CapitalBudgetRequest

Construct Randolph Hall for Engineering

Overview

Agency	Virginia Polytechnic Institute and State University (208)
Project Code	none
Project Type	New Construction
Biennium	2016-2018
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	

Agency Narrative

Agency Description

Virginia Tech's comprehensive College of Engineering is comprised of 13 departments, 335 faculty, 7,200 undergraduates, and 2,000 graduate students. The undergraduate engineering program is ranked 6th nationally among public universities. A [Wall Street Journal] survey of employment recruiters ranked Virginia Tech the 5th best school for engineering graduates. The college also has a broad research portfolio publishing 3,740 articles in 2013 and conducting more than $90 million in externally sponsored research. The College of Engineering is the primary occupant of this building.

Randolph Hall was constructed in 1952, with an addition in 1959, and several non-capital, small-scale improvements over the years. The building comprises about 166,000 gross square feet and houses portions of several departments in the College of Engineering, including Aerospace and Ocean Engineering, Chemical Engineering, and Mechanical Engineering and Material Science Engineering.

The departments currently occupying the building serve more than 2,300 undergraduate majors, 500 graduate students. These departments 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 experienced significant growth in students (19 percent since 2008-09) and will continue to grow in both students and faculty members.

The existing building is outdated and does not support teaching and research in the 21st century in engineering disciplines. This 60 year-old building is one of the most outdated academic and research buildings on campus with extensive egress and ADA deficiencies and deteriorated building systems. The increased use of modern scientific equipment, ranging from computers to specialized laboratory equipment, is exceeding the capabilities of the existing mechanical, electrical, plumbing, and environmental control systems.

The existing Randolph Hall cannot sustain the existing enrollment in these engineering programs and cannot support the demand for engineering majors at Virginia Tech. This project request is to demolish the existing building and replace it with a new and expanded size building to high quality academic and research space appropriate to the needs of these students and accomplished faculty.

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.

Justification

Program Description:
The approximate 166,000 gross square foot Randolph Hall was constructed in two phases: the original 1952 phase (west section) connected to Hancock Hall totaling 80,685 gross square feet, and the 1959 second phase (east section) totaling 85,235 gross square feet. This replacement project includes the demolition of the original three story west and east sections and construction of a new four story facility at the approximate location of the demolished sections, totaling approximately 206,000 gross square feet. The footprint of the new sections may extend beyond the limits of the demolished sections to include portions of the adjacent service yard that are not needed for future service operations. This additional captured area, including the provision of an extra story in height, will significantly increase the gross square footage available for program use by an estimated 40,000 gross square feet. Programmatically, the new spaces will include classrooms and instructional and research laboratories, seminar rooms and administrative space within the College of Engineering. These new spaces will provide high quality academic and research space. As in the original building, 'dirty' research and teaching lab space and support spaces are planned to be located at the basement floor.

A replacement Randolph Hall will primarily house portions of the departments of Aerospace and Ocean Engineering, Chemical Engineering, Mechanical Engineering, Materials Science and Engineering and Mining and Minerals Engineering along with general assignment and specialized classrooms, research laboratories and faculty offices. In addition, this new building will provide additional space for student team based projects for high profile, national science competitions and demonstrations. Virginia Tech's students are frequently top performers in 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.

Programmatically, the new building will include classrooms and instructional and research laboratories, seminar rooms and faculty offices to serve the College of Engineering. The departments currently occupying the building serve more than 2,300 undergraduate majors, 500 graduate students. These departments 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 $16M in annual expenditures. The College of Engineering has experienced significant growth in students (19 percent since 2008-09) and will continue to grow in both students and faculty members. The new, expanded facility will provide high quality academic and research space appropriate to the needs of these students and accomplished faculty.

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
• Emphasizing translational research and scholarship
• Maintaining growth in research expenditures toward a target of $680 million by 2018.
• Increasing graduate enrollment toward a target of an additional 1,000 students
• Increasing the number of post-doctoral positions in STEM-H research areas.
• Increasing undergraduate involvement in meaningful research experiences and experiential learning (hands on minds on)
• 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:
The roughly 166,000 gross square foot building was constructed in two phases- the original 1952 phase (west section) totaling 80,685 gross square feet and the 1959 second phase (east section) totaling 85,265 gross square feet. The building has not had any major improvements or renovations since the 1959 construction was completed. The building has become outdated and deterioration is progressing beyond the scope of normal operations and maintenance reserve repairs, it is listed in the Facility Inventory Condition and Assessment System with a facility condition index of 32 percent.

The building is outdated and does not support teaching and research in the 21st century in engineering disciplines. This 55 year-old building is one of the most outdated academic and research buildings on campus with extensive egress and ADA deficiencies and deteriorated building systems. The increased use of modern scientific equipment, ranging from computers to specialized laboratory equipment, is exceeding the capabilities of the existing mechanical, electrical, plumbing, and environmental control systems. The building has received no major renovations, upgrades or improvement projects since originally constructed, with the exception of limited refurbishment of a portion of the general assignment classrooms. These small scale renovations to selected spaces in the building have reached the capacity of existing aged mechanical and electrical systems. The college has begun leasing off-campus space to house additional faculty and graduate students. A two phase replacement of the entire building will allow it to become an efficient and effective use to support successful and expanding instructional and research programs.

Funding Plan:
The program of this project request is 66 percent instruction and 34 percent research. The funding plan for the project calls for $119.4 million of general fund support for the instruction program and 50 percent of the research program and $24.4 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 building renovation and additional leasing of off-campus space and project deferral. 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.

Alternatives Considered

Costing Methodology

The method for estimating costs includes: 1) using unit costs in the Bureau of Capital Outlay Management's Construction Costs Database updated April 2015 with a regional market multiplier and a multiplies for softs costs; and 2) comparables as shown in the CR-3. Both methods are escalated to a construction midpoint of 2019 at three percent

On a total project cost basis, inclusive of design, construction, and equipment, the unit costs are $698 per gross square foot. The unit construction costs of the project are $549 per gross square foot, including self-performed construction work. The building types in this request are wet laboratory, dry laboratory, and classroom spaces in the Bureau of Capital Outlay Management's Construction Costs Database.

Virginia Tech's project cost estimate is 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.

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. The Virginia Tech Board of Visitors has directed that all new building projects and expansion projects built on the Blacksburg central campus must use Hokie stone as the predominate building material on all building facades. Brick, metal panels, and siding materials are not permitted as substitutions for Hokie stone. In maintaining the random ashlar stone pattern of our collegiate Gothic buildings, the university has explored a wide range of contemporary stone erection means, methods and systems. The most efficient system tested that meets erection, insulation and moisture protection requirements utilizes 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, meeting our requirement for a 50-100 year enclosure life expectancy. Because the university owns the stone quarry, the quarrying and stocking of all the cut stone is carried as a project (soft) cost, and the construction budget carries all erection, final stone dressing, installation and intensive quality assurance inspection costs.

Mechanical equipment and building automation systems will be designed to maximize energy efficiency and minimize operations and maintenance costs. Mechanical equipment will be located inside and screened from view to maximize student use of the campus landscape. Electrical systems will support current academic technologies and increased student use of individual technology equipment. Effective use of exterior and interior glazing will enhance energy efficiency lighting fixtures for an improved academic experience. Design priorities will include flexibility to maximize the long-term programmatic functionality of the building.

Virginia Tech produces the most STEM-H graduates of any university in the Commonwealth. Our role as the leading producer of STEM-H degrees relies upon a system of classrooms, instructional laboratories that support technology driven instruction in engineering, physical sciences, life sciences, and advanced mathematics. All buildings must have high-capacity wireless networks to support multiple devices (laptop computer, tablet computer, smartphone) used simultaneously by students to retrieve information and to communicate within the classroom and to connect digitally with instructional sites around campus and around the world. The use of electronic equipment in the classroom by student participants also requires dedicated power outlets corresponding to the seat/station count and power outlets in common areas. Raised floor systems are needed to accommodate these and future developments in technology and classroom configuration. Specialized degrees in engineering and physical sciences require specialized equipment specific to those fields and sometimes shielded or vibration protected areas in which to operate this equipment. The university operates its own communications network using primarily internet connectivity which requires accessible, climate controlled server rooms in lieu of the traditional phone closet. Because the communications infrastructure is installed by our own university operated auxiliary it is carried as a project (soft) cost outside of the normal construction budget.

The project is anticipated to have moderate site conditions but restricted site access in a dense and active part of campus will impact mobilization costs. This project will use a C-M at risk construction delivery method appropriate for the size and complexity of this project. Project costs are estimated to the mid-point of construction using three percent escalation in accordance with the instructions for developing the Six-Year Capital Outlay Plan.

Summary of Randolph Hall Replacement Other Costs:
1. Hokie stone used as primary exterior building envelope material.
2. Building foundation deep caissons or piers to remediate unsound subsurface foundation conditions
3. Raised flooring systems throughout classrooms and laboratories for flexible use of electronic equipment.
4. Specialized building slabs designed to eliminate ground vibration interfering with sensitive scientific equipment.
5. High performance computing will require exceptional electrical, HVAC, and internet connectivity throughout.

Agency Funding Request

Phase	Year	Fund	Subobject	Requested Amount
Construction	2019	0100 - General Fund	2322 - Construction, Buildings	$119,400,000
Construction	2019	0815 - 9(D) Debt Service - Construction Costs	2322 - Construction, Buildings	$24,400,000
			Total	$143,800,000

Project Costs

Cost Type	Total Project Costs	Requested Funding	DGS Rec
Acquisition Cost	$0	$0	

Building & Built-in Equipment	$91,951,000	$91,951,000	
Sitework & Utility Construction	$9,147,000	$9,147,000	
Construction Cost Total	**$101,098,000**	**$101,098,000**	
DESIGN & RELATED SERVICE ITEMS			
A/E Basic Services	$13,272,000	$13,272,000	
A/E Reimbursables	$238,000	$238,000	
Specialty Consultants (Food Service, Acoustics, etc.)	$832,000	$832,000	
CM Design Phase Services	$1,544,000	$1,544,000	
Subsurface Investigations (Geotech, Soil Borings)	$214,000	$214,000	
Land Survey	$24,000	$24,000	
Archeological Survey	$0	$0	
Hazmat Survey & Design	$0	$0	
Value Engineering Services	$0	$0	
Cost Estimating Services	$71,000	$71,000	
Other Design & Related Services	$713,000	$713,000	
Design & Related Services Total	**$16,908,000**	**$16,908,000**	
INSPECTION & TESTING SERVICE ITEMS			
Project Inspection Services (inhouse or consultant)	$2,673,000	$2,673,000	
Project Testing Services (conc., steel, roofing, etc.)	$891,000	$891,000	
Inspection & Testing Services Total	**$3,564,000**	**$3,564,000**	
PROJECT MANAGEMENT & OTHER COST ITEMS			
Project Management (inhouse or consultant)	$1,544,000	$1,544,000	
Work By Owner	$154,000	$154,000	
BCOM Services	$12,000	$12,000	
Advertisements	$0	$0	
Printing & Reproduction	$0	$0	
Moving & Relocation Expenses	$178,000	$178,000	
Non Built-In Data and Voice Communications	$1,663,000	$1,663,000	
Signage	$95,000	$95,000	
Demolition	$950,000	$950,000	
Hazardous Material Abatement	$297,000	$297,000	
Utility Connection Fees	$0	$0	
Utility Relocations	$950,000	$950,000	
Commissioning	$1,164,000	$1,164,000	
Miscellaneous Other Costs	$3,412,000	$3,412,000	
Project Management & Other Costs Total	**$10,419,000**	**$10,419,000**	
Furnishings & Movable Equipment	$9,789,000	$9,789,000	
Construction Contingency	$2,022,000	$2,022,000	
TOTAL PROJECT COST	**$143,800,000**	**$143,800,000**	

Capacity

Cost Type	Unit of Measure	Units	Cost Per Unit
Acquisition Cost		0	$0
Construction Cost	GSF	206,000	$491
Total Project Cost	GSF	206,000	$698

Operating and Maintenance Costs (Agency)

Cost Type	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
GF Dollars	$0	$0	$1,040,502	$1,071,717	$1,103,868	$1,136,984

NGF Dollars	$0	$0	$213,115	$219,508	$226,093	$232,876
GF Positions	0.00	0.00	3.38	3.38	3.38	3.38
NGF Positions	0.00	0.00	0.69	0.69	0.69	0.69
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
07-CR-3 Randolph Hall Replacement.xls	625,664	Rob Mann	6/13/2015	CR-3_Replace Randolph Hall

Workflow History

User Name	Claimed	Submitted	Step Name
Rob Mann	05/18/2015 11:16 PM	05/18/2015 11:16 PM	Enter Capital Budget Request
Rob Mann	05/18/2015 11:16 PM	05/18/2015 11:18 PM	Continue Drafting
Rob Mann	05/18/2015 11:44 PM	05/18/2015 11:44 PM	Continue Drafting
Rob Mann	06/08/2015 05:38 PM	06/08/2015 05:38 PM	Continue Drafting
Jennifer Hundley	06/12/2015 05:10 PM	06/12/2015 05:43 PM	Continue Drafting
Rob Mann	06/13/2015 09:32 AM	06/13/2015 09:36 AM	Continue Drafting
Rob Mann	06/13/2015 12:55 PM	06/13/2015 01:00 PM	Agency Review Step 1
Rob Mann	06/13/2015 07:22 PM	06/13/2015 07:26 PM	Agency Review Step 1
Rob Mann	06/13/2015 08:31 PM	06/13/2015 08:31 PM	Ready for DPB Submission
Rob Mann	06/13/2015 08:34 PM	06/13/2015 08:34 PM	Ready for DPB Submission
Bob Broyden	06/14/2015 02:18 PM	06/14/2015 02:18 PM	Ready for DPB Submission
Ruth Anderson	06/15/2015 03:44 PM	06/15/2015 03:46 PM	DPB Review
Ruth Anderson	06/18/2015 10:59 AM	06/18/2015 10:59 AM	DPB Review
Anne Smith	06/19/2015 03:35 PM	06/19/2015 03:35 PM	DPB Review
Rob Mann	06/19/2015 03:39 PM	06/19/2015 03:40 PM	Agency Review Step 1
Bob Broyden	06/19/2015 03:51 PM	06/19/2015 03:51 PM	Ready for DPB Submission
			DPB Review