." The Webmaster is someone with graphics design background who has also Web site creation skills and programming skills; mainly knowledge and experience with HTML, JAVA, and DHTML. The Webmaster administers multiple servers (i.e.: Web, FTP, Email, ListServer, Database, Applications, Files server) and writes or implement programs required by the faculty and staff.

(4) Ben Rashid, Information Systems Analyst, Career Level

The hardware technician provides hardware support and maintenance for the College of Engineering. The hardware technician is expected to: maintain, install, repair, and troubleshoot component level hardware in microcomputer systems, peripheral equipment, and local area networks; provide technical support for faculty and staff; act as liaison with hardware and software vendors; recommend upgrade requirements for software and hardware; maintain and monitor the College of Engineering computer inventory; and train and work closely with student assistants.

Specifically, Mr. Rashid troubleshoots email problems, desktop network issues, printing problems (including network printing), system performance issues, peripheral configuration, user account management, system security, part repair and service, hardware and software compatibility issues, and user data migration when new systems are installed.

(5) Kindness Israel, Information Systems Analyst, Expert Level, Director

The ECS Director is responsible for developing, implementing, managing, and maintaining cost-effective, reliable College-wide computing and network systems, which includes administrative systems, instructional computer labs, and Internet access. The Director makes specifications for procurement, installation, support, and maintenance of requisite hardware and software for the COE, makes recommendations for all Engineering departments, develops and implements operational policies, procedures, and practices necessary for reliable delivery of computing and network services in consultation with the Central Computing and Telecommunications, coordinates technology projects with the appropriate faculty, staff, and students, builds consensus and solicits input when making significant changes, and maintains good channels of communication in terms of decisions and policies associated with the delivery
of technical services within the College. He provides support and direct supervision of personnel subordinate to this position (5 full time staff and 40 hours/week student assistants) including initiating and monitoring project planning and reviews, recommending personnel actions, preparing performance reviews, job descriptions, participates in recruitment of ECS personnel. He develops and implements requests and proposals for acquisition of equipment, software, supplies, and services, and assists in providing technical training for faculty and staff. The director also develops and maintains databases, records, documents, and files associated with computing and networking systems.

a-2. ECS Scope of Responsibility

a-2.1. Network Infrastructure
Responsible Person(s): Kindness Israel, William Black, Scott Pham
Scope: COE Building, IS Building, Aviation Building, All Departments
Hardware/Software:
- COE IP Copper/Fiber Backbone (Currently 2000 ports)
- 4 Alcatel 9 Slot OmniSwitches
- 15 Alcatel 5 Slot OmniSwitches
- 16 Alcatel 3 Slot OmniSwitches
- 7 Alcatel 5024 OmniStacks
- 4 Alcatel 1032 OmniStacks
- Dozens of Netgear and Linksys Hubs
- 6506 Cisco Router
- 2511 Cisco Router
- COE Wireless Network
  - Linux Router/Gateway
  - 8 Wireless Linksys Access Points
  - RADIUS Server
- SUSU Wireless Network
  - Router
  - 4 Switches
  - 16 Cisco 1200 Access Points
- Design and Implementation of New Network (Upgrade to 4,000 ports)
  - New Cat6 Copper and Multimode Fiber Infrastructure by May 2005
  - New Cisco Electronics by August 2005

Student/Faculty Impact: Administration, Staff, Faculty, and Students
Policy/Guidelines: Internet usage policies are determined by the CSU Chancellor's office.

a-2.2. Core Servers
Responsible Person(s): Kindness Israel, William Black, Scott Pham
Scope: COE, All Departments
Hardware/Software:
- Firewall (Linux using iptables)
- Xvision Server (Alcatel SNMP Server)
- VPN Server (Firewall access for Faculty)
- 3 DNS Servers (Domain Name Server Address Resolution)
- DHCP Server (IP Address Leasing)
- MRTG Monitor (Security Monitoring)
- MIRROR Server (Linux Software Application Server)
- 3 ENGR MS Active Directory Servers (Primary Domain Controller)
- Oracle 8i INFO Database (Faculty/Staff Database)
- Oracle 8i CMPE Database (CMPE 138, 143)
- Application Development Server (Opentrak, Peoplesoft Access)

Student/Faculty Impact: Administration, Staff, Faculty, and Students
Policy/Guidelines: ECS is responsible for the procurement, installation, and maintenance of all hardware and software necessary to ensure the smooth operation of the COE computing infrastructure.
a-2.3. COE Academic Laboratories
Responsible Person: Scott Pham
Scope: E333, E390, E391, E407, E393, E394
Hardware/Software: 150 Pentium Computers, Domain Controller, and File Server / MS Win2000
Student/Faculty Impact: All Undergraduate Students, and Faculty
Policy/Guidelines: ECS is responsible for the procurement, installation, and maintenance of all hardware and software necessary to conduct computer laboratory instruction in the COE academic laboratories (Exhibit II-3a).

a-2.4. Open Laboratories
Responsible Person: Scott Pham
Scope: E405 and E390
Hardware/Software: 50 Pentium Computers, Domain Controller / MS WinNT
Student/Faculty Impact: Undergraduate, Graduate Students, and Faculty
Policy/Guidelines: ECS is responsible for the procurement, installation, and maintenance of all hardware and software necessary to conduct computer laboratory instruction in the COE open laboratories (Exhibit II-3a).

a-2.5. Department Laboratories
Responsible Person(s): Faculty members who conduct classes in the laboratories and department technicians.
Scope: Network access is provided by ECS.
Hardware/Software: MS Operating Systems, Sun Solaris, Linux
Student/Faculty Impact: Undergraduate, Graduate Students, and Faculty
Policy/Guidelines: ECS provides network access to all department laboratories. ECS provides secondary-level support to every department and research laboratory. Secondary-level support consists of answering any technical questions posed by the faculty or department technician thus ensuring the successful implementation of the project or class. Any ECS person may be called upon to assist.

a-2.6. Research Laboratories
Responsible Person(s): Faculty members who originally obtained the grant and department technicians.
Scope: Network access is provided by ECS.
Hardware/Software: Varies
Student/Faculty Impact: Graduate Students, Faculty
Policy/Guidelines: ECS provides network access to research laboratories such as the HAIL Lab, Cisco Laboratory, and faculty research laboratories. ECS provides secondary-level support to every department and research laboratory. Secondary-level support consists of answering any technical questions posed by the faculty or department technician thus ensuring the successful implementation of the project. Any ECS person may be called upon to assist.

a-2.7. UNIX (Solaris) Laboratories
Responsible Person(s): William Black, Kindness Israel
Scope: Primarily EE and CMPE Cadence Laboratories and Research Laboratories
Hardware/Software: 120 Sun Solaris, IBM AIX, and Linux on Intel Architecture
Student/Faculty Impact: Graduate Students enrolled in Cadence Classes, Department Graduate Research Projects
Policy/Guidelines: ECS provides UNIX support for all departments of the COE (Exhibit II-3b).

a-2.8. WWW.ENGR.SJSU.EDU Website
Responsible Person: In the Process of Hiring
Scope: COE, All Departments
Hardware/Software: Dell Linux Server / Apache, MySQL, PHP, WebAdmin, Photoshop
Student/Faculty Impact: All Administrative, Faculty, Staff, and Students
Policy/Guidelines: ECS maintains the COE home page and provides support for all departments and faculty. Many departments have their own webmasters. ECS has always sought to coordinate and streamline the efforts of the department webmasters with the COE main page.

a-2.9. Administrative Desktop Support
Responsible Person: Ben Rashid
Scope: Dean and Graduate Studies Offices, CEE, ChemE
Hardware/Software: Domain Controller and File Server / Microsoft Windows and Office Suite Software - All Versions, PeopleSoft, Oracle Discover Clients, Photoshop, and assorted workflow applications.
Student/Faculty Impact: Administration, Staff, and Faculty
Policy/Guidelines: ECS provides front-line support to the Dean and Graduate Studies, and CEE. The other departments in the COE have department-level technician support. ECS provides secondary-level support to every department. Secondary-level support consists of answering any technical questions posed by the faculty or department technician thus ensuring the successful implementation of the department's operation. Any ECS person may be called upon to assist.

a-2.10. Email Support:
   Lotus Notes
   Responsible Person: Ben Rashid
   Scope: COE, All Departments
   Hardware/Software:
      Lotus Notes Servers - Central Computing
      Lotus Notes Clients - Ben Rashid
   Student/Faculty Impact: Administration, Staff, and Faculty
   Policy/Guidelines: It is the responsibility of ECS to install and configure the Lotus Notes client. Lotus Notes servers are administered by Central Computing.
   Lotus Notes is the preferred (and recommended) email service for administrative, staff, and faculty usage.

Eudora
   Responsible Person: Scott Pham
   Scope: COE, All Departments
   Hardware/Software: Eudora Clients
   Student/Faculty Impact: Administration, Staff, and Faculty
   Policy/Guidelines: It is the responsibility of ECS to install and configure the Eudora client. Department technicians also assist with email client installations.

MS Outlook, Mozilla, and Other Email Clients
   Responsible Person(s): ECS Staff
   Scope: COE, All Departments
   Hardware/Software: Eudora Clients, Mozilla, Netscape, and MS Outlook
   Student/Faculty Impact: Administration, Staff, and Faculty
   Policy/Guidelines: It is the responsibility of ECS to install and configure Email clients in the absence of department technicians or in instances where special problems are encountered.

a-2.11. Faculty and Staff Desktop Support
Responsible Person(s): Department Technicians, Ben Rashid, ECS Staff
Scope: COE, All Departments
Hardware/Software: Microsoft Windows - All Versions
Student/Faculty Impact: Administration, Staff, and Faculty
Policy/Guidelines: ECS provides front-line support to the Dean and Graduate Studies, and CEE. The other departments in the COE have department-level technician support. ECS provides secondary-level support to every department. Secondary-level support consists of answering any technical questions posed by the faculty or department technician thus ensuring the successful implementation of the department's operation. Any ECS person may be called upon to assist.
a-2.12. Backups
Responsible Person(s): ECS Staff
Scope: COE, All Departments
Hardware/Software: Intel Architecture, Sun Sparc, Network Devices, Core Servers, File Servers, and Domain Controllers / Linux, Solaris, Windows 2000, Databases, Student Accounts, and Research data
Student/Faculty Impact: Administrative, Faculty, Staff, and Students
Policy/Guidelines: Kindness Israel performs daily and weekly backups on the COE core servers, databases, and Linux student accounts. Solaris student accounts are the responsibility of William Black, Scott Pham is responsible for the academic laboratory domain controllers and related student accounts, and Ben Rashid is responsible for the administrative domain controllers and file servers. In the Process of Hiring is responsible for the COE WWW server and related accounts. Sigurd Meldal performs daily backups on the CMPE administrative accounts. The other COE departments perform no regular or scheduled backups.

a-2.13. Anti-Virus and Security
Responsible Person(s): Scott Pham, Kindness Israel, William Black
Scope: COE, All Departments
Hardware/Software: Intel Architecture / Microsoft Windows - All Versions
Student/Faculty Impact: Administrative, Faculty, Staff, and Students
Policy/Guidelines: The COE purchases McAfee AntiVirus software for distribution to the faculty and staff. ECS oversees and ensures that antivirus software updates are distributed to the COE department technicians for installation.

Security is primarily a subdivision of networking. The primary network defense is the COE firewall. Unfortunately, an inordinate amount of time is required to track-down abusers of the system. The security and best practices of the CSU are posted on the ECS Networking Web Page.

a-2.14. Software
Microsoft CD Library and Distribution Server (ecs_apps)
   Responsible Person: Scott Pham
   Scope: COE, All Departments
   Hardware/Software: MS Operating Systems, MS Office Suite
   Student/Faculty Impact: Faculty, Technical Staff
   Policy/Guidelines: The COE purchases a minimal number of distribution disks and licenses. The original CDs are archived and the images are distributed via Juanita's share server which can be accessed using a password and shared link. All department technicians use the share server daily. Certain bootable CDs must be replicated from the original CDs. Juanita performs the CD creation task for the COE.

Software Licenses
   Responsible Person: Scott Pham
   Scope: Faculty
   Hardware/Software: Matlab, McAfee, ASAP Contracts
   Student/Faculty Impact: Faculty and Students
   Policy/Guidelines: ECS obtains and maintains the software licenses. EE also has an extended version of Matlab applications. Matlab and AutoCad are distributed to the department technicians via the ECS application server along with non-licensed software.

a-2.15. COE and ECS Department Purchases
Responsible Person(s): Kindness Israel, Scott Pham, and Ben Rashid
Scope: COE, ECS, All Departments
Hardware/Software: All computer hardware and software necessary to maintain the COE and ECS departments.
Student/Faculty Impact: Administrative, Faculty, and Staff
Policy/Guidelines: In addition to the COE Dean and Graduate Studies office purchases, ECS also researches and advises faculty members and technical staff about where and how to obtain the most cost efficient hardware and software.
a-2.16. Staff Training  
Responsible Person(s): ECS Staff  
Scope: Department Technicians  
Hardware/Software: Intel and Sun / Microsoft Windows - All Versions, Linux, Sun Solaris  
Student/Faculty Impact: Department Technicians  
Policy/Guidelines: ECS has conducted classes for department technicians and maintains a mailing list for the purpose of keeping the technical staff informed of upcoming relevant events and special classes. By and large, a constant dialog and exchange of information is conducted between ECS and the technical staff.

a-2.17. Walk-In and Phone Support  
Responsible Person(s): ECS Staff  
Scope: COE, All Departments  
Hardware/Software: All  
Student/Faculty Impact: Faculty, Technical, and Administrative Staff  
Policy/Guidelines: ECS has an "open door" policy toward questions and eagerly looks forward to helping any COE faculty, staff, or student solve their computer or network problems.

a-2.18. Special Projects  
Responsible Person: Kindness Israel  
Scope: Students  
Hardware/Software: Linux / Linux  
Student/Faculty Impact: Students  
Policy/Guidelines: Kindness Israel is the sponsor of the San Jose State Linux Users Group (SJSULUG). The club meets in E239 and has built several Linux clusters for research projects.

a-2.19. Student Organization Rooms  
Responsible Person(s): Department Technicians  
Scope: Departments  
Hardware/Software: Intel / Microsoft Operating Systems - All Versions.  
Student/Faculty Impact: Faculty, Students  
Policy/Guidelines: The department club rooms are maintained by the departments. ECS provides network access.

a-2.20. Development of Disaster Recovery Documentation/FAQs  
Responsible Person(s): ECS Staff  
Scope: COE, ECS  
Hardware/Software: All  
Student/Faculty Impact: ECS Staff  
Policy/Guidelines: Every ECS staff member is required to produce a disaster recovery booklet or spreadsheet of computers under their care. The documentation contains the name, type, location, and any pertinent information about how to login, shutdown, and restart the machine and its primary services. ECS also maintains several.

a-2.21. Software Development  
Responsible Person(s): Kindness Israel, Student Assistant  
Scope: Administration, Faculty, Staff  
Hardware/Software: Linux on Intel Architecture / Advisor, Room Scheduler, Monitor Software, OpenTrak, Student Data, Login Accounts, COE Databases, Department Queries, UNIX Scripts.  
Student/Faculty Impact: Administrative, Faculty, Students  
Policy/Guidelines: ECS has traditionally employed a student programmer for the purpose of providing direct access to SIS and PeopleSoft data. These data have been used to create a myriad number of products and solve complex IT problems.

a-2.22. Inventory and Resources  
Responsible Person: Kindness Israel
Scope: COE Building
Hardware/Software: Annual Inventory conducted with FD&O
Student/Faculty Impact: N/A
Policy/Guidelines: FD&O requires that all computer items and network equipment costing more than $5,000 be accountable. Overall, ECS is directly responsible for over a million dollars worth of computer and network equipment.

a-2.23. Computer and Printer Repair
Responsible Person(s): ECS Staff, Student Assistant
Scope: Academic Laboratories, Administrative Offices, Core Servers, ECS Desktops
Hardware/Software: Core Servers, Laboratory Computers, Administrative Computers, Sun Servers, Printers
Student/Faculty Impact: Undergraduate Students, Faculty, Administrative Staff
Policy/Guidelines: The academic laboratories are the sole responsibility of ECS. The Dean's office and Graduate Studies office are the sole responsibility of ECS. ECS also maintains the software and hardware contracts for the Cadence Solaris laboratories but does not purchase the licenses. Printers are generally cleaned and repaired locally by Ben Rashid or a student assistant.

b. Student Advising and Services

b-1. College of Engineering Units

The College of Engineering has two college-level student advising and supporting units: the Engineering Student Advising Center and the MESA Engineering Program.

The Engineering Advising Center was established in Spring 2005. The Center provides the following services to all engineering students:

- General Education requirement advising
- Monitoring and advising of students on probation
- Study skills workshops
- New Student Advising

The goal of the MESA Engineering Program is to increase the number of competent and qualified graduates entering the engineering profession from groups with low eligibility rates in college admissions. The program provides the following services: student study center, Academic Excellence Workshops, professional development workshops, freshmen orientation, career advising, and support to student organizations.

c. Design and Fabrication Services

College of Engineering Central Shop is staffed by two full-time mechanics and several part-time student assistants. Central Shop provides a variety of services in the shops, laboratories, and related areas in support of the teaching and research needs of the instructional programs. The responsibilities of the central shop are maintenance and repair of mechanical equipment, design, fabrication and installation of teaching devices and apparatus for instructional, student projects, and faculty research needs, and providing guidance to faculty and students on machine operations.
APPENDIX A.II
Background Information
Relative to the Department

A. Department’s Mission
B. Programs Offered and Degrees Granted
C. Student Enrollment
D. Department Advisory Council (DAC)
E. Faculty Vitae
A. Department Mission

The Department mission is defined in the following way:

To serve society, the public sector, and private industry by
- providing undergraduate and graduate civil engineering education that prepares students to apply engineering knowledge to the diverse issues of resources, infrastructure and the built environment;
- contributing to the development and codification of knowledge through faculty scholarship, and;
- meeting the needs of working professionals for continuing education.

B. Programs Offered and Degrees Granted

The Department of Civil and Environmental Engineering offers two degrees:

* Bachelor of Science of Civil Engineering
* Masters of Science of Civil Engineering

C. Student Enrollment

The Civil and Environmental Engineering undergraduate student population of 325 majors in Fall 2004 was 24.3% Asian, 20.9% White, 12.6% Filipino, 6.2% Hispanic, 14.2% Mexican American, 4.0% African-American, and 1.2% Pacific Islander and 0.6% American Indian/Alaskan. The remaining 16.0% declined to state an ethnic identity. Women made up 19.4% of the undergraduate student population.

<table>
<thead>
<tr>
<th>Undergraduate Enrollment for the Past Five Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term</td>
</tr>
<tr>
<td>Male Undergraduate Students</td>
</tr>
<tr>
<td>Female Undergraduate Students</td>
</tr>
<tr>
<td>Total Undergraduate FTES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Graduate Enrollment for the Past Five Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term</td>
</tr>
<tr>
<td>Male Graduate Students</td>
</tr>
<tr>
<td>Female Graduate Students</td>
</tr>
<tr>
<td>Total Graduate FTES</td>
</tr>
</tbody>
</table>
D. Department Advisory Council (DAC)

The department has maintained an industry review board for several years. This group, known as the Department Advisory Council, has been staffed by practitioners volunteering their time to assist the department. The benefit derived from this group was noted as one of the strengths in the last accreditation review.

The DAC normally meets once every semester with the department Chair and additional faculty members as their time permits. The agenda of the meeting varies, but often includes a review of the current Program Educational Outcomes, current trends in civil engineering, student enrollment and success, and potential fund-raising activities. Additionally, the Chair of the DAC meets with the department Chair regularly to maintain alignment between departmental and DAC goals. DAC members are often used as external reviewers of the graduate classes, engineering laboratories and other ad hoc activities as defined by the department.

E. Faculty Vitae – on the following pages
1. **Al-Manaseer, Akthem**
   Name: October 5, 1956
   Date of Birth:

2. **Academic Rank**
   - Professor: 60% of Time
   - Chair of Civil Engineering: 40% of Time

3. **Degree**
   - Ph.D.: Structural Engineering, Glasgow University, 1983
   - B.Sc.: Civil Engineering, University of Basra, 1978

4. **Number of Years of Service**
   - On this Faculty: 9
   - Original appointment: 1996
   - Advancement in Rank: Professor Fall 1999

5. **Other Related Experience:**
   - Professor: San Jose State University, CA, 7/99
   - Associate Professor: San Jose State University, CA, 8/96–7/99
   - Research Engineer: Atomic Energy of Canada, 1/88-1/91
   - Research Assistant Professor: University of Saskatchewan, Canada, 12/85-1/88
   - Post-doctoral fellow: University of Saskatchewan, Canada, 12/83-12/85

6. **States in which Registered**
   - Professional Engineer, Saskatchewan, Canada, 1986-date
   - Chartered Structural Engineer, United Kingdom, 1990-date

7. **Principal Publications of Last Five Years**

8. **Memberships in Scientific and Professional Societies**
   1. The American Society of Civil Engineers, Fellow
   2. The American Concrete Institute, Fellow
   3. The Canadian Society for Civil Engineering, Fellow
   4. The Institution of Structural Engineers (U.K.) (Chartered Engineer)
   5. The Engineering Council, (U.K.)
9. **Honors and Awards**

1. Certificate of Appreciation from the American Concrete Institute for Contribution to the ACI Student Cube Competition, San Francisco, Spring Convention, March 2004.
2. Fulbright Scholar, January-June 2003, University of Sharjah, UAE
3. Canadian Society for Civil Engineering for many contributions as the Chair of the 1997 International Conference on Engineering Materials, June 1998
4. Certificate of Appreciation from the Canadian Society for Civil Engineering for many contributions as the Chair of the 1997 International Conference on Engineering Materials, June 1998
5. Supervised a thesis entitled “Ultimax Cement and Nondestructive Testing of High Strength Concrete.” This thesis in 1998 received the outstanding thesis award of San Jose State University.

10. **Institutional and Professional Services**

1. Vice President ACI Northern California & Western Nevada Chapter 2005.
2. Student Activities Committee Chair & Member of Board, ACI North. CA and West. NV Chapter 1998-date.
3. DAC Advisory Member, Evergreen Community College, 2002-date
4. Chairman, ACI Committee 209, Creep and Shrinkage in Concrete, 1995-1999
5. Member, ACI Committee 227, Radioactive and Hazardous Waste Management 1995-1999
8. Member of the Board of Directors, Canadian Society for Civil Engineering (CSCE) 1994-1995

11. **Professional Development Activities**

1. Editor of the 2001 2nd International Conference on Engineering Materials, Sponsored by the Canadian and Japanese Societies for Civil Engineering, 16-19 August, San Jose, CA, Co-editors S. Nagataki, K. Sakata, 2 volumes 709 pages)
3. Organizer of an educational seminar on “Fast Setting Concrete.” Sacramento, California, 1998
4. Co-Chairman of the 1998 ACI Paris Chapter Workshop on Creep and Shrinkage in Concrete Structures
5. Chairman and Editor of the 1997 International Conference on Engineering Materials, Sponsored by the Canadian and Japanese Societies for Civil Engineering, 8-11 June, Ottawa, Canada, Co-editors S. Nagataki, R. Joshi. (Refereed, 2 volumes 650 pages)
1. Botha, Jan Louis
Name

January 24, 1950
Date of Birth

2. Academic Rank
% of Time
Non-academic activity % of Time
Professor 100 - -

3. Degree
Field
Institution
Date
Ph.D. Transportation Engineering University of California at Berkaley 1980
M.S. Transportation Engineering University of California at Berkaley 1977
B.Sc.(Hons) Civil Engineering University of Pretoria 1975
B.S. Civil Engineering University of Pretoria 1972

4. Number of Years of Service
On this Faculty
Original appointment
15 1989

Advancement in Rank
Associate Professor 1989-1993
Professor 1993

5. Other Related Experience:
Field
Position
Place
Date
Civil Engineering Associate Professor Dept of Civil Eng., Univ. of Alaska, Fairbanks 1986–1989
Transportation Eng. Partner TRANSTECH 1985-1986
Transportation Eng. Associate Burger Pretorius and Partners 1984-1986
Structural Eng. Engineer City Council of Germiston 1973

6. Consulting
Development and teaching of professional short courses in the following areas:
- Geometric design
- Analysis and evaluation of traffic safety problems
- Engineering economy for highway and traffic engineers
Limited ad hoc consulting in transportation engineering

7. States in which Registered
South Africa

8. Principal Publications of Last Five Years
Journals
1. Tsao, H-S and Jan L. Botha. An Automated Highway System Dedicated To Inter-City
   Trucking:Design
   Options, Operating Concepts, and Deployment. In ITS Journal: Computing, Communication, and

Conference Papers and Presentations
1. Tsao, H-S and Jan L. Botha. An Automated Highway System Dedicated To Inter-City
   Trucking:Operating
   Concepts And Deployment. Paper presented at the 81st Transportation Research Board Annual


Reports


9. Memberships in Scientific and Professional Societies
   1. Member of the American Society of Civil Engineers
   2. Member of the South African Society of Civil Engineers

10. Honors and Awards
   None

11. Institutional and Professional Service in Last Five Years
    University:
    College:
       1. Retention, Tenure and Promotion Committee (AY 04/05)
    Department:
       1. Executive Committee
       2. Retention, Tenure and Promotion Committee

12. Professional Development Activities in the Last Five Years
    1. Member of the Transportation Research Board (TRB) Committee on the Application of Economic Analysis to Transportation Problems (1993-present).
    2. Member of the Transportation Research Board Committee Vehicle Highway Automation (2001-present)
    3. Member of the Subcommittee for Two-Lane Highways of the TRB Committee on Highway Capacity and Quality of Flow (1990-present)
    4. Member of the American Society of Civil Engineers (ASCE) Committee on Urban Transportation Economics and Policy (1994-2002).
    5. Member of the American Society of Civil Engineers (ASCE) Committee on Planning and Economics), (2004-present)
1. Christiansen, Jerald Nelson
   Name
   July 21, 1931
   Date of Birth

2. Academic Rank
   % of Time
   Non-academic activity
   % of
   Time
   Lecturer 20 - -

3. Degree
   Field
   Institution
   Date
   M.S. Civil Engineering, Utah State University 1954
   B.S. Civil Engineering, Utah State University 1953

4. Number of Years of Service
   On this Faculty
   Original appointment
   Advancement in Rank
   3 2002 None

5. Other Related Experience
   Position
   Place
   Date
   Consultant, Titan Corp, Sunnyvale, CA 2005
   Chief Scientist for Systems Engineering Services, The Boeing Company, Sunnyvale, CA 1995-01
   Technical Consultant Lockheed Missiles and Space Co. Sunnyvale, CA 1992-95
   Program Manager Lockheed Missiles and Space Co. Sunnyvale, CA 1990-92
   Technical Consultant Lockheed Missiles and Space Co. Sunnyvale, CA 1985-90
   Asst. Program Manager Lockheed Missiles and Space Co. Sunnyvale, CA 1982-85
   Senior Management Staff Specialist Lockheed Missiles and Space Co. Sunnyvale, CA 1979-81
   Program Manager Lockheed Missiles and Space Co. Sunnyvale, CA 1969-78
   Senior Consulting Scientist Lockheed Missiles and Space Co. Sunnyvale, CA 1965-69
   Resident Director Lockheed Missiles and Space Co. Houston, TX 1965
   Asst. Resident Director Lockheed Missiles and Space Co. Houston, TX 1963-65
   Information Processing Staff Lockheed Missiles and Space Co. Sunnyvale, CA 1960-63
   Instructor, Asst. Prof. Dept of Mechanics United States Air Force, USAF Academy 1958-60
   Instructor, Engineering Mechanics Cornell University, Ithaca, NY 1954-56

6. States in which Registered
   None

7. Principal Publications of Last Five Years
   All publications since 1965 remain classified

8. Memberships in Scientific and Professional Societies
   None

9. Honors and Awards
   Listed in American Men and Women of Science
   National Science Foundation Fellow 1953-54 & 1956-58

10. Institutional and Professional Services
    Director, Silver Creek Valley Country Club Homeowners Association 2000-present
    Member, Industry Advisory Group for Electrical and Computing Engineering, Utah State Univ. 1987-97
    Director, Daconics Corporation 1968-75
1. Edward W. Cummings          October 29, 1949
   Name                       Date of Birth

2. | Academic Rank | % of Time | Non-academic activity | % of Time |
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<tr>
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<tr>
<td>Lecturer</td>
<td>20</td>
<td>Consultant Civil Engineering</td>
<td>30</td>
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</table>

3. | Degree  | Field                              | Institution                                      | Date     |
<table>
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<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>M.S.</td>
<td>Environmental Engineering</td>
<td>San Jose State University, CA</td>
<td>1978</td>
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<tr>
<td>B.Sc.</td>
<td>Civil Engineering with Honors</td>
<td>University of California at Berkeley</td>
<td>1971</td>
</tr>
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4. Number of Years of Service
   On this Faculty          Original appointment          Advancement in Rank
   0.5                      2005                                    None

5. Other Related Experience:

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<th>Position</th>
<th>Place</th>
<th>Date</th>
</tr>
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<tbody>
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<td>Assistant General Manager</td>
<td>Zone 7 Water Agency, Livermore, California</td>
<td>1999-2004</td>
</tr>
<tr>
<td>Director of Operations &amp; Maintenance</td>
<td>Contra Costa Water District, Concord, California</td>
<td>1996-1999</td>
</tr>
<tr>
<td>Assistant Director of Water Operations</td>
<td>Contra Costa Water District, Concord, California</td>
<td>1993-1996</td>
</tr>
<tr>
<td>Director of Water Quality</td>
<td>Contra Costa Water District, Concord, California</td>
<td>1990-1993</td>
</tr>
<tr>
<td>Environmental Engineer</td>
<td>Contra Costa Water District, Concord, California</td>
<td>1988-1990</td>
</tr>
<tr>
<td>Senior Engineer</td>
<td>Contra Costa Water District, Concord, California</td>
<td>1980-1988</td>
</tr>
<tr>
<td>Senior Engineer</td>
<td>Zone 7 Water Agency, Livermore, California</td>
<td>1975-1980</td>
</tr>
<tr>
<td>Associate Engineer</td>
<td>ACFC&amp;WCD, Hayward, California</td>
<td>1971-1975</td>
</tr>
</tbody>
</table>

6. States in which Registered

   Registered Civil Engineer, California – 1971 to date
   Grade 5 Water Treatment Operator, California - 1997 to date

7. Principal Publications of Last Five Years

8. Memberships in Scientific and Professional Societies

   American Society of Civil Engineers
   American Water Works Association
   Chi Epsilon

9. Honors and Awards
   None

10. Institutional and Professional Services
    None

11. Professional Development Activities
    None
1. Sayed A. Fakhry
   Name
   November 28, 1956
   Date of Birth

2. Academic Rank % of Time Non-academic activity % of Time
   Lecturer 20
   Civil Engineer II, City of Santa Clara 80

3. Degree Field Institution Date
   M.S. Transportation Engineering San Jose State University 2002
   M.S. Engineering Hydraulics University of Newcastle upon Tyne 1982
   B.S. Civil Engineering University of Kabul 1979

4. Number of Years of Service
   On this Faculty Original appointment Advancement in Rank
   3 2002 None

5. Other Related Experience:

   1. Part Time Faculty San Jose State University, CA 8/2002
   2. Civil Engineer II City of Santa Clara, CA 5/99–present
   3. Civil Engineer County of Orange, CA 10/88-5/99
   4. Engineering Tech. City of Santa Ana, CA 5/87-10/88

6. States in which Registered
   1. Traffic Engineer, California, 2003-date
   2. Professional Engineer, California, 1991-date

7. Memberships in Scientific and Professional Societies
   1. Institute of Transportation Engineer
   2. South Bay Transportation Officials Association (SBTOA)
   3. Member -Project Development Team, Community Working Group, BART extension to San Jose and Santa Clara

8. Honors and Awards
   1. Honorable Mention Award from Orange County Engineering Council, CA
   2. Project of the Year Award by the American Public Works Association

9. Institutional and Professional Services
   1. San Jose State University, Part Time Faculty, 2002-date.
   2. Civil Engineer II, City of Santa Clara, CA, 1999-date.
   3. Civil Engineer, County of Orange, CA, 1988-1999

10. Accomplished Projects
    1. Project Manager, San Tomas Aquino/Saratoga Creek Trail, Santa Clara, CA, a 3-mile Class I bike/pedestrian trail with construction costs of $8 millions, 2004.
    2. Project Manager/Resident Engineer, State Route 71, Riverside County, CA, a cooperative project between County of Orange, Caltrans, and U.S. Army Corps of Engineers, a 3.1 miles state highway project with an estimated construction costs of $12 millions, 1998.
1. Scott R. Haggblade  
Name: Scott R. Haggblade  
Date of Birth: July 8, 1956

2. Academic Rank  
% of Time: 20  
Non-academic activity: Structural Engineer  
% of Time: 80

3. Degree  
Field: Civil Engineering  
Institution: San Jose State University  
Date: 1987

4. Number of Years of Service  
On this Faculty: 8  
Original appointment: 1997  
Advancement in Rank: None

5. Other Related Experience:

<table>
<thead>
<tr>
<th>Position</th>
<th>Place</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Engineer</td>
<td>Donald C. Urfer &amp; Associates, Inc.</td>
<td>1985-Present</td>
</tr>
<tr>
<td>Civil Engineer</td>
<td>Richard J. Huyck &amp; Associates, Inc.</td>
<td>1983-1985</td>
</tr>
<tr>
<td>Civil Engineer</td>
<td>Leong/Razzano &amp; Associates, Inc</td>
<td>1982-1983</td>
</tr>
<tr>
<td>Teachers Assistant</td>
<td>University of California, Berkeley</td>
<td>Fall 1982</td>
</tr>
</tbody>
</table>

6. States in which Registered  
Structural Engineer, California, S2950  
Civil Engineer, California, C3363

7. Memberships in Scientific and Professional Societies  
SEAONC
1. **Lee, Chu Liang**  
   Name  
   December 19, 1950  
   Date of Birth

2. | Academic Rank | % of Time | Non-academic activity | % of Time |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>Lecturer</td>
<td>20</td>
<td>Santa Clara Valley Water</td>
<td>80</td>
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</table>

3. | Degree | Field         | Institution                                      | Date  |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ph.D.</td>
<td>Hydraulic Engineering</td>
<td>University of Iowa, Iowa City, IA</td>
<td>1981</td>
</tr>
<tr>
<td>B.Sc.</td>
<td>Civil Engineering</td>
<td>Cheng Kung University, Taiwan</td>
<td>1972</td>
</tr>
</tbody>
</table>

4. **Number of Years of Service**  
   On this Faculty: 1  
   Original appointment: 2004  
   Advancement in Rank: None

5. **Other Related Experience:**
   - Position: Hydraulic Engineering Unit Manager  
     Place: Santa Clara Valley Water District, CA  
     Date: 5/01-date
   - Position: Project Engineering Manager  
     Place: Bechtel Corporation, CA  
     Date: 12/81-5/01

6. **States in which Registered**  
   Professional Civil Engineer, California, 1984-date

7. **Principal Publications of Last Five Years**
   None

8. **Memberships in Scientific and Professional Societies**
   1. The American Society of Civil Engineers, Member
   2. The American Society of Mechanical Engineers, Member
   3. The American Public Works Association, Member

9. **Honors and Awards**
   1. Project Development Award from Bechtel Corporation, 1999.

10. **Institutional and Professional Services**
    1. Served as subcommittee chairperson for ASCE taskforce on air entrainment, 1995
    2. Served as lead of Board Communication Committee for Capital Investment Program Taskforce, SCVWD, 2004

11. **Professional Development Activities**
1. **Maaz, Muhieddine**  
   Name  
   Date of Birth: January 5, 1966

2. **Academic Rank**  
   Lecturer  
   % of Time: 40  
   Non-academic activity: Consulting Engineering & Construction Management  
   % of Time: 60

3. **Degree**  
   **Field**  
   **Institution**  
   **Date**  
   M.S. Civil Engineering  
   San Jose State University  
   1989  
   B.S. Civil Engineering  
   San Francisco State University  
   1987

4. **Number of Years of Service**  
   On this Faculty: 1.5  
   Original appointment: 2004  
   Advancement in Rank: None

5. **Other Related Experience:**
   **Position and Description**  
   **Place**  
   **Date**
   1. Co-Founder and VP of MK Housing LLC  
      Purchasing, subdividing large lots and Developing custom homes.  
      CA  
      2003- Present
   2. Co-Founder of California & Beyond  
      General Contractors – General construction  
      Ranging from residential addition to private School construction ($100K to $5 M)  
      Work included dealing with City, clients and Supervising up to 40 employees.  
      CA  
      2000-2003
   3. Founder of QSED, Inc. Consulting Engineers  
      Prepare structural, architectural, mechanical Electrical, and civil plans for numerous projects residential, commercial, industrial, civil.  
      Work included dealing with clients, city and county staff, supervising sub consultants and large number of employees.  
      Project ranged from small residential sub-division to 11 miles fiber optics placement design in public right of way encompassing 4 cities, 2 counties, and 12 government agencies.  
      CA  
      1994-Present
   4. Project Engineer with Albert H. Alexanian And Associates, Structural Engineers  
      Prepared structural plans, calculations and Details for various projects. Inspected and Evaluated numerous structures (over 100) after the Loma Prieta and Northridge earthquakes.  
      CA  
      1988-1994

6. **States in which Registered**
   Professional Engineer, California, USA, 1994-date

7. **Memberships in Scientific and Professional Societies**
   The American Society of Civil Engineers  
   The American Concrete Institute
1. McMullin, Kurt  
Name  
December 30, 1959  
Date of Birth  

2. Academic Rank  
Associate Professor  
% of Time  
100  
-  
% of Time  
-  
Non-academic activity  
-  

3. Degree  
Ph.D. Civil Engineering  
University of California at Berkeley  
1997  
M.S. Civil Engineering  
University of California at Berkeley  
1988  
B.S. Agricultural Engineering  
Iowa State University  
1982  

4. Number of Years of Service  
On this Faculty  
9  
Original appointment  
1996  
Advancement in Rank  
Associate Professor 2002  

5. Other Related Experience:  
Field  
Structural Engr.  
Mechanical Engr.  
Position  
Design Engineer  
Senior Engineer  
Place  
Middlebrook and Louie  
Halliburton Services  
Date  
1/89-8/96  
5/82-5/85  

6. Consulting  
1994-2005  
Consulting Engineer – structural analysis, design and evaluation.  

7. States in which Registered  
P.E. Civil Engineering - California  

8. Principal Publications of Last Five Years  
Journals  

Conferences  

Reports

9. Memberships in Scientific and Professional Societies
1. American Society of Civil Engineers
2. Earthquake Engineering Research Institute
3. Structural Engineers Association of Northern California

10. Honors and Awards
2. College of Engineering Award - Celebrating the Scholarship of College Teaching and Learning, SJSU 2000.

11. Institutional and Professional Service in Last Five Years
1. Department committees including: Assessment Task Force, Executive, Curriculum
2. College committees including: Assessment Task Force, Associate Dean Search
3. University committees including: Campus Planning Board and International Students and Studies.
4. Pacific Earthquake Engineering Research Center’s Education Committee.

12. Professional Development Activities in the Last Five Years
1. Merrick, Daniel S. 
   Name 
   October 23, 1956 
   Date of Birth 

2. Academic Rank % of Time 
   Lecturer 40 
   Non-academic activity % of Time 
   Consulting Engineer 60 

3. Degree Field Institution Date 
   M.S. Civil Engineering SJSU 1986 
   B.S. Civil Engineering SJSU 1981 

4. Number of Years of Service 
   On this Faculty Original appointment Advancement in Rank 
   21 1984 None 

5. Other Related Experience: 
   Position Place Date 
   Consulting Forensic Engineer Self Employed 1979 - present 
   Research Engineer Scientific Service, Inc. 1980 - 1984 
   Structural Designer T. F. Fitzgerald & Assoc. 1979 - 1980 
   Laboratory Technician Testing Engineers, Inc. 1978 - 1979 

6. States in which Registered 
   Professional Engineer, California, 1989 - present 

7. Principal Publications of Last Five Years 

8. Memberships in Scientific and Professional Societies 
   1. American Society of Civil Engineers 
   2. International Code Council 
   3. American Society of Safety Engineers 
   4. Earthquake Engineering Research Institute 

9. Honors and Awards 
   None 

10. Institutional and Professional Services 
    None 

11. Professional Development Activities 
    None 

98
1. Ndon, Udeme
   October 12, 1958
   Name
   Date of Birth

2. Academic Rank % of Time  Non-academic activity % of Time
   Associate Professor 100

3. Degree  Field  Institution  Date
   Ph.D. Civil Engineering Iowa State University 1995
   Minor: Chemical Engineering
   M.S. Civil Engineering Iowa State University 1990
   B.S. Civil Engineering Iowa State University 1990
   M.S. Mathematics Western Illinois University 1987
   B.S. Mathematics Harding University 1984

4. Number of Years of Service
   On this Faculty  Original Appointment  Advancement in Rank
   3  1996  To Assoc. Prof. 2001

5. Other Related Experience:
   Field  Position  Place  Date
   Civil & Env. Engr. Research Associate Dept of Civil & Environmental Engr, University of Central Florida, Orlando 8/95-7/96
   Civil Engr. Process/Research Engineer McClure Engineering Company 1/94-8/95
   Civil Engr. Research Assistant Dept of Civil Engr, Iowa State University 87-94
   Mathematics Temporary Instructor Iowa State University 90
   Mathematics Teaching Assistant Iowa State University 87-88
   Mathematics Lecturer Western Illinois University 87-88
   Mathematics Teaching Assistant Western Illinois University 85-86

6. Consulting
   Jan 1994- Aug 1995  Process/Research Engineer, McClure Engineering Company, Fort Dodge Iowa, involved in managing projects ranging from $2,000 to $7,000,000.

7. State in which Registered
   none

8. Principal Publications of Last Five Years
   Journal


Conferences Proceedings (selected titles)


8. Memberships in Scientific and Professional Societies
American Society of Civil Engineers American Water Works Association
Water Environmental Federation National Environmental Health Association
International Association on Water Quality California Water Environment Federation

9. Honors and Awards
1. College of Engineering Teachers Scholar for 2004/2005 School Year
2. Who’s Who in Science and Engineering, 2005
3. Who’s Who in America, 2004
5. America’s Registry of Outstanding Professionals, 2003

10. Institutional and Professional Service in Last Five Years
1. Department committees including: Executive, Scholarship, Honor, Award and Recognition, curriculum
2. College committees including: Curriculum, Assoc. Dean Recruitment, Sabbatical, Graduate, Recruitment and Retention, Advising Task Force
3. University committees include: University environmental forum,
4. Association of Environmental Engineering Professors’ Diversity Committee Chair.

11. Professional Development Activities in the Last Five Years
   1. NSF Shaping the Future Conference. College Management Seminars (College of Engineering SJSU)
   2. College Leadership Workshop
1. **Oskoorouchi, Ali M.**
   Name
   **May 20, 1953**
   Date of Birth

2. **Academic Rank**
<table>
<thead>
<tr>
<th>% of Time</th>
<th>Non-academic activity</th>
<th>% of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecturer</td>
<td>50</td>
<td>Consultant Engineer</td>
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3. **Degree**
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<tr>
<th>Field</th>
<th>Institution</th>
<th>Date</th>
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<tbody>
<tr>
<td>Ph.D. Geotechnical Engineering</td>
<td>University of California, Davis</td>
<td>1981</td>
</tr>
<tr>
<td>M.Sc. Civil Engineering</td>
<td>Tehran Polytechnic</td>
<td>1977</td>
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4. **Number of Years of Service**
<table>
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<th>On this Faculty</th>
<th>Original appointment</th>
<th>Advancement in Rank</th>
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<tr>
<td>4</td>
<td>2002</td>
<td>None</td>
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5. **Other Related Experience:**
<table>
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<tr>
<th>Position</th>
<th>Place</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td>Part time Faculty</td>
<td>San Jose State University, CA</td>
<td>1/2002-Present</td>
</tr>
<tr>
<td>Associate Professor (F/T &amp; P/T)</td>
<td>Bradley University, Peoria, Illinois</td>
<td>8/96-7/2001</td>
</tr>
<tr>
<td>Visiting Associate Professor</td>
<td>Rutgers University, New Jersey</td>
<td>9/95-8/96</td>
</tr>
<tr>
<td>Associate Professor/Director of Geotechnical Center</td>
<td>Shiraf University of Technology, Tehran, Iran</td>
<td>9/83-8/95</td>
</tr>
<tr>
<td>Adjunct Professor</td>
<td>Katholieke University of Leuven, Belgium</td>
<td>10/87-10/94</td>
</tr>
<tr>
<td>Independent Geotechnical Consultant</td>
<td>California</td>
<td>3/04-present</td>
</tr>
<tr>
<td>Director and Principal Engineer</td>
<td>ATI Architects and Engineers, CA</td>
<td>8/01-3/04</td>
</tr>
<tr>
<td>Senior Project Engineer</td>
<td>Clark Engineers, Inc., Peoria, Illinois</td>
<td>6/98-8/01</td>
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</table>

6. **States in which Registered**
   - Professional Engineer - California, in Civil Engineering, C 62004
   - Professional Engineer – Delaware, 10941
   - Professional Engineer – Illinois, 062-053530
   - Geotechnical Engineer - California, GE 2594

7. **Principal Publications of Last Five Years**
   1. Oskoorouchi, Ali M., and Lane, Philip J., Slope Failure and Piping Potential due to Root Decomposition in an Aged Embankment Dam, Fifth International Conference on Case Histories in Geotechnical Engineering, April 2004, NY, USA.
8. **Memberships in Scientific and Professional Societies**

1. Association of State Dam Safety Officials
2. United State Committee on Large Dams (USSD)
3. American Society of Civil Engineers
4. American Society of Testing Materials
5. ASTM-Committees on Soils and Rocks, voting member

9. **Honors and Awards**

1. Presidential Award of Distinguished Faculty in Civil Engineering, SUT, 1991
2. Phenomenon Performance Award, ATI, 2002

10. **Professional Development Activities**

1. Co-Chairman of the Fifth International Conference on Case Histories in Geotechnical Engineering, April 2004, NY, USA, Embankment Dams, and Slopes
1. Shui-Hin Pang  
   Name  
   November 26, 1942  
   Date of Birth  

2.  
   Academic Rank:  
   % of Time  
   Non-academic activity:  
   % of Time  
   Lecturer:  
   20:  
   Civil engineer at Caltrans:  
   80:  

3.  
   Degree:  
   Field:  
   Institution:  
   Date:  
   Ph.D.: Structural Engineering:  
   UC Berkeley:  
   1975:  
   M. Eng: Structural Engineering:  
   McGill University, Canada:  
   1969:  
   B.Sc.: Civil Engineering:  
   Cheng-Kung University, Taiwan:  
   1965:  

4.  
   Number of Years of Service:  
   On this Faculty:  
   Original appointment:  
   Advancement in Rank:  
   14:  
   1991:  
   Associate Professor:  
   1999:  

5.  
   Other Related Experience:  
   Position:  
   Place:  
   Date:  
   Civil Engineer:  
   California Department of Transportation:  
   1998-date:  
   Adjunct Professor (part-time):  
   Santa Clara University, CA:  
   1991-2000:  
   Consultant Engineer:  
   T Y Lin International, CA:  
   1997-1998:  
   Principal Engineer:  
   General Electric Nuclear Energy, CA:  
   1993-1997:  
   Staff Consultant Engineer:  
   Pacific Gas & Electric Company:  
   1992-1993:  
   Research Specialist:  
   Lockheed Missiles & Space Company, Inc., CA:  
   1986-1991:  
   Senior Engineer:  
   Gibbs & Hills, Inc.:  
   1984-1986:  
   Project Engineer:  
   Quadrex Corporation:  
   1980-1983:  
   Project Engineer:  
   URS/John A. Blume & Associates:  
   1979-1980:  
   Senior Research Engineer:  
   Weidlinger Associates:  
   1974-1979:  

6.  
   States in which Registered:  
   Professional Engineer, California, 1978-date:  

7.  
   Publications of Last Ten Years:  
8. **Memberships in Scientific and Professional Societies**

1. Structural Engineers Association of California
2. Earthquake Engineering Research Institute
3. The Institution of Structural Engineers (England)
4. The Institution of Civil Engineers (England)
5. International Association for Bridge and Structural Engineering (Switzerland)

9. **Institutional and Professional Services**

1. Service as the committee for graduate students qualifying exams.
2. Attend several seminars every year in seismic design and finite element analysis areas.
3. Participate the student-night sponsored by SEAONC to meet the practicing engineers.
4. Attend meetings of the “Chinese Engineers Association in Northern California”.
5. Attend two days work shop from “Math & Science Teacher Education Program” (MASTEP) to improve my teaching skill.
6. Keep in touch with my professors at UC Berkeley to improve my knowledge.
1. **Signore, James M**
   - Name: James M
   - Date of Birth: May 13, 1963

2. **Academic Rank**
   - Lecturer: 20% of Time
   - Researcher UC Berkeley: 80% of Time
   - Educator ASCE:

3. **Degree**
   - **Field**
     - Ph.D.: Civil Engineering/Pavements
     - M.S.: Civil Engineering/Pavements
     - Grad Study: Electrical Engineering
     - B.S.: Electrical Engineering
   - **Institution**
     - University of Illinois
     - Drexel University
     - Clarkson University
   - **Date**
     - 1998
     - 1994
     - 1986/87
     - 1985

4. **Number of Years of Service**
   - On this Faculty: 1
   - Original appointment: 2000
   - Advancement in Rank: None

5. **Other Related Experience:**
   - **Position**
     - Principal Development Engineer
     - Educator/Trainer (Ongoing)
     - Senior Pavement Engineer
     - Graduate Research Assistant
     - Design Engineer
   - **Place**
     - University of California at Berkeley
     - ASCE / Univ. of Wash. Transspeed / NHI
     - Nichols Consulting Engineers
     - University of Illinois at Urbana-Champaign
     - General Electric Company
   - **Date**
     - 5/05-Present
     - 2/99-Present
     - 6/99-5/01
     - 8/91-8/98
     - 8/85-5/98

6. **States in which Registered**
   - Professional Engineer, State of California, 1998 - date
1. **Singh, Rameshwar**  
   Name  
   July 2, 1937  
   Date of Birth

2. **Academic Rank** | % of Time | **Non-academic activity** | % of Time
--- | --- | --- | ---
Professor | 50 | - | -

3. **Degree** | **Field** | **Institution** | **Date**
--- | --- | --- | ---
Ph.D. | Fluid Mechanics | Stanford University | 1965
M.S. | Hydraulics | Auburn University | 1962
B.S. | Civil Engineering | Auburn University | 1961
Diploma | Civil Engineering | Muzaffar Institute of Engineering (India) | 1956

4. **Number of Years of Service**
   - **On this Faculty**
     - Original appointment
     - Advancement in Rank
     - On this Faculty | Original appointment | Advancement in Rank
     - 38 | 1967 | Associate Professor 1972
     - 1977 | Professor 1977
   - 2 Univ. British Columbia | 1965 | Assistant Professor 1965

5. **Other Related Experience**
   - **Field** | **Position** | **Place** | **Date**
   - Hydrodynamics | Specialist-Consultant | Lockheed | 1979 - 84
   - Fluid Mechanics in Boiling Water Reactor | Staff Consultant | General Electric, San Jose | 1975 - 77
   - Water Resources Engineering | Staff Consultant | Santa Clara Valley Water District | 1968 - 72
   - Environmental Impacts | Staff Engineer | URS Corp | 1975 – 80
   - Reservoir Operations: Flow Profiles | Staff Engineer | Santa Clara Valley Water District | 1967 – 71
   - Frequency of Analysis | Staff Consultant | Jennings, McDermott, & Heiss | 1971 – 73
   - Hydraulic Modeling | Principal Investigator | Many companies | 1995-2005

6. **Consulting**
   - Water Resources | Consultant | Santa Clara Valley Water District | 1975 – 98
   - Environmental Impacts | Consultant | Ecol. Impacts Inc. | 1975 – 85
   - Groundwater | Consultant | Metcalf & Eddy | 1984
   - Surface Pollutants | Consultant | URS Corporation | 1980 –84
   - Accident Analysis | Consultant | Attorneys | 1975 – 1999
   - Water Logging in Farmlands | Consultant | Salinas Farms Corporation | 1998

7. **States in which Registered**
   State of California, Registered Civil Engineer, Certificate # C21476

8. **Principal Publications in Last Five Years**
   1. Singh, R. “Modeling of Stevens Creek Bridge Crossing at Homestead,” 2005 (in progress)

9. Memberships in Scientific and Professional Societies
   1. Fellow, American Society of Civil Engineers
   2. Member, National Society of Professional Engineers
   3. Member, American Society of Engineering Education

10. Honors and Awards
   1. Selected A.S.E.E. Faculty Resident to NASA, Ames, 1976 – 77
   2. Appointed to Governors Inter-group Commission, 1975
   3. Keynote Speaker to many Engineers Week Banquets
   5. Appointed to Advisory Board on Floods by S.C. County Supervisors, 1991 – 94
   6. Appointed Member of San Jose City Library Commission, City Council, 1989 – 93
   8. Member of Phi Kappa Phi Honorary Society, 1964-2005
   9. Elected Member of SJSU Academic Senate, 2000-06

11. Institutional and Professional Service in Last Five Years
   1. Reviewed Groundwater Hydrology by Mays, John Wiley, 2005
   3. Chair, College Sabbatical Leave Committee, 1994-99
   5. Senior Mentor of University Mentor Program, 1994-99
   6. Member University Fairness Committee, 1997-1999
   7. Legislative Alert Member of National Society of Professional Engineers, 1997-99
   8. Active Member of College Outreach Member, 1997-99
   9. Members of Numerous College and Department committees, 1994 – 99
   11. Chairman, Organizing Committee of Engineers Week Events, 1994-96
   12. Director, Santa Clara Chapter of California Society Professional Engineers, 1994-95
   13. Member, Scholarship Committee of California Society of Professional Engineers, 1994-95
   15. Member, N.S.P.E. Professional Engineers in Education Committee, 1985-87
   16. Elected Statewide President to C.S.P.E., 1984 – 85
   17. N.S.P.E. Director, 1985 – 86
   19. Director to C.S.P.E. Board, 1982 – 84

12. Professional Development Activities in the Last Five Years
   1. Attended many conferences during 2000-05
   2. Attended daylong seminar on Teaching and Learning, S.J.S.U. Institute of Teaching and Learning, 1999
1. Singhal, Ajay
   Name
   August 12, 1965
   Date of Birth

2. Academic Rank % of Time
   Lecturer 20
   Chief Engineer 80
   Non-academic activity % of Time

3. Degree Field Institution Date
   Ph.D. Civil Engineering Stanford University 1996
   M.S. Civil Engineering Rice University 1988
   B.Tech. Civil Engineering Indian Institute of Technology, Madras 1986

4. Number of Years of Service
   On this Faculty Original appointment Advancement in Rank
   3 2002 None

5. Other Related Experience:
   Position Place Date
   Chief Engineer Risk Management Solutions, Inc., CA 3/02
   Project Manager K2 Technologies, Inc., CA 12/00–2/02
   Senior Staff Engineer K2 Technologies, Inc., CA 7/96–11/00

6. States in which Registered

7. Principal Publications of Last Five Years
8. **Memberships in Scientific and Professional Societies**
   1. Member of Earthquake Engineering Research Institute, Oakland, California
   2. Member of Institution of Engineers, India
   3. Member of Indian Society of Earthquake Technology

9. **Honors and Awards**
   1. Recipient of Gold Medal for Outstanding Undergraduate Performance, 1986
   2. Recipient of Graduate Fellowship at Rice University, 1986
   3. Acknowledged for contribution to the Development of a Standardized Earthquake Loss Estimation Methodology

10. **Institutional and Professional Services**
    None

11. **Professional Development Activities**
    1. Reviewer for the Journal of Structural Engineering, ASCE
    2. Reviewer for Earthquake Spectra, the Journal of the Earthquake Engineering Research Institute
1. Vagliente, Victor Nicholas
   December 14, 1937
   Name
   Date of Birth

2. Academic Rank % of Time Non-academic activity % of Time
   Lecturer 65 Scholarly research and consulting 35

3. Degree Field Institution Date
   Ph.D. Civil Engineering Stanford University 6/73
   Degree of Engineering Aeronautics Stanford University 6/70
   B.S. Material Science Stanford University 6/61

4. Number of Years of Service
   On this Faculty Original appointment Advancement in Rank
   10 1967 None

5. Other Related Experience:
   Field Position Place Date
   Structural Engineering Project Engineer General Electric Company 12/73-12/76
   Statistical Methods Research Engineer Lawrence Livermore National Laboratory 6/78-2/81
   Structural Engineering Project Engineer NUTECH Engineers, Inc. 4/81-2/83

6. Consulting
   Preload Technology Inc.
   APTEK Inc.
   J.R. Benjamin and Assoc.

7. States in which Registered
   California P.E. Civil Engineering

8. Principal Publications of Last Five Years

9. Memberships in Scientific and Professional Societies
   None

10. Honors and Awards
    Visiting scholar
    Dept. of the History of Science
    University of California, Berkeley, California
    (9/90 to 6/92)

11. Institutional and Professional Service in Last Five Years
    None

12. Professional Development Activities in the Last Five Years
    Books:
    Engineering Statistics and Probability, under review for publication.
1. **Vukazich, Steven Martin**  
Name  
January 9, 1960  
Date of Birth  

2. **Academic Rank** | **% of Time** | **Non-academic activity** | **% of Time**  
Associate Professor | 100 | - | -  

3. **Degree** | **Field** | **Institution** | **Date**  
Ph.D. | Structural Engineering | University of California at Davis | 1993  
M.S. | Structural Engineering | University of California at Berkeley | 1984  
B.S. | Civil Engineering | University of California at Davis | 1983  

4. **Number of Years of Service**  
**On this Faculty** | **Original appointment** | **Advancement in Rank**  
12 | 1993 | Associate Prof. 1999  

5. **Other Related Experience:**  
**Field** | **Position** | **Place** | **Date**  
Civil Engineering. | Associate Instructor | Dept of Civil Eng., Univ. of California at Davis | 9/89–6/93  
Structural Engr. | Senior Engineer | Peter Culley and Associates, San Francisco | 6/84-8/89  

6. **Consulting**  
1/2004-pres.  
Structural Engineering Consultant to Framework Engineering in San Anselmo, California.  

7. **States in which Registered**  
PE – California (C 41217)  
SE – California (S 3306)  

8. **Principal Publications of Last Five Years**  
**Journals**  

**Conferences**  

112
Reports/Book Chapters

9. Memberships in Scientific and Professional Societies
1. Member SE - Structural Engineers Association of Northern California, Member of the Seismology Subcommittee
2. Earthquake Engineering Research Institute

10. Honors and Awards
1. College of Engineering Excellence in Teaching Award 1999
2. San Jose State University College of Engineering Teacher Scholar, 1997
3. California State University Research Award 1993, 1995
4. Outstanding Graduate Student Teaching Award 1991
5. Toward Outstanding Postgraduate Study (TOPS) Award, 1989
7. Civil Engineering Department Citation (UC Davis) 1983
10. Chi Epsilon (Civil Engineering) Honor Society
11. Tau Beta Pi (Engineering) Honor Society
12. Pi Mu Epsilon (Mathematics) Honor Society
13. Phi Kappa Phi Honor Society

11. Institutional and Professional Service in Last Five Years
1. College of Engineering Recruitment Task Force, 2005
3. Associate Dean Search Committee, 2004
4. Acting CEE Department Chair, Spring and Summer 2003
1. Wang, Wen C.
   Name
August 27, 1946
   Date of Birth

2. Academic Rank
   % of Time
   Non-academic activity
   % of Time
Professor 20 President, Multech Engineering Consultants 80

3. Degree
   Field
   Institution
   Date
Ph.D. Water Resources Engineering Colorado State University 1984
M.S. Water Resources Engineering National Taiwan University 1973
B.S. Civil Engineering National Taiwan University 1970

4. Number of Years of Service
   On this Faculty
   Original appointment
   Advancement in Rank
   1 2005 None

5. Other Related Experience:
   Position
   Place
   Date
President Multech Engineering Consultants, CA 5/89
Vice President DMA Consulting Engineer, CA 2/96-4/89
Senior Engineer/Project Manager DMA Consulting Engineer, CA 4/84-1/86
Technical Consultant Tetra Tech, Inc., CA 12/82-3/84
Senior Engineer/Project Manager Hydro Research Science, CA 2/80-11/82
Research Associate Colorado State University, CO 1/79-1/80
Hydraulic Engineer Sinotech Engineering Consultants 1/73-1/75

6. States in which Registered
   Professional Engineer, CA, 1987-date
   Professional Engineer, CO, 1981-date
   Professional Engineer, Taiwan, 1972-date

7. Principal Publications of Last Five Years
8. **Memberships in Scientific and Professional Societies**

1. The American Society of Civil Engineers, Member
2. The American Geophysical Union, Member
3. The United States Society on Dams, Member
4. The Chinese Institute of Engineers – USA, Member
5. The Chinese American Institute of Engineers and Scientists
6. Chinese American Water Resources Association - Member

9. **Honors and Awards**

3. Technical Session Chair, Chinese Institute of Engineers – USA’s Annual Winter Conference, January 2005.

10. **Institutional and Professional Services**

1. Chair, Yellow River Vision Committee, Chinese American Institute of Engineers and Scientists, 2003.
2. Secretary, Chinese American Institute of Engineers and Scientists, 2003.
3. Chair, Civil Engineering Group, Chinese Institute of Engineers – USA, 2004-date.
4. Trustee, Chinese Institute of Engineers – USA, 2004-date.
5. Member, Academic Committee, Cross-Strait Water Resources Conference, 2001-date.

11. **Professional Development Activities**

1. **Yates, Janet K.**  
   **Name**  
   **December 27, 1955**  
   **Date of Birth**

2. **Academic Rank** | **% of Time** | **Non-academic activity** | **% of Time**
--- | --- | --- | ---
Professor | 100 | - | -

3. **Degree** | **Field** | **Institution** | **Date**
--- | --- | --- | ---
Ph.D. | Construction Engr. and Man. | Texas A&M University | 1986
B.S. | Civil Engineering | University of Washington | 1978

4. **Number of Years of Service**  
   **On this Faculty**  
   **Original appointment**  
   **Advancement in Rank**  
   **10** | **1995** | Assoc. Prof. | 1992  
   Professor | 1998

5. **Other Related Experience:**  
   **Field** | **Position** | **Place** | **Date**
--- | --- | --- | ---
Civil Engr. | Associate Professor | Polytechnic University, Brooklyn, NY | 9/91-12/94
Civil Engr. | Assistant Professor | University of Colorado – Boulder | 9/90-6/91
Civil Engr. | Assistant Professor | Iowa State University, Ames Iowa | 9/87-6/90
Civil Engr. | Lecturer | Texas A&M University, College Station | 9/94-8/97
Construction | Project Engineer/Lecturer | Pertamina Indonesian Oil Co., Indonesia | 7/83-7/84
Construction | Project Engineer | Williams Brothers Engineers, Tupman, CA | 9/81-9/82
Construction | Project Controls Engineer | Bechtel Power Corporation, S.F.,CA | 9/80-9/81

6. **Consulting**  
   **Current** | **Expert Witness - Various Organizations**  
   **2/98-7/98** | **Bart Extension to Airport Project, writing the Quality Manual and designing the quality control program.**
   **5/95-6/95** | **Grupo APYSCA, Construction Estimate for a $90 million project in Mexico City, Mexico.**
   **6/93-12/94** | **New York City Court System, Expert Witness Testimony for Construction Failures and Accidents.**

7. **States in which Registered**  
   None

8. **Principal Publications of Last Five Years**

   **Books**

   **Journals: (34 refereed journal publications, samples provided below)**
Conference (9 refereed conference proceedings and 22 other presentations, samples provided below)

Reports (9 technical reports, samples provided below)

9. Memberships in Scientific and Professional Societies
1. American Society of Civil Engineers
2. American Association of Cost Engineers International
3. Project Management Institute
4. Construction Industry Institute

10. Honors and Awards (samples from recent awards – numerous other awards)
3. $853,000 total research funding from NSF, the Construction Industry Institute, and the Hewlett Packard Foundation

11. Institutional and Professional Service in Last Five Years
5. Reviewer: Journal of the Project Management Institute (appointed 1990)
6. Proposal Reviewer: National Science Foundation: Structures and Building Systems
7. Committee Member: Construction 2000 Task Force - Con. Industry Inst. ('88-'91)
APPENDIX B

Supplemental Information

A. Plans to Address Weaknesses Identified during ABET Review
B. Review Plan for Program Educational Objectives
C. Program Data
Appendix B.A – Plans to Address Weaknesses Identified during ABET Review

Weakness 1 – No formalized process for review of Program Educational Objectives

Action Items
- A plan for review of PEO’s was developed in January 2006.
- Review of PEO’s by Department Advisory Council in Fall 2006.
- Alumni Focus Group to provide feedback in Spring 2007.

Work that needs to be done:
- No formal timeline established for review of feedback.

Weakness 2 – Evidence lacking of formal outcomes review process.

Action Items
- Data streams developed in Summer 2006.
- Summary sheet for program enhancements composed in February 2006.
- Program enhancements being recommended at each semester retreat.
- Outcomes 5 and 11 to be reviewed in Fall 2006.
- Outcomes 8 and 12 to be reviewed in Spring 2007.

Work that needs to be done:
- Course Coordinators need to identify student work to be reviewed as data stream.
- Need to complete review of effectiveness of program enhancements.
- Continue outcomes retreat each semester.
- Data for data streams needs to be collected each semester.
- Need to locate FE results.
- Need to establish method of continuously receiving FE and 100W data.

Weakness 3 – Shortage of full-time faculty.

Action Items
- Authorization for faculty search for water resources faculty received in Aug. 06.
- Recruitment of water resources faculty initiated.

Work that needs to be done:
- Formalize timeline for hiring of geotechnical faculty member.
- Resolve need/resources for hiring of construction management / surveying faculty member.
**Weakness 4 – Lack of evidence showing that students meeting proficiency requirement.**

**Action Items**
- A review of course evaluation of proficiency was developed in May 2006.
- Starting in Fall 2006 and for each following term, the Course Coordinator for CE121, CE140, CE150, CE160 and CE170 is to duplicate and archive the final exams of the three students who received the lowest course grade that allows the student to graduate.
- Exams to be reviewed at retreat in Spring 2007.

**Work that needs to be done:**
- Follow through on review.
Appendix B.B – Review Plan for Program Educational Objectives
Evaluation Plan for Department Program Educational Objectives

Evaluation Methods

Alumni Survey
- Five-page survey sent to 300~500 alumni of the undergraduate program.
- Target is receiving 100 completed surveys.
- Survey questions ask about Program Educational Objectives and Program Outcomes.
- Surveys graduates on achievements and milestones of career: project engineer, licensure, supervisory status, career satisfaction, graduate degrees obtained, work responsibility.
- Survey conducted via mail.
- Mailing of survey to be conducted by department staff.
- Alumni of all ages surveyed.
- Results disaggregated into years since completing undergraduate degree: less than 5, 5~10, 10~20, more than 20.
- Survey conducted in Spring 2009, 2012, 2015, ...
- Written report to be compiled and provided to department faculty and filed in department assessment files.

Alumni Focus Group
- Focus group formed from alumni of undergraduate program.
- Eight to ten participants.
- Alumni who have graduated five to ten years prior to the discussion.
- Discussion lasts 2~3 hours.
- Discussion to be led by the Department Chair and at least one other faculty member.
- Pursues detailed questions about what aspects of the program were of most benefit to graduates career, what aspects of the program were less valuable, and what new aspects might be added to the program.
- Focus group conducted in Spring 2007, 2010, 2013, ...
- Written report to be compiled and provided to department faculty and filed in department assessment files.

Additional Items
- On the off years (Spring 2008, 2011, 2014, …) the department Chair will utilize time to improve alumni data base.
- DAC members should be used as a means of collecting alumni contact information, particularly for those who have graduated more than ten years ago.
Appendix B.C – Program Data

Course Enrollments over Time

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