Fairmont State University

WV-HEPC Series 11 Intent to Plan (Section 5 of Series 11)

Date: January 2018

Title of Degree: Bachelor of Science (B.S.)
Surveying & Geomatics Engineering Technology

Location: Fairmont State University

Effective Date of proposed action: August 2018

Submission of full proposal: March 2018, or upon approval of Intent to Plan

Fairmont State University

Dr. Mirta Martin, President

Dr. Christina Lavorata, Provost and Vice President for Academic Affairs

Dr. Donald Trisel, College of Science and Technology Dean

Professor Hugh Costello, P.E., Technology Programs Chair

Prepared by:
Professor Tabitha Lafferre, Professor James Vassil, P.E.

Formatting & Review by:
Dr. Jack Kirby, Associate Provost for Academic Affairs

This submission of the WV-HEPC Series 11 Intent to Plan is a proposal for the Bachelor of Science, Surveying & Geomatics Engineering Technology degree at Fairmont State University. The full proposal will be submitted upon approval in accordance with section 6 of Series 11 – Implementation Plan. Upon internal and external approvals, this program is projected for full implementation Fall 2018.

a. Educational Objectives

The proposed Surveying & Geomatics Engineering Technology (SGET) major is a 120-credit hour program that will provide students with an interdisciplinary program encompassing technology, natural sciences, social sciences, arts, humanities, and general studies. The curriculum is designed as a 2+2 program, with an accompanying Associate of Science degree. Once the Associate of Science degree is earned, students may choose to enter the workforce or continue on to the baccalaureate level. The major will prepare graduates with technical skills required to enter careers in land and boundary surveying, geographic information systems, engineering project surveying, photogrammetry, mapping and geodesy, remote sensing, and other related disciplines.

b. Program Description

The SGET program is structured to meet the growing need in surveying and mapping of natural resources, transportation systems, recreational facilities, cities, and subdivisions. As the program will be seeking Accreditation Board for Engineering and Technology (ABET) Accreditation with the Engineering Technology Accreditation Commission (ETAC of ABET), educational objectives and outcomes were designed to meet ETAC of ABET accreditation recommendations.

Building on the A.S. degree, graduates of the SGET program will have strengths in the following areas:

i. Utilizing measurement technologies and field mapping.
ii. Interpreting land records and prepare maps and plats.
iii. Applying geodetic science, photogrammetry, remote sensing, and data analysis techniques.
iv. Analyzing positional accuracy.
v. Planning and selecting appropriate measurement systems.
vi. Compose land records and plats to meet legal requirements.

These strengths are designed to meet the FSU College of Science and Technology's mission statement, which reads: "Our mission is to promote effective student learning in science, math, and technology and to prepare top-quality graduates for their future

endeavors, including graduate study, employment or other personal goals."

c. INSTITUTION HIGH QUALITY STANDARDS AND CONTINUING ASSESSMENT

The program will be seeking ETAC of ABET accreditation. The program will undergo regular reviews of both general and program-specific criteria specified by ABET. The program will also incorporate an integrated capstone experience and cooperative education with an internship. In addition, the program's advisory committee will provide advisement on current and future aspects of the technical field, in order to ensure the program is preparing the graduates to meet the need of the workforce. With ETAC of ABET accreditation, graduates will be eligible to obtain professional licensure.

d. SIMILAR PROGRAMS IN WV

Currently, there are no Surveying & Geomatics Engineering Technology programs in West Virginia. Glenville State College offers an associate degree in Land Surveying Technology. The Glenville A.S. degree typically accompanies the Bachelor of Science in Natural Resource Management, and with this associate degree, graduates may apply for licensure in West Virginia. It is not, however, recognized by surrounding states in the Appalachian region. Nationally, there are only fifteen ABET accredited B.S. degrees in Surveying & Geomatics Engineering Technology or related fields, four of which are ETAC of ABET accredited surveying programs.

e. SOCIETAL, OCCUPATIONAL, RESEARCH, OR PUBLIC SERVICE NEEDS AND STUDENT DEMAND

Licensed surveyors are an integral part of the country's infrastructure. Surveying and mapping is required for planning transportation systems, city and suburban development, natural resource development, and construction. Surveying is required for governmental agencies, private industries, as well as individuals with small or large projects.

Research is a crucial aspect to the degree and profession. Surveying has been a skill required since the first settlers began establishing property lines with a simple chain. Required documents can be extremely aged and require extensive investigation to acquire.

Based on data from other ABET accredited surveying programs, and from Fairmont State University's ETAC of ABET programs, the SGET program anticipates an enrollment of approximately 50 students each year.

f. ADDITIONAL RESOURCES NEEDED TO OFFER THE PROGRAM

The SGET major implementation will require minimal resources for the program.

i. **Equipment and Software**

Fairmont State University's College of Science and Technology already possess a considerable amount of surveying equipment and software. This includes AutoCAD suite, automatic levels, electronic total stations, and GPS receivers with data collectors. Equipment costs for the program will be minimal. The only anticipated equipment cost will be LiDAR scanners and Carlson Software, as recommended by the advisory committee.

ii. **Faculty**

The program will require one full time faculty and a Program Coordinator. Both of these faculty positions are in place for the program. Qualified adjunct faculty will be employed for special skills as enrollment increases.

iii. **Facilities**

No additional facilities will be required for the program.

g. INSTRUCTIONAL DELIVERY METHODOLOGIES

Courses in the proposed program will be delivered in face-to-face and online learning environments. A hybrid model will be implemented, utilizing technology for online lecture-based classes, while employing face-to-face settings for laboratory components. Instructional methods will include, but not be limited to, lectures, simulations and discussions, laboratory simulations and analysis, experiential learning, and a strong capstone experience and internship component.

h. SUMMARY

Fairmont State University's Surveying & Geomatics Engineering Technology major will provide students with more career choices while filling in industry need for licensed surveyors. The SGET Bachelor of Science degree, along with ETAC of ABET accreditation, will allow graduates to enter directly in to the workforce and to embark on the path for professional licensure. Due to the small amount of accredited surveying programs in the state and country, this major will appeal to students in the state of West Virginia as well as nationally. Letters of support, from both private and government entities, can be found in Appendix C.

APPENDIX A

B.S. Degree in Surveying & Geomatics Engineering Technology
Proposed Program Curriculum

Required Major Courses			
	Course Number	*Title*	*HRS*
SURV	2200	Professional Surveying Practices	3
SURV	2210	Interpreting Land Records	3
SURV	2220	Surveying Engineering Graphics	3
SURV	2230	Land Survey Boundary	3
SURV	2260	Dendrology	2
SURV	2290	Boundary Retracement	3
SURV	3320	Geodesy	3
SURV	3340	Principles of Photogrammetry	3
SURV	3380	Topographic Surveying	3
SURV	4400	Surveying Internship	3
SURV	4420	Surveying Practices & Decision Making	3
SURV	4480	Surveying Projects and Applications	4
CIVL	1100	Introduction to Civil Engineering Technology	1
CIVL	2200	Introduction to Surveying	3
CIVL	2240	Construction/Land/Route Surveying	3
CIVL	2275	Civil Engineering Graphics	3
CIVL	2280	Environmental Engineering Technology I	3
CIVL	3305	Hydraulics and Hydrology	3
SCIE	1107	Graphic Information Systems	4

APPENDIX B
B.S. Degree in Surveying & Geomatics Engineering Technology
Course Descriptions

SURV 2200 – Professional Surveying Practices
This course will introduce the broad skills required of a surveyor in a business atmosphere. Topics include business plan formulation, basic financial forms and accounting, pricing and bidding projects, marketing, contracts and proposals, and project management. Additional topics include preparing boundary descriptions, preparing survey reports, professional ethics, in addition to dealing with and obtaining oral evidence from landowners and other persons, both clients and adjoiners. This course will also introduce working with legal professionals: interaction with and cooperation with attorneys, preparation for depositions and testimony, effectively conveying and defending survey opinions in court.

SURV 2210 – Interpreting Land Records
Course topics include obtaining and analyzing deeds, wills, plats and other recorded documents, including instruction and practice in reading archaic cursive writing in old documents. The course will also incorporate the practices of finding and using other evidence not generally found in courthouse records, including old and new aerial photographs, other photographs, highway and other right of way plans, and assorted archival material.

SURV 2220 – Surveying Engineering Graphics
This course will emphasize field to office data automation as well as the use of coordinate geometry software. Topics will include data analysis, data adjustment and mapping calculations of municipal and rural maps and drawings, drainage applications, plan and profile drawings, cross-sections, earthwork plats, legal descriptions, contour and topography generation, quantity calculators, and other details related to pertinent surveying technology drawings. Computer-aided-drafting (CAD) with Carlson is used for drawings.

SURV 2230 – Land Survey Boundary
Topics include an overview of the basic concepts of boundary law and retracement, understanding the relative importance of different types of boundary evidence, and recognizing the often complex nature of boundary retracement.

SURV 2260 – Dendrology
Course provides an overview of tree taxa of the Appalachian Region. Topics include indigenous species identification, morphology, distribution, habitat and ecology. Students will gain knowledge on how morphology, life history, and ecology are related to habitat and distribution of woody plants.

SURV 2290 – Boundary Retracement
This class will continue with practical and in-depth instruction in the methods of recognizing and analyzing boundary evidence, and correlating record evidence with physical evidence. The class will also focus on applying logic and professional judgment in resolving conflicts between different aspects of the evidence, and reaching sound and defensible conclusions in the resolution of boundary issues.

SURV 3320 – Geodesy
This course will encompass the techniques of precise horizontal and vertical control surveying. Emphasis will be on practices of both government and private organizations. The use of directional theodolites, levels, and total station measurement is stressed. Topics include geometry of ellipsoids, coordinate systems, precise leveling and orthometric height, geodetic position computation and gravity field of earth.

SURV 3340 – Principles of Photogrammetry
This course will provide an introduction to the advantages of photogrammetry, both as a mapping and planning tool. Topics include vertical photo geometry, scale, displacement due to relief and tilt, viewing and measuring, development of planimetric and topographic maps, flight planning and aerial triangulation.

SURV 3380 – Topographic Surveying
Course will include the use of Global Positioning Systems (GPS) equipment in order to collect and create survey products in a computer aided drafting environment. Topics include geodetic horizontal and vertical datums, projection systems, datum transformations, and cadastral surveying as applied to the U.S. Public Land Survey System.

SURV 4400 – Surveying Internship
Students shall complete an advisor-approved surveying internship or co-op. Responsibilities must be in the field of surveying.

SURV 4420 – Surveying Practices & Decision Making
Students will learn to apply the principles of boundary retracement and boundary law using actual or virtual cases to develop skills in analyzing boundary evidence and making professional decisions, to enable students to begin developing the ability to analyze and resolve boundary issues.

SURV 4480 – Surveying Projects and Applications
This course is designed to serve as a capstone course for Surveying and Geomatics Engineering Technology majors. Students are required to successfully complete and approved senior project, with industry collaboration. This course requires both individual participation and teamwork in presentations, industry standards, and professional written communications.

APPENDIX C

B.S. Degree in Surveying & Geomatics Engineering Technology
Quantitative Industry Support

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

Division of Highways

1900 Kanawha Boulevard East • Building Five • Room 110
Charleston, West Virginia 25305-0430 • (304) 558-3505

Jim Justice
Governor

Thomas J. Smith, P. E.
Secretary of Transportation/
Commissioner of Highways

September 13, 2017

Ms. Tabitha M. Lafferre
Assistant Professor of Civil Engineering Technology
Department of Engineering Technology
Fairmont State University
1201 Locust Avenue
Fairmont, West Virginia 26554

Professor Lafferre:

I am writing in follow-up to our recent conversations regarding Fairmont State University exploring the option of a surveying degree. The West Virginia Division of Highways is currently working on new ways to attract and retain surveyors as our current staffing levels are at less than seventy percent. Surveying as a profession is a vital part of our design and construction program.

West Virginia is very much in need of educational paths that lead to well trained and educated surveyors that will meet the minimum standards implemented by the West Virginia Board of Professional Surveyors in 2012.

I would be honored to advise and work with you in your development process. Please feel free to contact me at West Virginia Division of Highways, Engineering Division, 1334 Smith Street, Charleston, West Virginia 25301, telephone: (304) 558-5757, and e-mail at Travis.E.Long@wv.gov.

Very truly yours,

Travis E. Long
Chief of Surveys
Engineering Division

TEL:b

E.E.O./AFFIRMATIVE ACTION EMPLOYER

DIEFFENBAUCH & HRITZ
Engineering | Surveying | Environmental

1095 Chaplin Road
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T: 304.985.5555
F: 304.985.5557
dandhengineers.com

September 07, 2017

Tabitha Lafferre
Fairmont State University
Assistant Professor of Civil Engineering Technology
FSU ASCE Student Chapter Faculty Advisor
College of Science and Technology

Dear Mrs. Lafferre,

I was excited to learn Fairmont State University was considering adding an accredited survey program to its curriculum. I can speak from personal experience that there are few options available for a two or four year accredited survey program. I am a professionally licensed surveyor and engineer in West Virginia and surrounding states, I actively run a survey department in Morgantown West Virginia. The professional requirements for surveying have changed a lot since I earned my degree. There is a concerted effort across the nation to increase the educational requirements for professional surveyors. As a matter of fact, even with ten years of survey experience and a B.S. degree in Civil Engineering my initial application was turned down by the West Board of Professional Surveyors because I did not possess formal education requirements in particular survey subjects. I am absolutely in favor of raising the educational bar for professional surveyors just as soon as the opportunity for education is available to students and working professionals. In the ten years since that rejected application I have earned the West Virginia Professional Survey License and that of three other states. And yet with four state professional licenses and 20 years of surveying practice I am not qualified to sit for the state exam in our neighboring state of Ohio due to the formal education requirements.

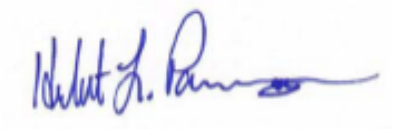
In addition to the education requirements there is a growing need for surveyors in the state and surrounding border states due to a number of factors including, retiring surveyors, technological advances in software, hardware, Global Positioning Systems (GPS) and growing local industries such as energy, transportation and land development. As a result I have personally found it difficult to find qualified candidates to hire in recent years. This is leading to a shortage of qualified surveyors available, albeit with plenty of experience, but lacking the education requirements to qualify for or to pass the exams for licensure. Furthermore with the advancement in hardware and software many surveyors today do not have a full understanding of the technology they are using and therefore do not have a full understanding of the profession. Finally the need for surveyors continues to grow in West Virginia and nationally, with

growing local industries there is an immediate need for surveyors both in the industry and with the consulting service providers that work for them.

Surveying is a broad field much like civil engineering, there is a lot to gain by formalizing the tools and skills needed to be productive in the field the moment you are hired. An advantage an entry level surveyor has with an accredited degree is that they are more likely hired under the assumption that they are on a licensing track. This leads to increased starting salaries and employer investment in career development. Those who do not possess a degree are required to learn all their skills sets through work experience, on the job training has more to do with the work at hand and less to do with their career development. Many field surveyors work hard to hone their field skills and find themselves too valuable to bring into the office to learn the remaining skills sets required to be a well-rounded surveyor. For some this is enough but the career path generally ends at party chief rather than a professionally licensed surveyor.

An accredited survey curriculum designed to meet the professional requirements for licensure will give Fairmont State University a unique program for West Virginia and the surrounding area. It will result in graduates that will be highly sought after and provide those graduates with a clear professional career path in a high demand field locally and nationally. If you add online courses and/or evening courses to your curriculum you will provide opportunity to the working class surveyor for licensure as well. I wish the University the best in their consideration of this program and I am certain if implemented it will be a successful endeavor.

Sincerely,



Herbert L. Parsons III, PS, PE
Operations Leader
Dieffenbauch & Hritz LLC

Lafferre, Tabitha

From: Joseph H. Lowther <jlowther@thethrashergroup.com>
Sent: Monday, September 11, 2017 8:42 AM
To: Lafferre, Tabitha
Subject: RE: Fairmont State Surveying Program

Good morning Tabitha,

It was nice to speak with you on the phone this morning. Aaron had forwarded me your email. Realizing the need for educated surveyors and the benefit of the ABET accreditation Thrasher will try to support as much as feasibly possible to help get this moving forward.

We look forward to working with you!

Thank you,
Joe

JOSEPH H. LOWTHER, PS
Assistant Survey Division Manager | The Thrasher Group, Inc.
office: 304-326-6386 | 800-273-6541
mobile: 304-677-5314
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600 White Oaks Blvd | P.O. Box 940 | Bridgeport, WV 26330

Lafferre, Tabitha

From: teterdon@frontiernet.net
Sent: Saturday, September 09, 2017 11:47 AM
To: Lafferre, Tabitha
Subject: Fw: FSU Land Surveying

--- On Sat, 9/9/17, Jw Wyatt <jwwyatt619@gmail.com> wrote:

> From: Jw Wyatt <jwwyatt619@gmail.com>
> Subject: FSU Land Surveying
> To: "Don Teter" <teterdon@frontiernet.net>
> Date: Saturday, September 9, 2017, 6:28 AM Don and FSU Administration,
> I am very pleased to hear that FSU is working on establishing of a
> Land Surveying program. There is currently a shortage of trained and
> licensed surveyors in WV. The demand for surveyors steadily increases
> over time more landowners desire to manage their forests as well as
> sub-divide properties for development and other reasons of fracture.
> Several of the surveyors in my working area are approaching retirement
> with very few to no young people seeking educational and career
> opportunities in surveying.
>
> As a forester and land manager of 30,000 + acres I frequently need the
> assistance of a trained land surveyor to survey properties, survey and
> map road right-of-ways as well as retrace and reestablish property
> boundaries so that I may administer timber sales.
> I commend FSU for establishing a land surveying program to provide WV
> and other states with competent trained professional surveyors. The
> program will also benefit FSU's enrollment as well as WV's economy.
>
> J.W. WyattWV Registered Forester
> 619Wyatt Land & Timber Management
> LLCPO Box 2343Elkins, WV
> 26241(304)-642-1073