CapitalBudgetRequest

Construct Undergraduate Science Laboratory Building

Overview

Agency	Virginia Polytechnic Institute and State University (208)
Project Code	none
Project Type	New Construction
Biennium	2014-2016
Budget Round	Initial Bill
Request Origin	Previously Submitted
Building Name	
Project Location	Roanoke Area
Facility/Campus	Blacksburg Main Campus
Source of Request	Agency Request
Building Function	Higher Education Instructional Laboratory -- 100% E&G
Infrastructure Element	Laboratory
Contains significant technology costs? No	
Contains significant energy costs? No	

Agency Narrative

Agency Description

This project has been on the university's capital plan since 2007 to provide new instructional space serving undergraduate STEM-H instructional programs. This project requests authorization to construct a new facility of 77,000 gross square feet for undergraduate science laboratories, laboratory support services, and classroom space.

The building is envisioned to be a three-four story structure, clad in a combination of Hokie stone, precast concrete panels and trim, and a combination of curtain wall glazing and punched opening windows. The building is planned to be located in the Derring Lot adjacent to the new undergraduate Classroom building currently under design. The Derring Lot location will require building design features to permit building placement within the 100-year floodplain that includes the Derring Lot. The design features will include provision of a parking level and/or other non- occupied space at the ground floor level to meet building requirements within a floodplain. This will result in a four story structure.

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 and 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. As the largest university in the state in terms of full-time equivalency enrollment Virginia Tech relies on classroom technology to support effective and efficient instruction of large class sections. This requires automated audiovisual and classroom lighting controls, which also rely on wireless networks. 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.

Justification

Virginia Tech graduates more than twice the number of STEM-H majors than any other Virginia institution. The university last constructed an undergraduate laboratory facility in 2004 for instruction in chemistry and physics. At that time, the university had 22,428 majors. Of those majors, 8514 or 38 percent were majors in the College of Science or College of Engineering. In Academic Year 2012-13, the university enrolled 23,859 undergraduates with 10591 or 45 percent being majors in the College of Science or the College of Engineering. The increase in both the actual number of majors in STEM-H fields and the strategic actions of the university to address the Top Jobs 21 goals for more STEM-H degrees has created significant pressures on existing, specialized laboratory instructional facilities. The university is confronted with the need to construct new instructional laboratory facilities to support enrollment growth in biology, biochemistry, biological systems engineering, and human nutrition. These programs are currently housed in facilities inadequate to support modern instructional methods and equipment and insufficient to address growing enrollments in STEM-H programs.

This project is designed to meet the course and laboratory prerequisite instruction demands of students in science courses that are part of the growing emphasis in the life sciences.

This project supports several principal strategies of the university's strategic plan including:

• 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
• Emphasizing translational research and scholarship
• Building upon existing and emerging strengths
• Pursuing quality-of-life initiatives in support of the university as a vibrant, dynamic, and sustainable workplace
• Supporting a sustainable workplace
• Increase in undergraduate involvement in meaningful research experiences and experiential learning opportunities by adopting a "hands on, minds on" philosophy that promotes connecting real life experience with academic concepts.
• Develop ways to integrate computational science/informatics and digital fluency for managing and analyzing complex data sets across a wide range of disciplines.
• Identify opportunities during construction and renovation to create flexible classroom spaces that fully support e-learning components.

Existing Facilities:
The existing laboratory facilities currently being used to deliver instruction include Derring Hall, built in 1969, Engel Hall, built in 1961, and Wallace Hall, constructed in 1968. These buildings are reaching the age when a major retooling of their building systems is required.

The existing laboratory capacity in these buildings is not sufficient to meet the scheduling demands for courses. The building systems - mechanical, plumbing and, in many cases, electrical infrastructure - are inadequate to provide a safe, healthy laboratory environment in which to deliver instruction. Efforts to upgrade these facilities to accommodate the modern technology involved in teaching science courses are encountering major obstacles, including structural barriers and limitations, such as low floor-to-floor heights and bearing walls interfering with space reconfigurations and wireless transmission.

The new building will provide new instructional space serving undergraduate science programs, undergraduate science laboratories, laboratory support services, and flexible classroom space.

A new laboratory building will provide sufficient instructional space to allow the university to begin renovations and upgrades in these buildings to return them to their highest potential use. Future renovation projects for these facilities are envisioned in the University's Six-Year capital Outlay Plan.

Funding Plan:
The program of this project is entirely Educational and General instructional programs; thus, the funding plan calls for 100 percent General Fund support.

Alternatives Considered

Options considered but not pursued include major renovations to Derring Hall, Engle Hall, and Wallace Hall. This effort was not pursued because efforts to upgrade these facilities to accommodate the modern technology involved in teaching STEM-H courses are encountering major obstacles, including structural barriers and limitations, such as low floor-to-floor heights and bearing walls interfering with space reconfigurations. In each of the three buildings, the building systems - mechanical, plumbing and, in many cases, electrical infrastructure - are inadequate to provide a safe, healthy laboratory environment in which to deliver instruction. The conclusion reached is that even with major renovations, the buildings will not provide a physical envelope to support state-of-the-art STEM-H instruction. The only practical option is to construct a new science laboratory facility and renovate and reprogram Derring Hall, Engle Hall, and Wallace Hall for less intensive non-laboratory uses.

Costing Methodology

The program description justifies classification of this project as a medium-range research lab. Our 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. Ceiling heights must be a minimum of 16 feet for sound attenuation in large lecture and assembly environments as required for effective pedagogy. Design priorities will include flexibility in classrooms and interior spaces to maximize the long-term programmatic functionality of the building. Building location and site design will focus on maintaining and creating that sense of place that is unique to Virginia Tech.

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Site development costs are anticipated to address floodplain and storm water management mitigation measures, and deep foundations required in this region. This project will also require replacement of parking spaces at the planned site. Construction Manager at Risk is the intended delivery method for 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.

Agency Funding Request

Phase	Year	Fund	Subobject	Requested Amount
Construction	2015	0100 - General Fund	2322 - Construction, Buildings	$66,000,000
			Total	$66,000,000

Project Costs

Cost Type	Total Project Costs	Requested Funding	DGS Rec
Acquisition Cost	$0	$0	$0
Building & Built-in Equipment	$39,023,000	$39,023,000	$0
Sitework & Utility Construction	$5,945,000	$5,945,000	$0
Construction Cost Total	$44,968,000	$44,968,000	$0
Design & related Services from Other Costs tab	$5,513,000	$5,513,000	$0
Inspection & Testing Services from Other Costs tab	$1,467,000	$1,467,000	$0
Project Management & Other Costs from Other Costs tab	$4,751,000	$4,751,000	$0
Furnishings & Movable Equipment	$7,502,000	$7,502,000	$0
Construction Contingency	$1,799,000	$1,799,000	$0
Total Project Cost	$66,000,000	$66,000,000	$0

Capacity

Cost Type	Unit of Measure	Units	Cost Per Unit
Acquisition Cost		0	$0
Construction Cost	square feet	77,000	$584
Total Project Cost	square feet	77,000	$857

Other Costs

Cost Type	Total Project Costs	RequestedFunding	DGS Rec
Design & Related Service Items			
A/E Basic Services	$4,535,000	$4,535,000	

A/E Reimbursables	$0	$0	
Specialty Consultants (Food Service, Acoustics, etc.)	$0	$0	
CM Design Phase Services	$562,000	$562,000	
Subsurface Investigations (Geotech, Soil Borings)	$105,000	$105,000	
Land Survey	$0	$0	
Archeological Survey	$0	$0	
Hazmat Survey & Design	$0	$0	
Value Engineering Services	$0	$0	
Cost Estimating Services	$36,000	$36,000	
Other Design & Related Services	$275,000	$275,000	
Design & Related Services Total	$5,513,000	$5,513,000	
Inspection & Testing Service Items			
Project Inspection Services (inhouse or consultant)	$1,180,000	$1,180,000	
Project Testing Services (conc., steel, roofing, etc.)	$287,000	$287,000	
Inspection & Testing Services Total	$1,467,000	$1,467,000	
Project Management & Other Cost Items			
Project Management (inhouse or consultant)	$884,000	$884,000	
Work By Owner	$67,000	$67,000	
BCOM Services	$0	$0	
Advertisements	$0	$0	
Printing & Reproduction	$0	$0	
Moving & Relocation Expenses	$66,000	$66,000	
Data & Voice Communications	$588,000	$588,000	
Signage	$26,000	$26,000	
Demolition	$0	$0	
Hazardous Material Abatement	$0	$0	
Utility Connection Fees	$390,000	$390,000	
Utility Relocations	$825,000	$825,000	
Commissioning	$390,000	$390,000	
Miscellaneous Other Costs	$1,515,000	$1,515,000	
Project Management & Other Costs Total	$4,751,000	$4,751,000	

Operating and Maintenance Costs (Agency)

Cost Type	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
GF Dollars	$0	$871,993	$898,153	$925,098	$952,851	$981,436
NGF Dollars	$0	$0	$0	$0	$0	$0
GF Positions	0.00	6.07	6.07	6.07	6.07	6.07
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

No supporting documents for this adjustment

Workflow History

Step Name	User Name	Claimed	Submitted
Enter Capital Budget Request	Rob Mann	05/22/2013 02:39 PM	05/22/2013 02:39 PM

Continue Drafting	Rob Mann	05/22/2013 02:39 PM	05/22/2013 02:51 PM
Continue Drafting	Rob Mann	05/22/2013 04:02 PM	05/22/2013 04:50 PM
Continue Drafting	Rob Mann	05/24/2013 08:32 AM	05/24/2013 08:33 AM
Continue Drafting	Rob Mann	05/25/2013 07:50 AM	05/31/2013 11:31 AM
Continue Drafting	Rob Mann	05/31/2013 11:44 AM	05/31/2013 11:44 AM
Continue Drafting	Rob Mann	05/31/2013 12:01 PM	05/31/2013 12:02 PM
Continue Drafting	Rob Mann	06/20/2013 10:07 AM	06/20/2013 10:09 AM
Continue Drafting	Rob Mann	06/20/2013 11:15 AM	06/20/2013 11:15 AM
Continue Drafting	Rob Mann	06/20/2013 11:46 AM	06/20/2013 11:47 AM
Continue Drafting	Rob Mann	06/20/2013 01:08 PM	06/20/2013 01:09 PM
Continue Drafting	Jennifer Hundley	06/21/2013 09:54 AM	06/21/2013 10:00 AM
Continue Drafting	Jennifer Hundley	06/21/2013 10:06 AM	06/21/2013 10:08 AM
Agency Review Step 1	Bob Broyden	06/21/2013 01:58 PM	06/21/2013 02:01 PM
Ready for DPB Submission	Bob Broyden	06/21/2013 02:12 PM	06/21/2013 02:13 PM
Ready for DPB Submission	Rob Mann	06/21/2013 05:40 PM	06/21/2013 05:40 PM
DPB Review	Anne Smith	06/26/2013 10:46 AM	06/26/2013 10:47 AM
DPB Review	Anne Smith	06/26/2013 11:30 AM	06/26/2013 11:32 AM
DPB Review	Anne Smith	06/26/2013 11:37 AM	06/26/2013 11:44 AM
DPB Review			