

April 1, 2014

Corpus Christi Business and Job Development Corporation  
1201 Leopard St.  
Corpus Christi, TX 78401

Dear Corporation Members:

On behalf of Texas A&M University-Corpus Christi, I respectfully submit this letter as a request for two million dollars in funding from the Corpus Christi Business and Job Development Corporation to assist in the establishment of three undergraduate Bachelor of Science degrees with majors in Electrical, Civil, and Industrial Engineering at the Island University.

Your previous support of the Mechanical Engineering program helped propel that program to early success with enrollment numbers exceeding projections and ABET accreditation being achieved earlier than anticipated. We sincerely appreciate your support and applaud your vision in understanding the community's need for that program.

The need for additional engineers statewide and locally remains high today, as evidenced by a wide range of data from State and industry sources. This data is included for your review in the attached Needs Statement document. Additionally, a synopsis of the University's proposed Electrical, Civil, and Industrial Engineering programs is also attached for your review. Please see the enclosed Proposed Degree Program document.

The establishment of three additional Engineering degrees at Texas A&M University-Corpus Christi will benefit the city in many ways, including but not limited to:

- Assisting with new business recruitment to the city by building a trained workforce needed by prospective businesses;
- Providing an educated, skilled labor pool for existing local industries, thereby increasing their capability and capacity;
- Enhancing employee retention—locally educated employees have already established themselves in Corpus Christi, making them more likely to stay;
- Providing qualified candidates for many of the 400-500 engineering jobs Coastal Bend Workforce Development anticipates by 2015;
- Increasing the number of local highly compensated positions—the starting salary of BSEE graduates is \$75,000 to \$80,000 per year with an estimated annual increase of 5% to 10% per year;
- Providing eight additional University faculty (annual salaries of \$100,000 to \$120,000 each) and two staff positions (annual salary of \$40,000) over a four year period;

- Providing a cumulative total of 400 full-time students over a five-year period, with increases as the program becomes well established;
- Generating additional student tuition, as well as State funding dollars through Student Credit Hour Revenue, to the University;
- Supporting local businesses through patronage, local spending, and personal contributions from the increased numbers of faculty, staff, and students; and,
- Impacting the local economy by approximately \$15 million by the end of the first five years of the program.

The Electrical, Civil, and Industrial Engineering programs are also vital to the success of the Lone Star Unmanned Aircraft System Program at Texas A&M University-Corpus Christi. That program anticipates \$49.6 million in infrastructure development and research funding, which is expected to generate more than 1,200 direct, indirect, and induced full-time equivalent jobs. Overall, the estimated economic impact of the Lone Star UAS Program is estimated at \$260 million for the Coastal Bend region. When fully staffed, the Lone Star UAS Command and Control Center at the Coastal Bend Business Innovation Center will employ 120 people with an annual payroll of no less than \$6.8 million<sup>1</sup>.

Funds received in the past from the Business and Job Development Corporation for Mechanical Engineering helped support that program's early success. More than 300 students are now enrolled in this engineering program. Given a reported average annual starting salary of \$75,000 for those graduates, the public funding has helped generate an estimated \$23 million in wage earnings per year<sup>2</sup>.

The funds we are requesting from the Business and Job Development Corporation will be used to retrofit and properly outfit with equipment and furnishings the laboratories currently used in our Electrical Engineering Technology program. Additionally, funding will be used to build new laboratories necessary for teaching the Electrical, Civil, and Industrial Engineering programs. It will also provide student and faculty/staff support as we recruit these individuals to Texas A&M University-Corpus Christi.

In addition to requesting funds from the Business and Job Development Corporation, Texas A&M University-Corpus Christi is investing \$534,750 per new Engineering program for faculty and staff salaries and benefits, for a total investment of \$1,604,250 over the next five years. We also have a goal of raising another \$2,000,000 from our community partners and industry businesses that will directly benefit from the electrical, civil, and industrial engineers who graduate from our University. We anticipate the five-year cumulative total of expenses for faculty and staff salaries and benefits plus program administration to be \$3,422,115 for these three programs combined. Additional funding for laboratories and student scholarships is necessary to ensure the success of these programs.

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<sup>1</sup> Emerging Technology Fund Research Grant Matching Project Proposal, submitted by Lone Star UAS Center of Excellence and Innovation to the Texas Office of the Governor, 2014

<sup>2</sup> Lee, J. (2014). Community Benefits from Type A Funds. *Corpus Christi and Coastal Bend Economic Pulse*, No. 3.

The two million dollars requested from the Business and Job Development Corporation may be paid out over time as the programs are implemented. We would request that one million dollars be dedicated to the Electrical Engineering program to be paid two months prior to that program commencing, either in the fall of 2014 or 2015. The remaining one million dollars would be paid when the Civil Engineering program begins, likely one to two years after the implementation of Electrical Engineering.

Again, please accept my gratitude for the support that the Corpus Christi Business and Job Development Corporation has given to Texas A&M University-Corpus Christi's Engineering Program.

Sincerely,

A handwritten signature in blue ink, appearing to read "Flavius C. Killebrew". The signature is fluid and cursive, with the first name "Flavius" being more prominent.

Flavius C. Killebrew  
President/CEO

Enclosure

## Needs Statement

**Bachelor of Science in Electrical Engineering (BSEE)**

**Bachelor of Science in Civil Engineering (BSCE)**

**Bachelor of Science in Industrial Engineering (BSIE)**

The need for additional engineering graduates in the Coastal Bend Region is supported by a wide range of evidence, including: Texas Workforce Commission projections, independent studies, Coordinating Board reports, surveys of local industry, and regional plans to boost local industry above recent trend lines. The need for additional engineering graduates is also evidenced by the multi-billion dollar investments being made in the Coastal Bend by international companies, such as the Tianjin Pipe Company manufacturing facility and voestalpine located in nearby San Patricio County, and M&G Chemicals located on the inner harbor. The growing energy boom due to the Eagle Ford Shale play, the location of the unmanned aircraft systems program at Texas A&M University-Corpus Christi, and the reversal of the Seaway pipeline between Oklahoma and the Gulf Coast will all further increase the workforce demand of engineers in our region. The growth of the Port of Corpus Christi and the completion of the Panama Canal expansion project will also increase demand for engineers here.

Texas Workforce Commission data show that there is a substantial need in the Coastal Bend regional for additional electrical, civil, and industrial engineers, as evidenced by workforce projections in these and closely related areas.

Occupation	Average Annual Employment: 2010	Average Annual Employment: 2020	Growth Rate	Average Annual Job Openings (New and Replacement)
Related to <b>Electrical Engineering</b>				
<i>Electrical Engineers</i>	150	180	20.0%	30
Electronics Engineers, Except Computer	160	180	12.5%	20
Computer Hardware Engineers	40	40	0.0%	0
Computer Specialists	2,720	3,180	16.9%	460
<b>Total</b>	3,070	3,580	16.6%	510

*Employment Projections for the Coastal Bend Workforce Development Area by the Texas Workforce Commission*

The demand for engineering remains strong. For example, an October 4, 2013 search of the occupations listed in the chart above (electrical engineers, electronics engineers (except computer), computer hardware engineers, and computer specialists) on a common engineering job search site used by many university career services centers, [www.engineer.info](http://www.engineer.info), identified more than 50,000 job listings nationwide. Of those job openings, 45 were available in the Corpus Christi area specifically.

## **Proposed Degree Programs**

**Bachelor of Science in Electrical Engineering (BSEE)**

**Bachelor of Science in Civil Engineering (BSCE)**

**Bachelor of Science in Industrial Engineering (BSIE)**

The proposed Electrical, Civil, and Industrial Engineering curricula are aimed at educating engineers of the 21<sup>st</sup> century. Through tailored study plans, graduates from Texas A&M University-Corpus Christi's engineering programs will have the option to prepare themselves for depth in technical focus areas, cultivate entrepreneurship, or pursue a minor in non-engineering fields. Focus of the proposed electrical, civil, and industrial engineering degree programs will be aimed at meeting regional needs of industry, including close collaboration with Del Mar College and expansion of regional efforts to enhance the STEM pipeline.

The proposed curricula will satisfy the ABET accreditation requirements and the Texas A&M University-Corpus Christi Core Curriculum. Three interdisciplinary, secondary focus areas along with appropriate certificate programs will be established: unmanned systems (including unmanned aircraft vehicles, remotely operated vehicles, and autonomous vehicles), renewable energy (solar, wind, geothermal, and algal fuels), and business or entrepreneurship.

Texas A&M University-Corpus Christi is committed to following the recommendations of the Coordinating Board's March 2010 report, Projecting the Need for Engineering Education in Texas. Specifically, the programs we plan to develop will:

- Align with projected workforce needs;
- Support the University and A&M System's initiative of the unmanned aircraft systems;
- Emphasize recruitment of underrepresented students and faculty, including Hispanics, African-Americans, and females;
- Include initiatives to ensure high completion rates;
- Be built from the ground up to ensure transfer student success, by including early and consistent collaboration with Del Mar College and by following relevant Coordinating Board enabled transfer compacts in the specific engineering disciplines; and
- Include a strong effort to recruit Texas and US students into these programs building on local and regional initiatives (for example, Moody High School's Innovation Academy, South Texas Engineering Alliance, and FIRST Tech Challenge Robotics Competition for grades 7-12).

The programs will follow the Texas Higher Education Coordinating Board Tuning of Engineering guidelines that ensure smooth transition of community college transfer students into the new program and will prepare students to successfully pursue an in-depth engineering education in upper division curriculum. The programs will seek Engineering Accreditation Commission of ABET requirements when the first students graduate from the degree program. The achievements of the accelerated accreditation of the mechanical engineering BS degree

program in Fall 2013 will guide the ABET accreditation process for electrical, civil, and industrial engineering programs as well.

The new programs are designed to provide well-rounded education and to prepare students to become leaders of their chosen careers. Emphasis will be placed on the University Core Component and learning communities approach, more cross-integration of subject materials in the engineering courses for a systems approach, and a cooperative education component involving industrial experiences and service learning. The goal of the engineering programs is to build a teaching and research program to provide students with a high quality education in the theory and practice of engineering, by adopting a multidisciplinary approach, encouraging innovation through the capstone design projects, and cultivating entrepreneurship.

Engineering students will participate in the internship programs at the Texas A&M University-Corpus Christi Coastal Bend Business Innovation Center and will submit their capstone design projects in the annual Coastal Bend Business Plan Competition to gain invaluable experiences in teamwork, communication skills, professionalism and ethics, innovation, and business practices. Engineering faculty will serve as technical advisors to student capstone projects as well as to clients of the Innovation Center, cultivating a supportive environment of entrepreneurship on campus. The proposed program will also support the Lone Star Unmanned Aircraft System Center of Excellence.

The educational objectives of this program are to graduate students who will:

- Practice the electrical, civil, and industrial engineering discipline successfully within commonly accepted professional standards;
- Be cognizant of ethical responsibilities as professionals;
- Be aware of technical issues and potential consequences in contemporary society; and
- Become a leader of his/her chosen profession.

Estimates for student enrollment are conservative and based upon our experience in Mechanical Engineering. Some of the current electrical engineering technology and mechanical engineering technology students, as well as some students from the Mechanical Engineering program, will transfer to the new Electrical, Civil, and Industrial engineering programs. It is estimated that the Electrical Engineering program will have 25 transfer students for the first year, followed by 5 transfer students per year thereafter. New student recruitments are estimated at 25 students for year one, 35 for year two, and 40 for subsequent years. Estimates for the Civil Engineering program start with 20 students in year one, then increase to 25 new students in year two, and 30 new students in each of the years three through five. Each year assumes five transfer students will move into the Civil Engineering program. For Industrial Engineering, we estimate 15 new students in the first year along with 10 transfer students. The second year we estimate 20 new students and 5 transfer students will join the Industrial Engineering program. In years three

through five we anticipate having 25 new students and 5 transfer students per year for Industrial Engineering. All estimates assume a 30% attrition rate, and all students will be full time.

<b>Projected Student Enrollment</b>					
<b>YEAR</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Electrical Engineering</b>	50	75	108	140	171
<b>Civil Engineering</b>	25	28	76	102	128
<b>Industrial Engineering</b>	25	43	66	88	111

When the Mechanical Engineering program began, estimates projected 5<sup>th</sup> year enrollment at 122 students. As of spring 2014, which is the end of the 5<sup>th</sup> year for Mechanical Engineering, we have 311 students (unofficial count) in the Mechanical Engineering program and another 33 students (unofficial count) in the Pre-Mechanical Engineering program. A conservative way to put the comparison is that our current enrollment is more than twice our projection, which easily illustrates the high demands for engineering education in the Coastal Bend.