CapitalBudgetRequest

Construct Nanoscience and Geoscience Laboratory

Overview

Agency	Virginia Polytechnic Institute and State University (208)
Project Code	none
Project Type	New Construction
Biennium	2014-2016
Budget Round	Amended 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 and Classroom -- 100% E&G
Infrastructure Element	Classroom / Laboratory
Contains significant technology costs? No	
Contains significant energy costs? No	

Agency Narrative

Agency Description

This request is for an 80,000 gross square foot science laboratory building. The building program includes dense high performance wet laboratory spaces, nanoscale imaging laboratories, and nonascale characterization laboratories that require vibration control. The building is envisioned as a four story structure. The facility location is the Blacksburg campus on the west section known as the life sciences precinct.

Justification

Program description:
This project was originally authorized under the title “Construct Sciences Building Laboratory I" with funds appropriated in Chapter 1 (2008) Section 2.4. While the university was ready to start the project immediately, the initiative was put on hold in the spring of 2009 when its $12 million lead donor was not able to fulfill their pledge. Because the project funding plan depended on realizing the full lead gift, the university deferred the project and worked with the state to advance another high priority project. Accordingly, the funding for this project was shifted to support the other project.

The university’s intention was to revive this project when nongeneral funds became sufficient. The university is now in a position to advance the project with a total budget of $66.5 million including $53.2 million of General Fund and $13.3 million of nongeneral fund the university has committed over time. Thus, the university is now resubmitting the project to request its share of General Fund support.

This building will support instruction and research in the area of geosciences and the rapidly emerging area of nanoscale science and technology – the study and manipulation of materials at the 1 billionth of a meter scale. The building program includes approximately 8,000 square feet of instructional laboratories, 14,000 square feet of geoscience research laboratories, 5,000 square feet of nanoscale imaging and analysis space, and 7,500 square feet of specialized wet labs with hoods. The facility will also include faculty and staff offices (12,000 square feet) and 3,000 square feet interactive museum area to be used for both educational and outreach purposes. Another 2,500 square feet will be dedicated to building support functions. With an assumed 65 percent building efficiency this program approximates an 80,000 square foot facility.

The nanoscale imaging and analysis function of the building will require extraordinary design and construction methods to provide power, HVAC, stability and isolation for the specialized equipment to be used. These are anticipated to include scanning electron microscopes (SEM), transmission electron microscopes (TEM), microprobes, x-ray diffraction, mass spectrometers and other equipment. Purchasing and upfitting these specialized pieces of equipment into the building will also require a larger than average equipment component for this capital project.

The university’s strategic plan includes the following principle strategies that will be supported by this project:
• Ensuring competency in data analysis and computational methods as a component of general education for all students.
• Developing an appropriate infrastructure for high performance computing.
• Building upon existing and emerging strengths.
• 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.
• Identifying opportunities during construction and renovation to create flexible classroom spaces that fully support e-learning components.

Existing facilities:
The University is confronted with an aging inventory of science laboratory space, much of it built in the 1970's and before, that is inadequate even with significant renovation to support the new protocols and instrumentation the latest micro- and nano-scale investigations require. This new building is needed to provide the sophisticated, state-of-the-art classroom and research laboratory space that is required by the technologies used in expanding research science fields, such as those for geosciences.

These science programs currently use Derring Hall, a 37 year-old building never specifically designed for these activities. The building lacks critical infrastructure needed for state-of-the-art analytic instrumentation and laboratory environments. Further, the laboratories in Derring Hall are very difficult and unreasonably expensive to bring up to modern construction, utility, and safety standards so that instruments may be properly housed.

Because most of the university's inventory of nanoscale characterization assets are located off-campus, the opportunity for undergraduate students to interact with the faculty and researchers and their use of this kind of equipment is limited.

Examples of space that is lacking include clean rooms for mass spectrometry, vibration-free stable rooms for high resolution microscopy, and shielded rooms for high pressure and temperature experiments. Precise room temperature control, required by many types of analytic devices, is difficult, and in certain cases impossible, thus jeopardizing millions of dollars of equipment.

Funding Plan:
The program of this project is for instruction and research programs; thus, the funding plan for the $66.5 million project calls for $53.2 million of General Fund support for 100 percent of the instruction costs and 50 percent for the research costs and $13.3 million of nongeneral fund support for 50 percent of the research costs. The overall cost split is based upon 60 percent of the space being allocated to instruction and 40 percent being allocated to research.

Alternatives Considered

The options considered include deferring the project, leasing space, and retrofitting an existing building.
(1) The project has been a high priority for the academic program for several years. The project has been deferred since 2009 because private gifts did not materialize as expected and the university is now in position to fully fund the nongeneral fund component. Because the project supports growth of key STEM disciplines and is critical to advancing the science program, further deferring the entire project is not supported;
(2) Leasing space is not a viable option because the local inventory does not include suitable facilities that meet the performance specifications of a science laboratory; and
(3) Retrofitting an existing building is not a viable option because the university is operating with a deficit of science laboratory space and non-laboratory space does not accommodate the mechanical systems required the proposed laboratories.

Thus, the university is requesting to move forward with the proposed project for 80,000 GSF of science research and instruction space with a total budget of $66.5 million.

Costing Methodology

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.

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 is necessary for energy efficiency lighting for academic work. 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.

The University's role as the leading producer of technology intensive degrees relies upon a system of classrooms and instructional laboratories and research spaces that support technology driven work 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 and faculty to retrieve information and to communicate and to connect digitally with sites around campus and around the world. The use of electronic equipment by students and faculty requires dedicated power outlets corresponding to the seat/station count and power outlets in common areas. This requires automated audiovisual and classroom lighting controls, which also rely on wireless networks. 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.

Site development costs in this region are historically in the medium to high range and require deep foundations. This project may also require relocation of parking spaces at the planned site. 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	2016	0100 - General Fund	2322 - Construction, Buildings	$53,224,000
Construction	2016	0815 - 9(D) Debt Service - Construction Costs	2322 - Construction, Buildings	$13,306,000
			Total	$66,530,000

Project Costs

Cost Type	Total Project Costs	Requested Funding	DGS Rec
Acquisition Cost	$0	$0	$0
Building & Built-in Equipment	$42,140,033	$42,140,033	$0
Sitework & Utility Construction	$4,214,003	$4,214,003	$0
Construction Cost Total	$46,354,036	$46,354,036	$0
Design & related Services from Other Costs tab	$7,368,282	$7,368,282	$0
Inspection & Testing Services from Other Costs tab	$1,503,975	$1,503,975	$0
Project Management & Other Costs from Other Costs tab	$4,582,431	$4,582,431	$0
Furnishings & Movable Equipment	$4,867,174	$4,867,174	$0
Construction Contingency	$1,854,102	$1,854,102	$0
Total Project Cost	$66,530,000	$66,530,000	$0

Capacity

Cost Type	Unit of Measure	Units	Cost Per Unit
Acquisition Cost		0	$0
Construction Cost	GSF	80,000	$579
Total Project Cost	GSF	80,000	$832

Other Costs

Cost Type	Total Project Costs	RequestedFunding	DGS Rec
Design & Related Service Items			
A/E Basic Services	$5,881,535	$5,881,535	
A/E Reimbursables	$115,025	$115,025	
Specialty Consultants (Food Service, Acoustics, etc.)	$283,200	$283,200	
CM Design Phase Services	$463,540	$463,540	
Subsurface Investigations (Geotech, Soil Borings)	$100,588	$100,588	
Land Survey	$21,701	$21,701	
Archeological Survey	$0	$0	
Hazmat Survey & Design	$0	$0	
Value Engineering Services	$0	$0	
Cost Estimating Services	$37,547	$37,547	
Other Design & Related Services	$465,146	$465,146	

Design & Related Services Total	$7,368,282	$7,368,282	
Inspection & Testing Service Items			
Project Inspection Services (inhouse or consultant)	$1,196,775	$1,196,775	
Project Testing Services (conc., steel, roofing, etc.)	$307,200	$307,200	
Inspection & Testing Services Total	$1,503,975	$1,503,975	
Project Management & Other Cost Items			
Project Management (inhouse or consultant)	$877,634	$877,634	
Work By Owner	$69,531	$69,531	
BCOM Services	$0	$0	
Advertisements	$0	$0	
Printing & Reproduction	$0	$0	
Moving & Relocation Expenses	$71,200	$71,200	
Data & Voice Communications	$628,000	$628,000	
Signage	$28,000	$28,000	
Demolition	$0	$0	
Hazardous Material Abatement	$0	$0	
Utility Connection Fees	$0	$0	
Utility Relocations	$1,022,582	$1,022,582	
Commissioning	$632,101	$632,101	
Miscellaneous Other Costs	$1,253,383	$1,253,383	
Project Management & Other Costs Total	$4,582,431	$4,582,431	

Operating and Maintenance Costs (Agency)

Cost Type	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
GF Dollars	$0	$0	$905,967	$933,146	$961,141	$989,975
NGF Dollars	$0	$0	$0	$0	$0	$0
GF Positions	0.00	0.00	6.31	6.31	6.31	6.31
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
CR-3 Nanoscience and Geoscience Laboratory.xls	625,664	Rob Mann	6/27/2014	CR-3 Nanoscience and Geoscience Laboratory

Workflow History

User Name	Claimed	Submitted	Step Name
Rob Mann	06/26/2014 12:29 PM	06/26/2014 12:29 PM	Enter Capital Budget Request
Rob Mann	06/26/2014 12:29 PM	06/26/2014 12:35 PM	Continue Drafting
Rob Mann	06/27/2014 05:48 PM	06/27/2014 06:03 PM	Continue Drafting
Rob Mann	06/27/2014 06:14 PM	06/27/2014 06:14 PM	Agency Review Step 1
Rob Mann	06/30/2014 10:53 AM	06/30/2014 10:58 AM	Ready for DPB Submission
Bob Broyden	06/30/2014 02:33 PM	06/30/2014 02:43 PM	Ready for DPB Submission
Bob Broyden	06/30/2014 03:15 PM	06/30/2014 03:15 PM	Ready for DPB Submission
Bob Broyden	06/30/2014 03:55 PM	06/30/2014 03:55 PM	Ready for DPB Submission

			DPB Review