

## Capital Budget Request

### Replace Randolph Hall

#### Overview

Agency	Virginia Polytechnic Institute and State University (208)
Project Code	none
Project Type	New Construction
Biennium	2018-2020
Budget Round	Initial Bill
Request Origin	Previously Submitted
Project Location	Roanoke Area
Facility/Campus	Blacksburg Main Campus
Source of Request	Agency Request
Infrastructure Element	Classroom / Laboratory
Contains significant technology costs? No	
Contains significant energy costs? No	
Project will be used by other than a state or local governmental entity? No	

#### Agency Narrative

**Agency Description**  
**Executive Summary:**

Virginia Tech's College of Engineering is comprised of 12 departments, 355 faculty, 7,900 undergraduates, and 2,300 graduate students. The undergraduate engineering program is ranked 8th nationally among public universities by US News and World Report and 15th among all universities. A Wall Street Journal survey of employment recruiters ranked Virginia Tech the 5th best school for engineering graduates.

Randolph Hall is located in the center of north campus 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.

Randolph Hall was constructed in two phases between 1952 and 1959. The existing 166,000 gross square feet, 60 year-old building is one of the most outdated academic buildings on campus with extensive egress and ADA deficiencies, deteriorated building systems, and a facility condition index of 27 percent in the FICAS system as of June 9, 2017. The existing Randolph Hall does not support teaching and research in the 21st century in engineering disciplines, cannot sustain the existing enrollment in these engineering programs, and cannot support the demand for engineering majors at Virginia Tech.

The College of Engineering's enrollment has grown 42 percent since the fall of 2006 and is projected to grow more in both students and faculty members with the ongoing demand for STEM-related degrees. 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.

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. The proposed replacement building would be 284,000 gross square feet with a total project cost of \$182.5 million with a funding plan that calls for \$155.125 million of General Fund and \$27.375 million of nongeneral fund.

**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 adjacent to other key buildings occupied by the College of Engineering.

This replacement project will demolish the entire existing four story building, which has east and west sections, and construct a new 166,500 gross square foot, five story west wing and a 117,500 gross square foot, four story east wing at the approximate location of the demolished sections, totaling approximately 284,000 gross square feet.

The footprint of the new sections may extend beyond the limits of the demolished sections. This additional captured area, including the provision of an extra story in height, will significantly increase the gross square footage available for the academic program by an estimated 118,000 gross square feet.

The expanded replacement building will include 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; 55,000 ASF of research laboratories; 52,000 ASF of shared faculty, staff and student office spaces, and 7,500 ASF of building support and storage spaces. As in the original building, 'dirty' research and teaching laboratory space and support spaces are planned to be located at the basement floor.

The project scope, site development, and building configuration shall be consistent with the 2017 master plan update and include universal accessibility design principles as appropriate. The proposed building is expected to provide a strong connection to the site including landscaping for outdoor classroom sections.

#### Justification

##### Program Description:

Virginia Tech's College of Engineering is comprised of 12 departments, 355 faculty, 7,900 undergraduates, and 2,300 graduate students. The undergraduate engineering program is ranked 8th nationally among public universities by US News and World Report and 15th among all universities.

The college also has a broad research portfolio 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.

The proposed replacement building would house five large departments including Aerospace and Ocean Engineering, Chemical Engineering, Mechanical Engineering, Engineering Education, and Computer Science; 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 Virginia's leadership in science, technology, engineering, and math education.

The five departments proposed to occupy the building 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 in annual expenditures.

The College of Engineering has grown 42 percent since 2006 and will continue to grow in both students and faculty members. 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 completion of this project:

- Increasing the number of our programs recognized as among the best internationally.
- Ensuring competency in data analysis and computational methods as a component of general education for all students.
- Developing an appropriate infrastructure for e-learning.
- Developing an appropriate infrastructure for high performance computing.
- Maintaining growth in research expenditures toward a target of \$680 million by 2018.
- Increasing graduate enrollment toward a target of 10,000 students across all campuses.
- Increasing the number of post-doctoral positions in STEM-H research areas.
- Increasing undergraduate involvement in meaningful research experiences and experiential learning.
- Developing ways to integrate computational science/informatics and digital fluency for managing and analyzing complex data sets across a wide range of disciplines.
- Continuing to investigate, develop, and utilize current and emerging technologies to enhance traditional classrooms, provide mobile access, and expand high-quality.
- Distance -learning opportunities.

##### Existing Facilities:

Randolph Hall was constructed in two phases and totals approximately 166,000 gross square feet. The original west section was constructed in 1952 and contains 80,690 gross square feet. The east section was constructed in 1959 and contains 85,310 gross square feet.

The 166,000 gross square foot Randolph Hall, constructed in 1952, has not had any major improvements or renovations since the 1959 addition was completed. This intensively used, 55 year-old building is one of the most outdated academic buildings on campus with extensive egress and ADA deficiencies and deteriorated building systems. Small scale renovations to selected spaces and limited refurbishment to a portion of general assignment classrooms have exhausted the capacity of existing aged mechanical and electrical systems. With a facility condition index of 27 percent in the FICAS system as of June 9, 2017, Randolph's condition has progressed beyond the scope of normal operations and maintenance reserve repairs. The college has begun leasing off-campus space to house additional faculty and graduate students.

The building is outdated and does not support teaching and research in the 21st century in engineering disciplines. The increased use of

modern scientific equipment is exceeding the capabilities of the existing mechanical, electrical, plumbing, and environmental control systems.

#### Funding Plan:

The program of this project request is 70 percent instruction and 30 percent research. The funding plan for the project calls for \$155.125 million of General Fund support for the instruction program and 50 percent of the research program and \$27.375 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 and 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 adjacent areas to campus. Deferral of this project to a future biennium will impact the programs ability to efficiently provide instruction and to remain competitive for sponsored research projects.

An 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 manageable impact to the instruction programs or research programs.

#### Alternatives Considered

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#### Costing Methodology

##### A. Methods Used to Estimate Costs:

The method for estimating costs for the Randolph Hall Replacement project includes: 1) using unit costs in the Bureau of Capital Outlay Management's Construction Costs Database updated October 2016 with a regional market multiplier and a multiplier for softs costs; and 2) comparables as shown in the CR-3. Both methods are escalated to a construction midpoint of 2021 at three percent 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 \$643 per gross square foot. The unit construction costs of the project are \$460 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 Bureau of Capital Outlay Management's 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. Our 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 provisions the cut material to the building; thus, the material costs are carried in the Other Costs section of the proposed budget while the construction budget carries all erection, final stone dressing, installation and intensive quality assurance inspection costs.
- 2) 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.
- 3) Academic buildings include interior glazing for energy efficiency, lighting for academic work, and to enhance pedagogy.
- 4) Ceiling heights must be a minimum of 16 feet for sound attenuation in large lecture and assembly environments as required for effective pedagogy.
- 5) 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.
- 6) 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.

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

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

9) Climate controlled technology server rooms, 10 feet by 10 feet, on each floor of the building.

10) 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.

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

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

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

### Agency Funding Request

Phase	Year	Fund	Subject	Requested Amount
Construction	2019	01000 - General Fund	2322 - Construction, Buildings	\$155,125,000
Construction	2019	08150 - 9(D) Rev Bonds-Construction	2322 - Construction, Buildings	\$27,375,000
Total				\$182,500,000

### Project Costs

Cost Type	Total Project Costs	Requested Funding	DGS Rec
Acquisition Cost	\$0	\$0	
Building & Built-in Equipment	\$130,740,524	\$130,740,524	
Sitework & Utility Construction	\$0	\$0	
<b>Construction Cost Total</b>	<b>\$130,740,524</b>	<b>\$130,740,524</b>	
<b>DESIGN &amp; RELATED SERVICE ITEMS</b>			
A/E Basic Services	\$16,668,069	\$16,668,069	
A/E Reimbursables	\$25,118	\$25,118	
Specialty Consultants (Food Service, Acoustics, etc.)	\$0	\$0	
CM Design Phase Services	\$604,014	\$604,014	
Subsurface Investigations (Geotech, Soil Borings)	\$193,477	\$193,477	
Land Survey	\$0	\$0	
Archeological Survey	\$0	\$0	
Hazmat Survey & Design	\$0	\$0	
Value Engineering Services	\$0	\$0	
Cost Estimating Services	\$0	\$0	
Other Design & Related Services	\$0	\$0	
<b>Design &amp; Related Services Total</b>	<b>\$17,490,678</b>	<b>\$17,490,678</b>	
<b>INSPECTION &amp; TESTING SERVICE ITEMS</b>			
Project Inspection Services (inhouse or consultant)	\$1,220,238	\$1,220,238	
Project Testing Services (conc., steel, roofing, etc.)	\$720,393	\$720,393	
<b>Inspection &amp; Testing Services Total</b>	<b>\$1,940,631</b>	<b>\$1,940,631</b>	
<b>PROJECT MANAGEMENT &amp; OTHER COST ITEMS</b>			
Project Management (inhouse or consultant)	\$939,398	\$939,398	
Work By Owner	\$154,965	\$154,965	
BCOM Services	\$551,200	\$551,200	

Advertisements	\$0	\$0
Printing & Reproduction	\$0	\$0
Moving & Relocation Expenses	\$594,209	\$594,209
AV Cabling	\$0	\$0
IT Cabling	\$0	\$0
Telephone Cabling	\$0	\$0
AV Equipment	\$0	\$0
IT Equipment	\$1,049,498	\$1,049,498
Telephone Equipment	\$0	\$0
Signage	\$111,001	\$111,001
Demolition	\$0	\$0
Hazardous Material Abatement	\$244,513	\$244,513
Utility Connection Fees	\$0	\$0
Utility Relocations	\$649,119	\$649,119
Commissioning	\$1,664,895	\$1,664,895
Miscellaneous Other Costs	\$4,052,521	\$4,052,521
<b>Project Management &amp; Other Costs Total</b>	<b>\$10,011,319</b>	<b>\$10,011,319</b>
Furnishings & Movable Equipment	\$11,358,864	\$11,358,864
Construction Contingency	\$10,957,984	\$10,957,984
<b>TOTAL PROJECT COST</b>	<b>\$182,500,000</b>	<b>\$182,500,000</b>

### Capacity

Cost Type	Unit of Measure	Units	Cost Per Unit
Acquisition Cost		0	\$0
Construction Cost	GSF	284,000	\$460
Total Project Cost	GSF	284,000	\$643

### Operating and Maintenance Costs (Agency)

Cost Type	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
GF Dollars	\$0	\$0	\$0	\$1,664,564	\$1,714,501	\$1,765,936
NGF Dollars	\$0	\$0	\$0	\$0	\$0	\$0
GF Positions	0.00	0.00	0.00	9.31	9.31	9.31
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
<a href="#">CR-3_Project Planner-03 Renew Randolph.xlsx</a>	419,176	Rob Mann	7/7/2017	CR-3 Form_Randolph Hall
<a href="#">Randolph Hall.jpg</a>	756,751	Rob Mann	7/7/2017	Randolph Hall Picture
<a href="#">03_Randolph Program Chart.pdf</a>	72,612	Rob Mann	7/7/2017	Randolph Hall Program Chart

### Workflow History

User Name	Claimed	Submitted	Step Name	Submit Action
Jennifer Hundley	06/06/2017 01:25 PM	06/06/2017 01:25 PM	Enter Capital Budget Request	Continue Working

Jennifer Hundley	06/06/2017 01:25 PM	06/06/2017 01:25 PM	Continue Drafting	Continue Working
Jennifer Hundley	06/09/2017 03:15 PM	06/09/2017 03:19 PM	Continue Drafting	Continue Working
Jennifer Hundley	06/09/2017 03:25 PM	06/09/2017 03:27 PM	Continue Drafting	Continue Working
Rob Mann	07/07/2017 02:03 AM	07/07/2017 02:18 AM	Continue Drafting	Submit for Agency Review
Rob Mann	07/07/2017 11:30 AM	07/07/2017 11:32 AM	Agency Review Step 1	Ready for DPB Bulk Submit
Bob Broyden	07/07/2017 03:30 PM	07/07/2017 03:32 PM	Ready for DPB Submission	Continue Review
Bob Broyden	07/07/2017 03:57 PM	07/07/2017 03:58 PM	Ready for DPB Submission	Continue Review
Bob Broyden	07/07/2017 04:35 PM	07/07/2017 04:35 PM	Ready for DPB Submission	Submit to DPB
			DPB Review	