

Capital Budget Request

Replace Randolph Hall	
Overview	
Agency	Virginia Polytechnic Institute and State University (208)
Project Code	none
Project Type	New Construction
Biennium	2020-2022
Budget Round	Initial Bill
Request Type	New Project
Project Location	Roanoke Area
Facility/Campus	Blacksburg Main Campus
Source of Request	Agency Request
Infrastructure Element	Classroom / Laboratory
Contains O & M costs? Yes	
Contains significant technology costs? No	
Contains significant energy costs? No	
Possible that project will be used by other than a state or local governmental entity, or for research under sponsored programs (higher education)? No	
Agency Narrative	
<p>Agency Description</p> <p>Executive Summary:</p> <p>Virginia Tech's College of Engineering is comprised of 12 departments, 298 faculty, 8,411 undergraduates, and 2,143 graduate students. The undergraduate engineering program is ranked 9th nationally among public universities by US News and World Report and 13th among all universities. A Wall Street Journal survey of employment recruiters ranked Virginia Tech the 5th best school for engineering graduates. Virginia Tech also leads the state in STEM-H degree production with over 4,600 degrees awarded annually. This represents 54 percent of Virginia Tech's total degree production and 24 percent of the statewide STEM-H degree production in public universities.</p> <p>The undergraduate enrollment in the College of Engineering has grown 63 percent since the fall of 2006 and is projected to grow further in both students and faculty members. The undergraduate enrollment in the College of Engineering will exceed 10,000 students by 2023-24 with the opportunity to grow beyond that with the tech talent pipeline statewide initiative. Without improved and expanded space for these programs, the university cannot meet the expectations of students and faculty for an engineering education from Virginia Tech.</p> <p>Randolph Hall is located in the southeast segment of the North Academic District and is the university's largest engineering building. It houses five departments in the College that serve more than 2,300 undergraduate majors, 500 graduate students, and award more than 650 degrees each year. The 107 tenure track faculty who teach and perform research in these departments oversee sponsored research programs that account for more than \$16 million of the college's annual \$90 million in externally sponsored research expenditures.</p> <p>Randolph Hall was constructed in two phases between 1952 and 1959. The existing 166,000 gross square feet, 67 year-old building has not been updated to meet new building code and accessibility requirements, its building systems are outdated, and its facility condition index is at 35 percent in the FICAS system as of April 2019. The existing Randolph Hall does not support teaching and research in the 21st century engineering disciplines, cannot sustain the existing enrollment in these engineering programs, and cannot support the demand for engineering degrees at Virginia Tech. This capital project request is in accordance with the governor's stated priorities of workforce development and public education.</p> <p>This project request is to demolish the existing 166,000 gross square foot building and replace it on site with a new and expanded facility containing high quality academic and research space appropriate to the needs of the students and faculty. Replacing Randolph Hall is at the core of supporting enrollment growth and growth for the engineering program at Virginia Tech and contributes to achieving the goals of the statewide talent pipeline initiative. The proposed replacement building is 284,000 gross square feet with a total project cost of \$231.9 million. The funding plan calls for \$208.71 million of General Fund support and \$23.19 million of nongeneral fund.</p>	

Project Description:

The existing Randolph Hall was constructed between 1952 and 1959 in two phases and totals approximately 166,000 gross square feet. The existing building is located in the north section of campus in the heart of the academic enterprise and is adjacent to other key buildings occupied by the College of Engineering.

This replacement project will demolish the entire existing building. In its footprint, a new facility will be constructed to maximize the buildable area of the site. Totalling approximately 284,000 gross square feet, the new facility will add over 70 percent more gross square feet in the same footprint. The existing Stability Wind Tunnel, one of the largest university-owned wind tunnels in the country, that is located to the east of the building will remain and be enclosed with the new facility.

The expanded replacement building will include approximately 54,000 assignable square feet (ASF) of classrooms and instructional laboratories; 12,400 ASF of student team-based projects for high profile, national science competitions and demonstrations spaces for team projects; approximately 56,000 ASF of research laboratories; approximately 55,000 ASF of shared faculty, staff and student office spaces; approximately 7,200 ASF of student advising, collaboration, teaming, studio space, and instructional lab breakout space; and approximately 6,400 ASF of building support and storage spaces. As in the original building, 'dirty' laboratory space and support spaces are planned to be located at the ground level.

The Virginia Tech Rescue Squad will be relocated to this facility and occupy a portion of the ground level as well. Projected to be approximately 6,000 ASF in size, the student-run operation will consist of garage, support, and lounge spaces.

The new facility will maximize the existing site while meeting the objectives of the master plan and exceeding the needs of this century's engineering students and faculty. The site objectives, building configuration and massing, and universal design and sustainability priorities shall be consistent with the 2018 campus master plan.

Justification

Program Description:

Virginia Tech's College of Engineering is comprised of 12 departments, 398 faculty, 8,411 undergraduates, and 2,143 graduate students. The undergraduate engineering program is ranked 9th nationally among public universities by US News and World Report and 13th among all universities.

The proposed replacement building would house five large departments including Computer Science, Aerospace and Ocean Engineering, Chemical Engineering, Mechanical Engineering, and Engineering Education; and would provide additional space for student team research projects, including national team-based research and development competitions. The success of Virginia Tech in these competitions draws national attention to the Commonwealth's leadership in science, technology, engineering, and math education.

The five departments proposed to occupy the building serve more than 2,300 undergraduate majors and 500 graduate students and award more than 650 degrees each year. The 107 tenure track faculty who teach and perform research in these departments oversee sponsored research programs that account for more than \$16 million in annual expenditures. The college's broad research portfolio includes publishing nearly 4,000 articles annually and conducting more than \$90 million annually in externally sponsored research. This level of performance places the College of Engineering as the 8th ranked out of 381 institutions in engineering research expenditures as found within an annual National Science Foundation survey.

Since 2006, undergraduate enrollment in the College of Engineering has grown 53 percent and will continue to grow in both students and faculty members, with an ultimate goal of 10,000 undergraduate students by 2023-24 and the opportunity to grow beyond that with the tech talent pipeline. However, existing instructional space must be replaced to support current enrollment and additional space is necessary to increase future enrollment within the college. Without improved and expanded space for these programs, the university cannot meet the expectations of students and faculty for an engineering education from Virginia Tech.

The university's strategic plan includes the following principle strategies that will be supported by the completion of this project:

- Increase excellence in research, discovery, and creativity.
- Increase teaching and learning excellence for a holistic education.
- Increase institutional impact and visibility. Achieve top US public land-grant ranking by 2024.
- Increase the four-year graduation rate for all undergraduate students to 70 percent as well as the three-year graduation rate for all undergraduate transfer students to 75 percent.
- Reduce the student average student loan debt per graduating senior to \$25,000 by 2024.
- Increase representational diversity, cultural competency, and address critical societal issues impacting humanity and equity.
- Attract, retain, and develop the talents of students, faculty and staff prepared to serve both the local and global communities while also supporting lifelong engagement and learning.
- Continue to develop the physical campus and technology infrastructure.
- Increasing the number of programs recognized as among the best internationally.
- Ensure 100% of majors have a required experiential learning component by 2024.

Existing Facilities:

Randolph Hall was constructed between 1952 and 1959 in two phases and totals approximately 166,000 gross square feet. The first phase consists of a ground level with two floors above and totals approximately 80,700 gross square feet. The second phase is of similar size, but is one story taller and totals approximately 85,300 gross square feet. Soon after the second phase was constructed, a Stability Wind Tunnel built by NASA in 1940, was brought to the university and installed to the east of the building. The wind tunnel is one of the largest in the country that is university-owned.

At the time of construction, Randolph Hall was at the northern edge of campus with only one non-residential structure in close proximity built nearly two decades earlier. Since then, five major buildings exceeding 470,000 total square feet have surrounded Randolph Hall.

Nearly three decades ago, the program outgrew the facility resulting in the construction of a stick-built modular administrative building placed in the space between the original section and addition. This 3,360 square foot facility primarily handles administrative spaces that would otherwise be located in Randolph Hall. More recently, the college has also begun leasing off-campus space to house additional faculty and graduate students who cannot be accommodated due to space constraints.

This intensively utilized, 67 year-old building is one of the most outdated academic buildings on campus with extensive egress and ADA deficiencies and deteriorated building systems. Numerous select, small scale renovations and limited classroom refurbishment have occurred over the years; however, no full scale comprehensive updates have occurred.

The increased use of modern scientific equipment is exceeding the capabilities of the existing mechanical, electrical, plumbing, and environmental control systems. The existing building organization also includes some elements that do not comply with current code requirements for egress safety.

With a facility condition index of 35 percent in the FICAS system as of April 2019, Randolph's condition has progressed beyond the scope of normal operations and maintenance reserve repairs. The building is undersized, outdated, out of compliance with today's building and accessibility codes, and does not support teaching and research in the 21st century in engineering disciplines.

Funding Plan:

The program of this project request is 80 percent instruction and 20 percent research. The funding plan for the project calls for \$208.71 million of General Fund support for the instruction program and 50 percent of the research program on top of \$23.19 million of nongeneral fund authorization for the university's 50 percent support of the research program. The nongeneral fund component is requested as a revenue bond authorization that will be repaid by overhead revenue generated from the research program and targeted fundraising that will occur in the university's capital campaign.

Options Considered:

Options considered but rejected include a major building renovation, additional leasing of off-campus space, and project deferral. The building renovation would not be the most cost effective option in terms of capital expenditure or on-going operations. Leasing space is costly and reduces program cohesiveness by distributing students, faculty and staff across several buildings and areas adjacent to campus. Deferral of this project to a future biennium will impact the program's ability to efficiently provide instruction and to remain competitive for sponsored research projects. The estimated cost to renovate Randolph is \$178.3 million plus \$150 million to construct and then lease 118,000 square feet of off campus space.

A viable option for consideration is phasing the project over two biennia. The facility was constructed in two components, and the university could use the separation line between the sides to cleave the demolition and spread the replacement over two biennia. A phased approach could be implemented with a manageable impact to the instruction programs or research programs. Under this plan, the university would request phase one to cover planning for the entire replacement and construction of the west wing and a phase two to cover construction of the east wing replacement.

Methodology

Cost Explanation and Methodology:

A. Methods Used to Estimate Costs:

The method for estimating costs for the Replace Randolph Hall project includes: 1) using unit costs in the Division of Engineering and Building's Construction Costs Database updated March 2018 with a regional market multiplier and a multiplier for softs costs (via an in-house cost estimating system); and 2) comparables as shown in the CR-1. The project costs are escalated to a construction midpoint of 2023 at four and a half percent escalation in accordance with the instructions for developing the Six-Year Capital Outlay Plan.

On a total project cost basis, inclusive of design, construction, and equipment, the unit costs are \$817 per gross square foot. The unit construction costs of the project are \$617 per gross square foot, including self-performed construction work. The building types in this request reflect a combination of science wet laboratory, dry laboratory, research laboratory, classrooms, and office spaces in the Division of

Engineering and Building's Virginia Construction Costs Database.

The university's project cost estimates are derived from a database of on-campus construction costs of comparable project types. Virginia Tech building construction reflects the high level of quality, durability, and tradition that makes Virginia Tech a distinctive and memorable place for students. The estimates also include the cost of technology, specialized instruction, and energy efficiency goals of the institution.

Construction Manager at risk is the intended delivery method for this project.

B. The proposed costs include the following critical considerations to ensure the project fully meets the needs of the program and the university:

1) The building envelope will be comprised primarily of Hokie Stone with precast concrete accents consistent with university standards as affirmed by the Board of Visitors. Brick, metal panels, and siding materials are not permitted as substitutions for Hokie Stone. The stone is a four-inch thick nominal stone thickness with a two-inch nominal air barrier over moisture resistant sheathing. Stainless steel anchoring straps and load bearing shelf angles and stainless steel flashings comprise the structural support and flashings system. The university owns the stone quarries and provides the cut material to the building; thus, the material costs along with intensive quality insurance inspections costs are carried in the Other Costs section of the proposed budget, while the construction budget carries all erection, final stone dressing, and installation costs.

2) Hazardous materials were utilized during the era in which this building was constructed. This will increase both the time and cost of making the building safe for the planned scope of work.

3) Mechanical equipment and building automation systems are designed and selected to meet performance requirements and to optimize total costs of ownership inclusive of energy costs and operations and maintenance costs. System selections are justified based on a 30-year economic life cycle analysis. Mechanical equipment will be covered and secured to maximize equipment life and service.

4) Academic buildings include interior glazing for energy efficiency, lighting for academic work, and to enhance pedagogy, while also creating a secure envelope.

5) Ceiling heights will be appropriate for proper sound attenuation in large lecture and assembly environments as required for effective pedagogy.

6) Building structural support systems will accommodate large open and unimpeded interior spaces to maximize long-term programmatic functionality and adaptation to new program space and technology arrangements. This includes raised floor systems for maximum adaptation.

7) High-capacity wireless networks to support multiple devices (laptop computer, tablet computer, smartphone, and other WIFI devices) used simultaneously by students and faculty to retrieve information and to communicate and to connect digitally with sites around campus and around the world. Testing and instruction can utilize online applications that require the capacity for an entire classroom to be connected simultaneously.

8) Power outlets corresponding to the seat/station count and power outlets in common areas will exceed the minimum code requirements by approximately 30 percent.

9) Automated audiovisual and lighting controls are included for all classroom and class laboratory spaces.

10) Climate controlled technology server rooms, 10 feet by 10 feet, on each floor of the building or as required to provide efficient distribution of services.

11) Communications infrastructure, both wired and wireless, is installed by a university operated auxiliary; thus, these costs are shown in the Other Costs section of the proposed budget.

12) Site development costs in this region are historically in the medium to high range and require generally significant rock removal and deep foundations.

13) Utilities (power, steam, chilled water, domestic water, gas, sanitary sewer, technology, and storm water infrastructure) do not terminate at the building site and their extension is included the proposed budget.

14) Specialized degrees in engineering and physical sciences require specialized equipment specific to those fields. This building requires shielded and vibration protected areas in which to operate this equipment.

15) The existing Randolph Hall incorporates a wind tunnel that supports a significant research enterprise and must continue. The wind tunnel will need to be adapted into the new building and may require specialized structural supports and enclosures.

16) Randolph Hall has a robust structural design including 12" floor slabs. Demolition costs will be in excess of standard demolition costs.

17) Hancock Hall adjoins Randolph Hall and shares an exterior wall with Randolph Hall. The demolition of Randolph Hall will require the shoring of Hancock Hall.

18) Code and regulation are updated over time. Following are some changes that have occurred that were not in place on the comparable projects that were used to provide the parametric estimate for this project:

- DEQ increased the storm water management requirements in 2014. Extensive BMP's and off-set credits are required to be installed and/or purchased to comply with this Federal regulation.
- ASHRE 90.1 energy code stipulates that buildings use less energy with each successive issuance of the code. The most recent change requires 18.5 percent decrease in energy usage. This translates into increase capital costs.
- The state mandated High Performance Building Act provides three options for compliance. Virginia Tech utilized LEED V4 which mandates energy savings beyond the requirements of energy code, ASHRE 90.1. This increases the capital construction costs.
- LEED additionally requires the commissioning of the energy savings components. The costs are on the order of 0.75-1.3 percent of the construction costs. The services are provided by a third party and are captured in the Other Costs section.

Funding Request

Phase	Year	Subobject	Fund	Amount
Full Funding	2021	2322 - Construction, Buildings	01000 - General Fund	\$208,710,000
Full Funding	2021	2322 - Construction, Buildings	08150 - 9(D) Rev Bonds-Construction	\$23,190,000
Total				\$231,900,000

Project Costs

Cost Type	Requested Funding
Acquisition Cost	\$0
Building & Built-in Equipment	\$175,109,026
Sitework & Utility Construction	\$0
Construction Cost Total	\$175,109,026
DESIGN & RELATED SERVICE ITEMS	
A/E Basic Services	\$20,981,505
A/E Reimbursables	\$35,022
Specialty Consultants (Food Service, Acoustics, etc.)	\$0
CM Design Phase Services	\$805,502
Subsurface Investigations (Geotech, Soil Borings)	\$262,664
Land Survey	\$0
Archeological Survey	\$0
Hazmat Survey & Design	\$0
Value Engineering Services	\$0
Cost Estimating Services	\$0
Other Design & Related Services	\$1,505,938
Design & Related Services Total	\$23,590,631
INSPECTION & TESTING SERVICE ITEMS	
Project Inspection Services (inhouse or consultant)	\$1,628,514
Project Testing Services (conc., steel, roofing, etc.)	\$963,100
Inspection & Testing Services Total	\$2,591,614
PROJECT MANAGEMENT & OTHER COST ITEMS	
Project Management (inhouse or consultant)	\$1,291,366
Work By Owner	\$210,131
BCOM Services	\$735,458
Advertisements	\$0
Printing & Reproduction	\$0
Moving & Relocation Expenses	\$787,991

AV Cabling	\$0
IT Cabling	\$0
Telephone Cabling	\$0
AV Equipment	\$0
IT Equipment	\$1,400,872
Telephone Equipment	\$0
Signage	\$140,087
Demolition	\$0
Hazardous Material Abatement	\$332,707
Utility Connection Fees	\$0
Utility Relocations	\$875,545
Commissioning	\$2,223,885
Miscellaneous Other Costs	\$5,585,978
Project Management & Other Costs Total	\$13,584,020
Furnishings & Movable Equipment	\$13,522,528
Construction Contingency	\$3,502,181
TOTAL PROJECT COST	\$231,900,000

Size and Scope

Cost Type	Unit of Measure	Units	Cost Per Unit
Acquisition Cost		0	\$0
Construction Cost	GSF	284,000	\$617
Total Project Cost	GSF	284,000	\$817

Operating and Maintenance Costs

Cost Type	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
GF Dollars	\$0	\$0	\$0	\$1,990,573	\$2,050,290	\$2,111,799
NGF Dollars	\$0	\$0	\$0	\$0	\$0	\$0
GF Positions	0.00	0.00	0.00	7.50	7.50	7.50
NGF Positions	0.00	0.00	0.00	0.00	0.00	0.00
GF Transfer	\$0	\$0	\$0	\$0	\$0	\$0
GF Revenue	\$0	\$0	\$0	\$0	\$0	\$0
Layoffs	0	0	0	0	0	0

Planned start date of new O&M costs (if different than the beginning of the fiscal year):---

Supporting Documents

File Name	File Size	Uploaded By	Upload Date	Comment
02- Replace Randolph Hall Program Chart.pdf	88,254	Cassidy Limer	7/24/2019	
02 -CR-1e Project Planner-Randolph Hall Replacement-VIRGINIA TECH-State Version.xlsx	616,769	Cassidy Limer	7/29/2019	

Workflow History

User Name	Claimed	Submitted	Step Name	Submit Action
Cassidy Limer	07/16/2019 03:09 PM	07/16/2019 03:09 PM	Enter Capital Budget Request	Continue Working
Cassidy Limer	07/16/2019 03:09 PM	07/24/2019 03:05 PM	Continue Drafting	Continue Working
Cassidy Limer	07/25/2019 09:49 AM	07/25/2019 09:57 AM	Continue Drafting	Submit for Agency Review
Rob Mann	07/25/2019 04:47 PM	07/25/2019 04:47 PM	Agency Review Step 1	Return for Further Data Entry
Cassidy Limer	07/25/2019 05:22 PM	07/25/2019 05:27 PM	Continue Drafting	Continue Working

Cassidy Limer	07/26/2019 08:52 AM	07/26/2019 12:31 PM	Continue Drafting	Submit for Agency Review
Rob Mann	07/26/2019 01:46 PM	07/26/2019 01:57 PM	Agency Review Step 1	Ready for DPB Bulk Submit
Rob Mann	07/26/2019 02:16 PM	07/26/2019 02:17 PM	Ready for DPB Submission	Submit to DPB
Anne Smith	07/26/2019 03:44 PM	07/26/2019 03:44 PM	DPB Review	Return to Previous Submitter
Rob Mann	07/29/2019 10:04 AM	07/29/2019 10:05 AM	Agency Review Step 1	Return for Further Data Entry
Cassidy Limer	07/29/2019 01:09 PM	07/29/2019 01:38 PM	Continue Drafting	Continue Working
Jennifer Hundley	07/29/2019 04:35 PM	07/29/2019 04:45 PM	Continue Drafting	Continue Working
Jennifer Hundley	07/30/2019 10:44 AM	07/30/2019 10:46 AM	Continue Drafting	Submit for Agency Review
Rob Mann	07/30/2019 12:32 PM	07/30/2019 12:32 PM	Agency Review Step 1	Return for Further Data Entry
Cassidy Limer	07/30/2019 04:43 PM	07/30/2019 04:43 PM	Continue Drafting	Submit for Agency Review
Rob Mann	07/31/2019 09:53 AM	07/31/2019 09:53 AM	Agency Review Step 1	Return for Further Data Entry
Cassidy Limer	07/31/2019 11:39 AM	07/31/2019 11:46 AM	Continue Drafting	Submit for Agency Review
Rob Mann	07/31/2019 03:29 PM	07/31/2019 03:38 PM	Agency Review Step 1	Ready for DPB Bulk Submit
Rob Mann	07/31/2019 03:44 PM	07/31/2019 03:44 PM	Ready for DPB Submission	Submit to DPB
Anne Smith	07/31/2019 05:26 PM	07/31/2019 05:27 PM	DPB Review	Continue Review
			DPB Review	