Tennessee Higher Education Commission

Capital Outlay Request - FY 2020 / 21

Institution: University of Memphis
Project: STEM Research and Classroom Building
City/County: Memphis/Shelby

Project Data

STEM Research and Classroom Building
Serving College of Engineering / College of Arts and Sciences
Total Project Cost: $ 41,000,000
Committed External Funds: $ 8,089,000
State Funding Request: $ 32,911,000
Total Gross SF New/Renovated: 65,000/17,000
Total Net Square Feet: 41,816

Optional

Appendix Document List

The following documents are provided in separate electronic file and also included in the hard copy.
Cover Letter
Appendix A - Required Documents:
- Institutional Mission Profile
-THEC Space Guidelines workbook
-Facilities Survey Summary Sheets

Appendix B - Supplemental Support Documents:
-Excerpt from Campus Master Plan
-Renderings
-Strategic Plans
-Space Needs analysis
-Operational costs
-Campus Standards
-Stacking Diagram
-Architectural program

Executive Summary of the Proposed Project

The STEM Research and Classroom Building (SRCB) will support 22 STEM areas of study and multiple interdisciplinary research centers from the Herff College of Engineering (HCOE) and the College of Arts and Sciences (CAS). The SRCB will provide additional classroom, research, and laboratory space and renovations to 1970s space. The SRCB is a response to a space deficit caused by overwhelming growth. For 2013-2018, HCOE undergraduate enrollment increased 37% and the total number of bachelor's degrees awarded increased 50%. The CAS Computer Science enrollment increased 47% over 3 years. UofM has exceeded THEC's recommended space capacity for students, faculty and researchers in STEM disciplines. Without the SRCB, STEM enrollment and graduation growth will stagnate to the detriment of the Tennessee's workforce. The areas of study supported by the SRCB represent 322 graduates annually. The faciliy will support a 64% increase in degrees over the next 5 years, increasing annual graduates to 528 annually by AY 2022-23. The UofM expects an average increase in enrollment areas supported by the SRCB of 12% annually for the next 4 years. This increased enrollment from 1,719 to 2,544, is critical for, "increasing the education attainment levels of Tennesseans," toward meeting Drive to 55, UofM Master Plan, HCOE and CAS Strategic Plans, and UofM Strategic Plan goals.

1.1 State Goals

Institution: University of Memphis
Project: STEM Research and Classroom Building

A. Increasing Education Attainment Levels

The SRCB will increase the educational attainment level of Tennesseans by preparing more students for high quality STEM careers at a research institution that improves academic outcomes for all students. Aligned to the Drive to 55, the UofM is improving student retention and graduation rates institution-wide, with 4-year graduation rates up 12% and 6-year graduation rates up 11% in the last 5 years. STEM areas typically have between 3%-5% higher graduation rates than non-STEM; the growth in STEM majors will aid in continuing the trend of increasing the overall graduation rate. The SRCB is critical as it will allow the UofM to expand STEM offerings, which show significant growth in degrees awarded. In '17-'18, UofM awarded 480 STEM degrees, up from 375 3 years earlier. The students enrolled in the UofM's 22 STEM areas show a 10-year trajectory of success: 1-year retention rate up 12.6%, 4-year graduation rate up 18.6%, and 6-year graduation rate up 16%. Over the past five years, the HCOE has increased undergraduate enrollment by 37% and increased BS degree production by 50%. Growth does not come without challenges: UofM undergraduates are: 33% first generation, 47% pell-eligible, 42% Black/Hispanic; many need additional support to succeed. To increase degree completion, the UofM has: kept tuition affordable and accessible, implemented early warning systems to identify struggling students, and provided academic supports (tutoring and mentoring). The new SRCB will enhance these efforts by providing active learning space, aligned to industry, where students at all levels can succeed. Governor Lee's recent investments in K-12 STEM education aim to place Tennessee in the top 25 states for job creation in the STEM sector by '22. As a result, the pipeline of STEM students will increase. As the only research university in the region, the SRCB at UofM will support these efforts and dramatically increase STEM degree attainment.

B. Economic and Workforce Development

THEC's '18 Academic Supply and Occupational Demand in Tennessee lists engineering and engineering-related occupations as high employer demand and projects STEM occupations will increase by 19.4% by '26. Data from Tennessee's '17 LEAP report says that 13 STEM disciplines are currently in high-demand in the greater Memphis area. The proposed SRCB will serve 22 STEM programs of study, including all 13 of the high-demand disciplines identified in the LEAP report. To further study STEM disciplines and workforce needs, the UofM requested data from ECD. The data showed a need for skilled STEM graduates, specifically in IT and Engineering occupations. In Memphis alone, there have been an average of 785 IT-related job openings each year over the past five years. Data from the US Census and American Society for Engineering Education reports that West Tennessee significantly underproduces engineering degrees – in comparison to both the US and Tennessee. In '15, the US produced 33 engineering degrees per 100,000 people, Tennessee produced 23 per 100,000, East Tennessee produced 26, Middle Tennessee produced 28 and West Tennessee produced 10. When considering the economic and workforce implications of this low number, the UofM and HCOE embarked on a strategic plan to increase enrollment and produce a higher number of bachelor's degrees in engineering, and there has been significant early success (overall engineering enrollment increased 30%; the number of bachelor's degrees awarded increased 50%). Further, more than half of UofM graduates remain in the Memphis area after graduation, directly supporting the growth and development of the regional workforce. UofM maintains robust relationships with several major employers, including FedEx, First Tennessee, International Paper, AutoZone, Methodist Healthcare, Mitsubishi Electric Power Products and Smith & Nephew. The SRCB will support the Drive to 55, Governor Lee's Future Workforce Initiative, and UofM mission by increasing UofM's ability to meet critical workforce development demands in Tennessee and prepare more students with credentials needed to pursue careers in STEM fields.

1.2 Institution Mission & Goals

Institution: University of Memphis
Project: STEM Research and Classroom Building

C. Alignment of Mission and Project

The UofM is an urban research university with high doctoral research. The SRCB supports UofM's Mission Statement: "We provide the highest quality education by focusing on research and services benefiting local and global communities." The collaborative nature of the SRCB makes it ideal for a wider range of interdisciplinary funded research projects and ongoing instruction.These STEM research activities will impact local and global economies and citizens, specifically in the development of medical devices, advanced manufacturing, cybersecurity, logistics and transportation, information technology, and artificial intelligence. UofM STEM students and graduates provide services to the local and global community through healthcare advancements, the study of earthquake resistant structures, and environmental efforts including water and groundwater quality. The SRCB will be a much-needed extension of current research activities, providing a customized approach to modern research and innovation in an environment that offers hands on training while working in collaborative teams, similar to teams in today's workforce. The facility will demonstrate the UofM commitment to creating destinations where programs of distinction can be advanced and created. The active learning classroom/labs will provide the infrastructure to both increase the education attainment levels of Tennesseans and also address state and regional economic development, workforce development, and research needs. On Tennessee's most diverse campus, the UofM SRCB will increase degree production in STEM disciplines for students from a wide-range of backgrounds. The SRCB will provide state-of-the-art facilities for a growing population of students eager to pursue careers in these in-demand fields. Finally, the ability to accomodate new students resulting from increased enrollment and dedicate space to increase research expenditures and external funding awards are objectives all in direct support of both the HCOE and CAS Missions.

D. Advancement of the Strategic Plan

The SRCB aligns to the Vision Statement in the UofM Strategic Plan, "The UofM is an internationally recognized, urban public research university preparing students for success in a diverse, innovative, global environment." Modernizing the existing engineering facility and building a new SRCB will provide the space to expand program offerings that promote interdisciplinary, intercultural, and international perspectives working together to develop new ideas while training students to, "think critically about their course of study, themselves, and the world around them" (CAS Strategic Plan). The SRCB will enhance student discovery, expand research opportunities, and prepare the workforce of the future, all critical components of the HCOE, CAS and UofM Strategic Plans. Further, the UofM SRCB aligns to the following priorities in the UofM Strategic Plan: Student Success, Academic Excellence, Research and Innovation, Diversity and Inclusion, and Community Collaborations. As the region's preeminent destination for STEM instruction and collaboration, the SRCB will promote student success by catalyzing on growth in STEM degrees awarded and supporting a stronger pipeline of qualified graduates with facilities that resemble the workplace. Academic excellence will be supported by the SRCB by providing students with adequate facilities to study, collaborate, and innovate. Research and innovation will be supported by the SRCB by providing facilities to attract top STEM researchers and graduate students from across the country to Memphis. The UofM is already Tennessee's most diverse university and Diversity and Inclusion will increase with the SRCB because the UofM will be able to admit more qualified STEM students from a diverse range of backgrounds. Community collaborations will be enhanced because the SRCB will have ample space to expand offerings for community members, specifically K-12 students who the UofM currently engages in STEM educational activities in hopes that they will matriculate to a UofM STEM degree program. Further, community collaborations with business and industry will grow as the SRCB will allow the UofM to train a skilled workforce particularly in the tech, medical device, and logostics industries.

1.3 Academic Program & Credential Prod.

Institution: University of Memphis
Project: STEM Research and Classroom Building

E. Academic Programs Served by the Project

The SRCB will create space utilized by 22 degree programs on campus: Applied Lean Leadership (GCRT), Biomedical Engineering (BS, MS, PhD), Business Information Assurance (GRCT), Business Project Management (GCRT), Civil Engineering (BS, MS), Computer Engineering (BS), Computer Science (BS, MS, PhD), Cyber Security Information Assurance (GCRT), Data Science (MS), Electrical Engineering (BS, MS), Engineering (PhD), Engineering Technology (BS, MS), Information Systems (MS), and Mechanical Engineering (BS, MS). These programs are a priority for the UofM, region, and state because these areas prepare students for highly skilled STEM professions where there are thousands of highly paid, openings in the work force in West Tennessee. There are serious economic and workforce implications of current low credential production of STEM majors in West Tennessee, particularly in engineering. According to the U.S. Department of Labor's Occupational Outlook Handbook, the job forecast for engineering nationwide is projected to grow 7% between 2017 and 2026, with approximately 194,300 projected new jobs. Engineering and computer experts will be needed to fill a wide variety of jobs in infrastructure, renewable energy, advanced manufacturing, biomaterials, medical devices, cybersecurity, and robotics. Jobs in Information Technology, one of the fastest- growing occupations in the nation, are also projected to increase 13% from 2016 to 2026, adding roughly 557,000 new jobs by 2026. Further, these majors are a priority for the UofM because the research generated by them is an integral to the UofM reaching its goal of achieving the Carnegie R1 classification for exceptionally high research activity. This is an important priority for the state as investment in research at a Carnegie R1 institution results in a 4-1 return on investment. Tennessee has only one public R1. The SRCB will allow the UofM to expand credential production in important areas of economic growth and will allow the UofM to fulfill an important research goal.

F. Academic Programs and Credential Production

The SRCB will positively impact 22 academic programs by providing a collaborative space for HCOE and CAS students to work together, expanding lab space for STEM research, and fulfilling the credential production objectives spelled out in each of the college's strategic plans. The interdisciplinary space will allow student teams across disciplines to work together on academically aligned projects (baja car, concrete canoe, earthquake resistant structures, groundwater). New labs on campus will provide students with space to learn skills aligned to workforce competencies including: biomaterials, advanced manufacturing, water resources, cybersecurity, electronic sensors, machine learning, data science, and smart infrastructure. This complements a history of including undergraduates in research alongside faculty and graduate students. When existing facilities were completed in 1971, the primary consideration was instructional space. As STEM teaching and learning has evolved to include research, instructional space has been converted to uses for which it was never intended. For example, to accomodate targeted growth in advanced manufacturing, space for a new metal additive manufacturing lab was taken from a student design team workspace, and another lab is a retrofitted washroom. Credential production will be increased as additional undergraduate students will be recruited to occupy the SRCB by expanding current, successful recruiting efforts including heavy interaction with K-12 STEM stakeholders: West TN STEM Hub, Creative Game Design Camp, a partnership with Shelby County Schools' T-STEM Academy, and the First LEGO League West Tennessee Partnership. These recruiting efforts will benefit from the SRCB where prospective students can better visualize a quality STEM learning experience. Contemporary facilities will help attract more highly qualified faculty, who, in turn, will attract more and higher caliber graduate students. This aligns with UofM's goal to double doctoral production in STEM fields in the coming decade. The addition of research faculty will result in growth in externally funded research, along with support for student researchers engaged in these externally funded projects.

1.4 Enrollment Data

Institution: University of Memphis
Project: STEM Research and Classroom Building

A. Academic Programs - Support Documentation for Capital Outlay Project through AY 2022-23

Provide the number of majors directly served by the academic programs affected by the proposed project for the past 3 academic years and projected figures for future years. (This worksheet focuses on students majoring in the academic programs served by the proposed capital project. Not included in this worksheet are students that are taking classes in the academic program, but have a different major on campus.) An academic program is a program at a particular degree level with a unique CIP code. Individual programs listed on the institution's API cannot be combined on this worksheet. All Years are Academic Years.

Academic Program Information							
Academic Program A:	Applied Lean Leadership						
Degree:	GCRT						
10 Digit CIP Code:	0915000011						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	9.00	9.00	9.00	9.43	9.88	10.36	10.86
Fall FTE Enrollment - On Ground	1.25	0.00	0.00	0.00	0.00	0.00	0.00
Fall FTE Enrollment - Online	3.50	2.00	1.25	1.31	1.37	1.44	1.51
Graduates	2	2	2	3	3	4	5

Academic Program Information							
Academic Program B:	Biomedical Engineering						
Degree:	BSBE						
10 Digit CIP Code:	0914050100						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	2.67	2.33	3.00	3.35	3.71	4.06	4.42
Fall FTE Enrollment - On Ground	206.87	233.93	215.80	241.53	267.26	292.99	318.72
Fall FTE Enrollment - Online	0.47	0.00	2.67	2.67	2.67	2.67	2.80
Graduates	9	33	37	40	44	47	51

Academic Program Information							
Academic Program C:	Biomedical Engineering						
Degree:	MS						
10 Digit CIP Code:	0914050100						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	2.67	2.33	3.00	3.24	3.49	3.73	3.98
Fall FTE Enrollment - On Ground	5.42	3.42	4.58	4.96	5.34	5.71	6.09
Fall FTE Enrollment - Online	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Graduates	5	5	6	6	7	7	8

Academic Program Information							
Academic Program D:	Biomedical Engineering						
Degree:	PhD						
10 Digit CIP Code:	0914050100						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	2.67	2.33	3.00	3.35	3.70	4.05	4.40
Fall FTE Enrollment - On Ground	13.58	12.50	11.83	13.21	14.59	15.96	17.34
Fall FTE Enrollment - Online	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Graduates	1	3	3	4	4	5	5

Academic Program Information							
Academic Program E:	Business Information Assurance						
Degree:	GCRT						
10 Digit CIP Code:	0611109911						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty		6.00	6.00	6.26	6.54	6.83	7.14
Fall FTE Enrollment - On Ground	8.08	11.42	7.75	8.14	8.54	8.97	9.42
Fall FTE Enrollment - Online	1.00	0.50	1.00	1.00	1.00	1.00	1.00
Graduates	17	10	11	11	12	12	13

Academic Program Information							
Academic Program F:	Business Project Management						
Degree:	GCRT						
10 Digit CIP Code:	0611100511						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty		6	6	6.29	6.60	6.93	7.28
Fall FTE Enrollment - On Ground	2.75	8.42	9.75	10.24	10.75	11.29	11.85
Fall FTE Enrollment - Online	2.83	0.5	3	3.15	3.31	3.47	3.65
Graduates	10	8	8	9	9	10	10

Academic Program Information							
Academic Program G:	Civil Engineering						
Degree:	BSCE						
10 Digit CIP Code:	0914080100						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	6.50	6.50	6.50	7.34	8.18	9.02	9.86
Fall FTE Enrollment - On Ground	151.93	177.47	196.40	221.79	247.18	272.57	297.96
Fall FTE Enrollment - Online	0.00	1.00	0.00	0	0	0	0
Graduates	19	22	24	27	29	32	34

Academic Program Information							
Academic Program H:	Civil Engineering						
Degree:	MS						
10 Digit CIP Code:	0914080100						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	6.50	6.50	6.50	6.98	7.46	7.94	8.41
Fall FTE Enrollment - On Ground	12.92	7.92	11.83	12.70	13.57	14.44	15.31
Fall FTE Enrollment - Online	0.00	0.00	0.00	0	0	0	0
Graduates	10	6	7	7	8	8	9

Academic Program Information							
Academic Program I:	Computer Engineering						
Degree:	BS						
10 Digit CIP Code:	0914090100						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	11.00	11.00	10.00	11.14	12.28	13.41	14.55
Fall FTE Enrollment - On Ground	149.27	153.67	148.33	165.23	182.14	199.04	215.95
Fall FTE Enrollment - Online	0.60	1.27	0.47	0.49	0.51	0.54	0.57
Graduates	17	23	25	27	30	33	36

Academic Program Information							
Academic Program J:	Computer Science						
Degree:	BS						
10 Digit CIP Code:	0611070100						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	5.33	6.00	7.33	7.70	8.08	8.49	8.91
Fall FTE Enrollment - On Ground	212.07	224.67	333.03	349.68	367.17	385.53	404.80
Fall FTE Enrollment - Online	2.47	2.67	3.07	3.22	3.38	3.55	3.73
Graduates	36	34	36	37	39	41	43

Academic Program Information							
Academic Program K:	Computer Science						
Degree:	MS						
10 Digit CIP Code:	0611070100						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	5.33	6.00	7.33	7.69	8.08	8.48	8.91
Fall FTE Enrollment - On Ground	30.83	18.33	31.58	33.16	34.82	36.56	38.39
Fall FTE Enrollment - Online	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Graduates	20	13	14	14	15	16	17

Academic Program Information							
Academic Program L:	Computer Science						
Degree:	PhD						
10 Digit CIP Code:	0611070100						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	5.33	6.00	7.33	7.69	8.08	8.48	8.91
Fall FTE Enrollment - On Ground	25.50	29.83	30.33	31.85	33.44	35.11	36.87
Fall FTE Enrollment - Online	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Graduates	6	2	2	2	2	2	3

Academic Program Information							
Academic Program M:	Cyber Security Information Assurance						
Degree:	GCRT						
10 Digit CIP Code:	0611100311						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	8.00	8.00	7.00	8.00	8.00	9.00	9.00
Fall FTE Enrollment - On Ground		0.25	0.50	0.53	0.55	0.58	0.61
Fall FTE Enrollment - Online		0.00	0.00	0.00	0.00	0.00	0.00
Graduates		1	1	1	1	2	2

Academic Program Information							
Academic Program N:	Data Science						
Degree:	MS						
10 Digit CIP Code:	Proposed: 110701						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty				0.00	18.00	18.00	18.00
Fall FTE Enrollment - On Ground				0.00	40.00	100.00	180.00
Fall FTE Enrollment - Online				0.00	0.00	0.00	0.00
Graduates			0	0	0	32	54

Academic Program Information							
Academic Program O:	Electrical Engineering						
Degree:	BSEE						
10 Digit CIP Code:	0914100100						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	11.00	11.00	10.00	11.14	12.27	13.41	14.55
Fall FTE Enrollment - On Ground	132.87	120.33	117.20	130.44	143.68	156.91	170.15
Fall FTE Enrollment - Online	0.80	1.80	0.93	1.13	1.33	1.53	1.73
Graduates	26	23	26	28	31	33	36

Academic Program Information							
Academic Program P:	Electrical & Computer Engineering						
Degree:	MS						
10 Digit CIP Code:	0914100100						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	11.00	11.00	10.00	1.17	1.30	1.44	1.58
Fall FTE Enrollment - On Ground	17.58	14.75	12.17	13.79	15.41	17.03	18.66
Fall FTE Enrollment - Online	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Graduates	14	10	11	12	14	15	16

Academic Program Information							
Academic Program Q:	Engineering						
Degree:	PhD						
10 Digit CIP Code:	0914010100						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fall FTE Enrollment - On Ground	37.50	38.75	37.67	41.93	46.19	50.45	54.71
Fall FTE Enrollment - Online	0.50	0.00	0.00	0.00	0.00	0.00	0.00
Graduates	7	11	12	13	15	16	17

Academic Program Information							
Academic Program R:	Engineering Technology						
Degree:	BSET						
10 Digit CIP Code:	0915000000						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	4.50	4.50	4.50	4.96	5.42	5.88	6.34
Fall FTE Enrollment - On Ground	146.20	182.93	196.73	216.86	236.98	257.11	277.23
Fall FTE Enrollment - Online	2.53	0.93	1.47	1.57	1.67	1.78	1.88
Graduates	31	41	46	50	55	59	64

Academic Program Information							
Academic Program S:	Engineering Technology						
Degree:	MS						
10 Digit CIP Code:	0915000000						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	4.50	4.50	4.50	5.57	6.65	7.72	8.80
Fall FTE Enrollment - On Ground	3.67	1.75	0.25	0.44	0.63	0.83	1.02
Fall FTE Enrollment - Online	4.25	1.50	1.25	1.42	1.58	1.75	1.91
Graduates	7	2	2	2	3	3	3

Academic Program Information							
Academic Program T:	Information Systems						
Degree:	MS						
10 Digit CIP Code:	0611010300						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty		6.00	6.00	6.30	6.62	6.95	7.29
Fall FTE Enrollment - On Ground	32.50	48.08	58.08	60.99	64.04	67.24	70.60
Fall FTE Enrollment - Online	1.25	5.00	3.17	3.33	3.49	3.67	3.85
Graduates	25	37	39	41	43	45	47

Academic Program Information							
Academic Program U:	Mechanical Engineering						
Degree:	BSME						
10 Digit CIP Code:	0914190100						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	6.00	6.50	6.00	6.67	7.34	8.01	8.68
Fall FTE Enrollment - On Ground	299.60	310.67	305.73	339.91	374.08	408.25	442.42
Fall FTE Enrollment - Online	0.20	1.53	1.47	1.64	1.81	1.98	2.15
Graduates	52	30	33	37	40	44	47

Academic Program Information							
Academic Program V:	Mechanical Engineering						
Degree:	MS						
10 Digit CIP Code:	0914190100						
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	6.00	6.50	6.00	6.76	7.52	8.28	9.04
Fall FTE Enrollment - On Ground	5.75	8.83	7.67	8.64	9.61	10.58	11.55
Fall FTE Enrollment - Online	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Graduates	4	6	7	7	8	8	9

Academic Program Totals							
Academic Program Data	**2016-17**	**2017-18**	**2018-19**	**2019-20**	**2020-21**	**2021-22**	**2022-23**
FTE Faculty	108.00	128.00	129.00	131.04	159.20	170.48	180.90
Fall FTE Enrollment - On Ground	1496.13	1607.93	1737.23	1906.01	2115.97	2347.16	2599.65
Fall FTE Enrollment - Online	20.40	18.70	19.73	20.92	22.13	23.37	24.77
Graduates	318	322	351	380	411	475	528

B. Total FTE Supported by this Project

3,017 FTE majors and non-majors will be directly or indirectly served by the SCRB using current figures. Based on a conservative 12% average annual enrollment increase in majors and non-majors through 2023, the SRBC will serve approximately 3,379 FTE. This growth projection is not reflective of current ambitious CAS and HCOE recruitment initiatives. Engineering has grown undergraduate enrollment 37% over the past 5 years. Computer Science within CAS has also seen an increase in FTE enrollment of 47% over the past 3 years. The UofM envisions the SRCB as a destination for students enrolled in STEM disciplines, including 22 areas of study. The SCRB will include large student project presentation rooms that will double as assembly areas for the more than 5,000 expected non-formula generating program participants who annually participate in STEM outreach activities (Example: The Urban STEM Collaboratory, a current five-year NSF research project with Math, Civil and Electrical Engineering that provides scholarships plus academic, social, and workforce preparation support for academically talented students with financial need, with the goal of reporting to NSF how students develop a STEM identity). 174 researchers and staff will be impacted by prominent, nationally-recognized, interdisciplinary graduate and undergraduate research in the SRCB including these research centers: Mobile Sensor Data-to-Knowledge, Center for Information Assurance, Cyber Security, Institute for Intelligent Systems (IIS) and the Smart Cities Innovation Research Cluster: The new SRCB will house the IIS, the Smart Cities Innovation Research Cluster, the Intermodal Freight Transportation Institute, a laboratory for the Center for Earthquake Research and Information (CERI), and the hydrology lab for the Center for Applied Earth Sciences and Engineering Research (CAESER).

2.1 Campus Master Plan

Institution: University of Memphis
Project: STEM Research and Classroom Building

A. Campus Master Plan Project Description, Goals, Links to Campus Master Plan

The 2019 UofM Campus Master Plan (CMP) update is currently in progress. It has been approved by the UofM Board of Trustees and will go to THEC in late July for review. The current 2015 CMP is found: www.memphis.edu/masterplan/planfiles.php. Among the key planning components outlined in the CMP (pg. 8- Master Plan Drivers) are the following goals that are the impetus for the new SRCB: “Differentiate the University, Create a Campus of Distinction, Embrace Enrollment Growth and new Technologies, Increase Research, Focus on Student Success.” Additionally, the SRCB will provide much needed research space. The CMP Space Needs Analysis (page 84- Campus Recommendations) indicates that “The University of Memphis will need more space in which faculty and students can contribute to the research enterprise in support of the university’s mission as well as toward enhancement of academic programs.” The HCOE has already exceeded the CMP projections for enrollment. The CMP also indicates the planning for not only an additional Engineering Building, but an Interdisciplinary Research Facility; both part of the "strategic goal of the University to increase resesarch in the areas of science and engineering. Modern facilities are needed in order to attract top faculty and students." (CMP pg. 97-Recommendations).

B. Campus Master Plan Priority for the Project

In the 2019 UofM Master Plan (pending update), the SRCB is the UofM #1 capital outlay request priority. Prior to the 2019 update, the SRCB was titled Engineering Research Facility/ C.E.R.I. listed as priority #6. Since the 2015 CMP, the top 5 projects are in planning, design, or construction phases. The SRCB is part of the envisioned growth in the engineering complex and encompases the goal of constructing "new state-of-the- art facilites to better address the sciences" and "supplementing existing space in the HCOE." (Pg 98- Recommendations, Main Campus). The CMP says,"The illustrative Campus Master Plan represents an ideal future vision for each of UofM’s three campuses... Developed concurrently, each of the plans translate the guiding principles, key analysis objectives, and campus systems recommendations, developed during the master planning process, into a composite graphic for each campus." The recommendations embody ideas related to campus enhancement, preservation, and transformation opportunities that will strengthen UofM’s campuses. By laying the foundation for campus growth, the CMP allows the University to utilize the enrollment data, Strategic Plan, physical facilities challenges and external opportunities as the drivers of campus growth.

C. Campus Master Plan Space Needs and Facility Conditions

When the UofM updated its 2015 Master Plan using 2013 enrollment data, HCOE had a 31,896 square foot deficit (Master Plan Appendix, p. 23), the largest space deficit of any college on campus. Since the 2013 data was collected, engineering’s overall enrollment has increased by 30%. Specific to the HCOE, the following items are priority improvements to their existing facilities: compressed Air System Replacement; ES and ET have worn out compressors that need to be replaced with screw type units of at least the same capacity; Clean and Grounded Power; grounding issues have forced us to install independent ground rods, sensitive electronic equipment requires power conditioning; Women’s Toilet Rooms, ET 1st Floor; in the 1970’s, the department never anticipated women participating in engineering tech programs and therefore facilities were not provided (Note: the national average of female enrollment in colleges of engineering is 22%, at the HCOE women make up 19% of the engineering population); EA HVAC Upgrade; when ET and ES had HVAC upgrades in 2008, funding for EA upgrade was reallocated to install fire protection systems; Freight Elevators; ES and ET are unable to move heavy or bulky equipment to support program needs; Stairwell Improvements, Failed hardware and worn out doors present life safety risks. Guard rails, missing stair treads, and handrails are not code compliant; Welding Exhaust, ET100, No exhaust exposes personnel to toxic fumes.

2.2 Project Development

Institution: University of Memphis
Project: STEM Research and Classroom Building

D. Campus Master Plan and Project Development

The Campus Master Plan (CMP) defines the need for the SRCB in the STEM Corridor (pgs. 98-100 Recommendations-Main Campus). This SRCB project proposal is considered Phase 1 of a 2 Phase project. Rapid population growth, along with success in external funding for research, has made the SRCB the UofM's number one capital priority/ outlay request. Utilizing the key planning goals from the CMP, (pg. 8, Master Plan Drivers), the highest priorty considerations result from enrollment growth, externally funded research and ongoing research. This is consistent with the quote found on page 4 (Executive Summary) of the document which says, "The Campus Master Plan is designed as a long-range tool that can adapt and flexibly respond to unexpected future changes." Further, the refined academic goal to become a Carnegie R1 Research Institution supports development of the SRCB because it will provide the UofM with the research facilities needed to perform cutting edge research. Currently, the UofM does not have sufficient facilities to fulfil this goal or to adequately train undergraduates to accomplish Governor Lee's ambitious STEM workforce goals.

E. Architectural Programming and Planning - Status, Progress

The architectural programming for the proposed facility has been completed by in-house designers working closely with future occupants. The spatial listing, block plans, stacking plans, room detail sheets and other information such as campus standard materials, methods, and design criteria are included as appendix items. Multiple examples across the country (i.e. Auburn University, University of Tennessee Knoxville) have been examined, and the best selected practices utilized for this program. The campus working group for the project will conduct detailed interviews and planning sessions with the selected designers to verify the program prior to design once the project is funded.

Yes A Full Architectural Program is Complete and Delivered.

F. Alternatives Considered to Meet Objective

The UofM considered two distinct options before determining the new building:

1. Attempt to utilize existing limited resources to accommodate the growing population of STEM students.
Outcomes: a. Continue to implement creative solutions to space needs in undesirable alternative spaces which could compromise the quality of research and hinder recruitment of students and faculty. b. Share limited labs between several disciplines reducing the effectiveness of instruction, limiting the ability to adequately demonstrate concepts and operate in space below THEC standards. c. Leave sponsored research in the current location limiting the ability for vital research to grow.
2. Accept space constraints and limit STEM and research efforts accordingly.
Outcomes: a. Future research activities and opportunities would come to a standstill. b. Antiquated teaching environments would not be remedied. c. The University would not be able to keep pace in instruction with the ever-changing technologies that are necessary to equip students for the workforce.

3.1 DB70

1 Department: Tennessee Higher Education Commission
Institution: University of Memphis
Project: STEM Research and Classroom Building
City/County: Memphis/Shelby

2 Fiscal Year: 2020 / 2021

3

		New		Reno/Maint
X	Capital Outlay			
	Capital Maintenance	65,000	Gross Sq.Ft.	17,000
	Disclosure	41,816	Net Sq.Ft.	16,000
X	Designer Required	436.00	Cost/Sq.Ft.	128.00

4 Project Description:

Construction of a new 65,000 sq. ft. interdisciplinary STEM building that will include activity based classrooms, faculty offices, laboratories and sponsored research centers. 17,000 square feet of existing space in the adjacent Engineering Building will be renovated to provide enhanced research and instruction space.

5

Estimated Building Construction Cost: 30,516,000

Total Project	This Request				
30,516,000	30,516,000	Building Construction			
923,000	923,000	Site & Utilities			
2,500,000	2,500,000	Built-in Equipment			
33,939,000	33,939,000	**Bid Target**			
1,806,000	1,806,000	Contingency:	5.32	5.32	percent
35,745,000	35,745,000	**MACC** (Maximum Allowable Construction Cost)			
2,031,875	2,031,875	Fee:	5.46600393	grouper	
2,500,000	2,500,000	Movable Equipment			
200,000	200,000	first other	*commissioning*		
150,000	150,000	second other	*lab consultant*		
373,125	373,125	Administration & Miscellaneous			
41,000,000	41,000,000	**Total Cost**			

6 Funding Request:

THIS REQUEST		
32,911,000	32,911,000	STATE funds
0	0	FEDERAL funds
8,089,000	8,089,000	Local and Institutional Funds — Gift funds

7 Previous SBC Approved Funding:

	fund year	description
already approved for existing SBC project		
0	0	
plus This Request	0	
41,000,000	0	

8 SBC Action: If an existing project, SBC Project No.: NA

9 Designer: NA

3.2 Project Support Documentation Sheet 1

Institution: University of Memphis
Project: STEM Research and Classroom Building

A. Architectural Program Scope

The 65,000 sq. ft. SRCB will include: 7,100 sq ft for classrooms and lecture halls, 21,645 sq. ft. for labs/research, 4,850 sq. ft. for collaborative environments (tutoring, mentoring, studying), and 5,420 sq. ft. for faculty offices. HCOE and CAS are partnering to conduct research to address challenges related to infrastructure, cyber security, biomedical and earth sciences. The new SRCB will allow for additional research efforts while expanding key interdisciplinary centers. (Examples: Center for Applied Earth Science and Engineering Research's hydrology lab collaborates with Civil Engineering and Earth Sciences; Civil Engineering and the Center for Earthquake Research and Information and Earth Sciences collaborates on earthquake research and education; Electrical/Computer Engineering collaborates with Institute for Intelligent Systems to advance artificial intelligence systems; the Intermodal Freight Transportation Institute collaborates with Physics and Materials Science for biologistics research)

B. Evidence of Physical Facility Need

The SRCB and improvements to adjacent existing facilities will provide additional space required to accommodate growth and reconfiguration needed for program evolvement. The HCOE is deficient in research, lab, and instructional space. With projected average annual enrollment growth of 12%, the deficiency will expand with growing demand. Faculty and students use spaces that were not intended for research (locker/restrooms) because current facilities are inadequate and were built when instruction was purely lecture. Computer Science has also seen a dramatic increase in enrollment of 47% over the past 3 years. The lack of space is not sustainable and may soon limit enrollment of qualified STEM majors. The facilities also do not encourage collaboration which is a critical component of successful instruction and research. Finally, this project will renovate selected space in the 3 existing Engineering Buildings so they can be fully utilized to educate more STEM majors.

C. Historical Profile

The NE corner of Main Campus, known as the STEM Corridor, is home to the Herff College of Engineering with three facilities: Engineering Administration Building (46409 sq. ft., occupied in 1970), Engineering Technology (102,291 sq. ft., occupied in 1971), and Engineering Science Building (66,423 sq. ft., occupied in 1970). The fourth building will be the SRCB (65,000 sq. ft.) to supplement existing space available to the HCOE and CAS. Previous renovations include: Engineering Technology and Engineering Sciences HVAC and controls renovations 2008; Fire Protection Sytems, all Engineering Buildings, 2010; Fire Alarm Systems upgraded, 2018; Engineering Technology Building, Tissue Engineering Lab, 2013: Engineering Technology Building, Metal Additive Manufacturing Lab, 2018.

D. Summary Results and Date of Physical Facilities Survey

The Physical Facilities Survey for the buildings involved in the project has been updated as of 2019 and included as an appendix item. In general, the existing engineering facilities are in good condition with overall building scores near 80. Several capital maintenance projects have improved HVAC systems, fire alarms, generators, roofing and building envelope repairs. The spaces to be renovated in the project do not rate well in terms of interior finishes, equipment and furnishings, suitability or adaptability. These spaces rank in the 60 to 70 percentile range. Modifications included in the project will provide adequate infrastructure, equipment, configuration, and finishes that will be more suitable to the applicable function.

3.3 Project Support Documentation Sheet 2

Institution: University of Memphis
Project: STEM Research and Classroom Building

E. Cost Basis for Construction Estimate and Other Costs

Square footage costs are based on data from similar new construction projects at the University of Memphis, Auburn University, and University of Tennessee, Knoxville, campuses. The costs are adjusted for inflation. Here are the examples: University of Memphis Community Health Building - $393 dollars per sq. ft.; Auburn University Brown-Kopel Engineering Student Achievement Center - $419 dollars per sq. ft.; University of Tennessee Engineering Research Facility - $448 dollars per sq. ft.. Based on these figures, the proposed UofM SRCB should cost approximately $436 dollars per sq. ft.. The project request contains a 5 percent construction contingency, which is normal for new construction, and has the state formula design fee for design. The audio visual systems, IT cabling and infrastructure are included as part of the construction bid target. The budget also includes an allowance for full commissioning, and an allowance for a specialty lab consultant for the lab infrastructure needs. Administrative costs include surveying, soil boring, testing, fire marshall fees, and other similar project costs that are consistent with a project of this magnitude.

F. Project Schedule

Approval of Funds in FY 20/21 Budget - June 2020.
Submit to the State Building Commission for Approval - July 2020.
Designer Selection - July 2020.
Hire Construction Manager/General Contractor - November 2020.
Completion of Design and all Design Reviews - November 2020.
GM/GC Solicits Trade Bids - December 2020.
Develop and execute Construction Contract - February 2021.
Start Construction-March 2021.
Substantial Completion - August 2022.
Punch List-September 2022.
Move-in Equipment - October 2022.
First Classes in SRCB - January 2023.

G Campus or Architectural Program Impact

The program will reduce overcrowing in HCOE and provide additional space for sponsored research programs and collaboration clusters to encourage innovation beyond the classroom environment. The collaborative nature of the SRCB will serve as a model toward increasing joint coursework and research across various disciplines on campus. The SRCB will also allow the UofM to recruit and enroll additional STEM students. Increased enrollment will impact residence halls and food services, which the campus can absorb. Additionally, the increased enrollment will allow the UofM to expand STEM student activities and will create a more robust campus community with integrated research and instruction. The building will be sited in an area of existing surface parking on the UofM Main Campus, adjacent to the existing engineering facilities. This location allows good access, connection to utilities, and provides an area for any future building expansion. The loss of these parking spaces is minimal and will be backfilled with additional parking throughout campus. Any spaces that are vacated by CAS and moved into the new building, will be backfilled with viable academic use.

3.4 Schedule of Movable Equipment

Department: Tennessee Higher Education Commission
Institution: University of Memphis
Project: STEM Research and Classroom Building

Total Equip: **2,500,000**

A.	Description of Equipment Types	Life	Qty	Unit Cost	Total Cost
1	Classroom Tables	20	94	600	56,400
2	Stackable Classroom Chairs	10	193	150	28,950
3	Studio Tables	15	50	800	40,000
4	Studio Chairs	10	50	300	15,000
5	Moveable Tables	20	10	800	8,000
6	Task Chairs	10	100	300	30,000
7	Desks	20	48	2,500	120,000
8	Bookcases	20	48	650	31,200
9	Office Chairs	10	49	350	17,150
10	Guest Chairs	10	96	300	28,800
11	Collaborative student area seating	10	10	30,000	300,000
12	Reception Desk	20	1	10,000	10,000
16	2-Drawer Lat File	25	26	400	10,400
17	Powered Tables	10	30	1,200	36,000
18	Lounge Furniture	10	30	700	21,000
19	Misc. Tools and Tooling Machines	20	1	325,000	325,000
20	Earthquate Engineering Equipment	20	1	675,000	675,000
21	Hydrology Lab	20	1	300,000	300,000
22	Biomaterials Lab	15	1	447,100	447,100
					-
					-
					-
					-
					-
					-
					-

Do Not Use Square Foot Estimates for Movable Equipment

B. Explanation of Equipment Costs

Costs for items 1-18 were determined by 1) quantity of station counts in the Space Detail 2) costs of equipment based on current market rates and recent purchase of similar/same furnishings and equipment. Item 19 cost includes woodworking and metalworking machine tools for both the Senior Design Lab and Advanced Manufacturing Lab, using current market prices for lathes, milling machines, tooling, etc. Item 20 includes shake tables, crane, actuators, instrumentation, and similar equipment with cost based on data from the Dept of Civil Engineering. Item 21 includes a large flume, pumps, instrumentation and data acquisition equipment and is estimated based on information from Civil Engineering. Item 22 includes fume hoods, biosafety cabinets, ultra low temperature freezers, microscopes, and related equipment priced using current market rates. The specialized lab items are similar to those used at other teaching and research institutions; the UofM looked to Auburn University for lab equipment. Given the rapidly evolving nature of technologies, exact details cannot be specified.

3.5 Business Plan

Institution: University of Memphis
Project: STEM Research and Classroom Building

	Existing Budgeted Salaries	Estimated Future Salaries
Total Salaries:		3,942,000

This information applies to this project

	Existing Budgeted Positions Count	Estimated Future Position Count
Full-Time:		26
Part-Time:		44

A. Operations Overview

SRCB operations will mirror existing academic facilities on campus. With a high-performance building that adheres to state and federal energy efficiency guidelines, the UofM expects utility costs per square foot to be lower than buildings of similar size on campus. Utilities will be provided by existing campus systems for gas, water, electricity and sewer. The SRCB will have its own chiller and boiler for cooling and heating. Daily maintenance operations will become part of the UofM physical plant services for custodial, grounds, general maintenance and specialized services for other infrastructure maintenance. Costs incurred will be covered by the same model as other education and general facilities on campus using tuition and fees as well as state funded maintenance allocated for credit-hour producing space. Using the Sightlines Cost Forecaster (see Appendix) for a 65,000 square foot building with a technical complexity rating of 4 (3 is average, 5 the most complex), the impact on total operations costs will be an increase of $614,988 broken down by daily service costs ($409,592), planned maintenance ($23,206), and utility costs ($182,188). Estimates provided for future positions and salaries for the SRCB assume all who populate the building will be new hires. It is important to note that existing faculty and staff will initially populate the building; so, these maximum estimates are not likely to be realized. It is also important to note that the SRCB will provide significantly enhanced research capabilities enabling our faculty to more effectively compete for external research dollars, which provide another source of support for research-related facility and administrative costs. The SRCB will support more students and an annual increase of students that will increase the amount of tuition and fees collected. The projected increase of students from AY 2018-19 to AY 2022-23 is an additional 825 students, multiplied by $10,510 for tuition and fees per year (2018-19 amount) which generates an additional $8,670,750 in annual revenue. These revenues will be utilized for the total cost of operations and staffing for the new building of $4,556,988.

B. Revenue Sources, Fundraising and Partnerships

Of the $41 million in renovation and construction costs for the SRCB, 7% is allocated for renovation and 93% for new construction. Corporate partner donations for the SRCB from FedEx and AutoZone total $950,000, additional philanthropic donations total $2,789,000. The Herff Trust Board unanimously approved $2 million for the SRCB and the UofM is providing $2.35 million in institutional funds. This $8,089,000 match represents 19.7% of total project costs. There will be a subsequent campaign to raise money for programmatic purposes and UofM projects additional revenue as a result of the SRCB. In terms of Awards for Sponsored Programs STEM/IIS (found in appendix), the five-year average in HCOE and CAS is $20,182,047. When the SRCB is completed, the UofM projects a 20% increase in sponsored programs resulting in an additional $4,036,409 annually. At the completion of the initial SRCB capital campaign, UofM will launch a campaign to coincide with building completion to raise an additional $5 million in endowments for programmatic use including named professorships, graduate fellowships, and equipment maintenance and upgrades. When fully endowed, this fund will yield approximately $200,000 annually.

4.1 Space Needs

Institution: University of Memphis

Project: STEM Research and Classroom Building

Information Compiled By: Kathy Johnson

A Provide Data From Entire Campus Where Project is Located

Fall 2018 Date of Data

	Summary NASF - Info from THEC Space Guideline	Equiv FICM	Modeled	Exist E&G SF	Difference from Model	This Project: Net Change NASF	SF Results: Result Net E&G SF	SF Results: Difference from Model
I	Classrooms	1xx	9,984	10,886	902	7,100	17,986	8,002
II	ClassLab	210, 215	25,350	30,083	4,733	3,131	33,214	7,864
III	Open Lab	220, 225	10,030	8,846	-1,184	1,100	9,946	-84
IV	Research	250, 255	116,347	20,983	-95,364	21,978	42,961	-73,386
V	Office	3xx	40,066	23,528	-16,538	6,727	30,255	-9,811
VI	Library	4xx	0	0	0	-877	-877	-877
VII	Phys Ed	520 523 525	0	0	0	0	0	0
	Totals:		**201,777**	**94,326**	**-107,451**	**39,159**	**133,485**	**-68,292**
			Input Data from THEC Guideline	Input Data from PFI	- Shows Space under Guideline	Data will Import from the SpaceTab "Net Change NASF"		- Shows Space under Guideline

The three digit numbers are from the "Postsecondary Education Facilities Inventory and Classification Manual (FICM)" 2006

B Notes or Comments on Above Data, or Describe Need for Non-Formula Space

STEM disciplines require larger than typical (THEC standard) lab/classroom space for formula units. With a space deficit and deficiency, creating innovative spaces for STEM students has come at a cost to other programs/uses. The SRCB will enhance the student experience with a modern learning environment, right sized to mirror the workforce. STEM disciplines often participate in non-formula activities to teach K-12 students about STEM. These activities align to Governor Lee's STEM workforce objective to begin the STEM workforce pipeline early. The SRCB is needed to provide adequate space for programs through the pipeline.

C Migration Plan

Activities to be moved to the SRCB: Dunn Hall - 1,586 sq. ft. (research lab) used by the Center for Information Assurance and the Institute for Intelligent Systems; space to be backfilled by Computer Science and Math Active Learning Labs with offices for graduate assistants. Engineering Administration Building – 2,197 sq. ft. (administrative/research) used by the IFTI/STEM Hub Research Center; space to be returned to a student computer lab. Engineering Science Building – 3,897 sq. ft. used as Earthquake Engineering structures lab, Bioelectronics/Data Science Lab, EECE and Sr. Design Project Lab; space to be returned to EECE Student Design Studio space for large projects. Engineering Technology Building – 2,555 sq. ft. used for the Advanced Manufacturing Lab and Light Fabrication Lab; space to be restored to a restroom. FedEx Institute – 5,013 sq. ft. used by the NIH Center of Excellence (MD2K); space to be backfilled by the DATA Analytics Research Innovation Cluster, Sensor Institute, Virtual Reality and Immersive Environments Labs and Quantum Computing Labs. Renovations to the existing Engineering Administration, Engineering Technology, and Engineering Science buildings will occur in spaces vacated by migration to the new SRCB. This will cause no dislocation of occupants. Spaces to be renovated will be repurposed as renovations are complete. Only spaces that are part of the migration plan will be improved.

4.2 Tabulation of Affected Space

Institution: University of Memphis
Project: STEM Research and Classroom Building

FICM Space Use Catagories	Space Description	Net Assignable Square Feet: Demolition	Renovation: Former Use	Renovation: New Use	New Construction	Net Change NASF
100's	**Classrooms**	0	0	0	7,100	**7,100**
210, 215	**Class Lab / Studio**	0	8,889	7,770	4,250	**3,131**
220, 225	**Open Laboratories**	0	0	0	1,100	**1,100**
250, 255	**Research**	0	3,450	3,783	21,645	**21,978**
300's	**Offices**	0	1,161	2,460	5,428	**6,727**
400's	**Study facilities**	0	877	0	0	**-877**
520, 523, 525	**Physical education**	0	0	0	0	**0**
	Subtotal THEC Formula Space	**0**	**14,377**	**14,013**	**39,523**	**39,159**
600's	**General use facilities**	0	0		2,800	**2,800**
700's, 800's	**All other Assignable SF**	0	0	0	0	**0**

	Demolition	Former Use	New Use	New Const	Net Change
Sub-Total Net Assignable:	**0**	**14,377**	**14,013**	**42,323**	**41,959**
Efficiency:	#DIV/0!		82.4%	65.1%	

	Demolition	Total Reno	New Const
Enter Total Gross SF:	**0**	**17,000**	**65,000**

The three digit numbers are from the "Postsecondary Education Facilities Inventory and Classification Manual (FICM)" 2006

Explanation of Data, If Needed

Many buildings on the UofM campus are over 50 years old and were built for lecture, not research. As the mission of the UofM evolved to include research with greater emphasis on graduate education, instructional space has been converted to uses for which it was never intended. Also, due to the size and volume of the equipment needed for optimal instruction that aligns to the modern work place, classroom and lab space requirements have often exceeded the THEC space standards. The SRCB project will improve existing space in the engineering buildings, right sizing the spaces to create a successful learning environment while improving the quality and efficiency of both instruction and research.

4.3 Outline Architectural Program

Institution: University of Memphis
Project: STEM Research and Classroom Building

Space Name	Room Use	Activity Description	Area (NASF)	Occupant Count	Number of Spaces	Total Occ. Count	Total Area (NASF)
Classroom	110	Active Learning Classroom	2,100	120	3	360	6,300
	115	Classroom Service	400	2	2	4	800
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
Classroom	(All 100s)	**Total Classroom**	**2,500**		**5**	**364**	**7,100**
ClassLab	210	Classroom Lab	3,131	50	1	0	3,131
	215	Classroom Lab Svc	500	1	1	0	500
	220	Open Lab	600	25	1	0	600
	250	Research Lab	1,998	120	11	0	21,978
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
ClassLab	(All 200s)	**Total ClassLab**	**6,229**		**14**	**0**	**26,209**
Office	310	Office	176	28	28	0	4,928
	315	Office Service	200	1	1	0	200
	350	Conference	722	1	1	0	722
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
Office	(All 300s)	**Total Office**	**1,098**		**30**	**0**	**5,850**

Study Facilities	410		0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
Study Fac.	(All 400s)	**Total Study Facilities**	**0**		**0**	**0**	**0**
Special Use	530		0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
Special Use	(All 500s)	**Total Special Use**	**0**		**0**	**0**	**0**
General Use	610	Exhibition/Presentation	1,200	64	2	0	2,400
	625	Exhibition/Presentation	400	1	1	0	400
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
General Use	(All 600s)	**Total General Use**	**1,600**		**3**	**0**	**2,800**
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
			0	0	0	0	0
Support & Health	(700s & 800s)	**Total Support & Health**	**0**		**0**	**0**	**0**
Grand Total Net Assignable SF:			**11,427**		**52**	**364**	**41,959**

5.1 External Funding

Department: Tennessee Higher Education Commission
Institution: University of Memphis
Project: STEM Research and Classroom Building

	8,089,000	**Total Match Funding** (No Match Funding required for TCATs)		
	Amount	Non-Appropriated Category		Specifics of Source
29%	2,350,000	Plant Funds (Auxiliary)		operating funds
0%	0	Plant Funds (Non-auxiliary)		
0%	0	Land Sale Proceeds		
0%	0	Access Fees		
0%	0	Student Fees		
71%	5,739,000	Gifts		Gifts, Herff Trust
0%	0	Local Government		
0%	0	Federal Funds		
0%		5-Year Bond Funds		
0%	0			
0%	0			

Community College

Total Project Cost	41,000,000		
Total Match	8,089,000	**Minimum**	**Maximum**
Renovation	7%	-	143,500
New Construction	**93%**	762,600	3,813,000
		762,600	**3,956,500**
		Eligible Check	7,326,400
		Ratio above minimum	229%
		Maximum Points	8.00
		Calculated Points	**8.00**

Match Requirement

Min	Max	
0%	5%	Reno
2%	10%	New

Moderate Research University - APSU ETSU MTSU TSU TTU UTC UTM

Total Project Cost	41,000,000		
Total Match	8,089,000	**Minimum**	**Maximum**
Renovation	7%	57,400	287,000
New Construction	**93%**	1,906,500	5,719,500
		1,963,900	**6,006,500**
		Eligible Check	6,125,100
		Ratio above minimum	152%
		Maximum Points	8.00
		Calculated Points	**8.00**

Match Requirement

Min	Max	
2%	10%	Reno
5%	15%	New

High Research University - UoM UTK

Total Project Cost	41,000,000		
Total Match	8,089,000	**Minimum**	**Maximum**
Renovation	7%	114,800	430,500
New Construction	**93%**	3,813,000	9,532,500
		3,927,800	**9,963,000**
		Eligible Check	4,161,200
		Ratio above minimum	69%
		Maximum Points	8.00
		Calculated Points	**5.52**

Match Requirement

Min	Max	
4%	15%	Reno
10%	25%	New

X.1 Multi-Phase Project Grouper

to show a project in multiple phases and as a total project

Department: Tennessee Higher Education Commission
Institution: State University
Project: Classroom Building

Budget Line Items	**New** or Phase 1 New Building	+	**Reno** or Phase 2 Renovation	=	Total Project
Buildings	28,340,000.00		2,176,000.00		30,516,000.00
Sitework	923,000.00		0.00		923,000.00
Built-in Equip	2,500,000.00		0.00		2,500,000.00
TARGET	31,763,000.00		2,176,000.00		33,939,000.00
Contingency	1,588,000.00		218,000.00		1,806,000.00
MACC	33,351,000.00		2,394,000.00		35,745,000.00
Design Fee	1,831,579.00		200,296.00		2,031,875.00
Movable Equip	2,500,000.00		0.00		2,500,000.00
commissioning	200,000.00		0.00		200,000.00
lab consultant	150,000.00		0.00		150,000.00
Miscellaneous	297,421.00		75,704.00		373,125.00
TOTAL	38,330,000.00		2,670,000.00		41,000,000.00
Percent of Mix	93%		7%		100%
bldg square footage	65,000.00		17,000.00		82,000.00
$ / s.f. estimate	436.00		128.00		
resulting estimate	28,340,000.00		2,176,000.00		
$ / s.f.	436.00		128.00		372.15
Contingency Pct	5.0%		10.0%		5.3%
MACC for Log	$ 33,351,000.00		$ 2,394,000.00		
MACC for Mix	$ 33,351,000.00		$ 2,394,000.00		
35/LogP-1.15 Fee Rate	5.491825%		6.693282%		
"New" or "Renovation"	New		Renovation		
New/Reno Multiplier	1.00		1.25		
Base Design Fee	$ 1,831,578.63		$ 200,296.45		
Service Phases	Full Basic Services		Full Basic Services		
Percent of service	100%		100%		
Design Fee	$ 1,831,579.00		$ 200,296.00		

Basic Design Phases:	Fee percent per Phase	Fee percent per Phase	
Program	3	3	Delete the
Schematic	18	18	percentage
Design Development	20	20	values at
Construction Documents	30	30	left for
Bidding	2	2	Phases of
Construction	23	23	Basic Services
Close Out	4	4	to exclude.
If not 41%, 71%, or 100%			

See separate pdf file titled 20-21 U of M STEM Project Appendix 1 and 2