

## Capital Budget Request

### Construct Global System Sciences Complex

#### Overview

Agency	Virginia Cooperative Extension and Agricultural Experiment Station (229)
Project Code	none
Project Type	New Construction
Biennium	2018-2020
Budget Round	Initial Bill
Request Origin	New Project
Project Location	Roanoke Area
Facility/Campus	Other
Source of Request	Agency Request
Infrastructure Element	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:

The University has developed an exciting research and extension program focused on solving complex problems across the nexus of natural and human systems associated with food and water supply. The program is known as the Global Systems Sciences initiative and brings together science disciplines for land, air, food, water, and animal production with advanced technology modeling and computing resources.

The major programs involved include key faculty appointments in the College of Science, College of Natural Resources, College of Agriculture and Life Sciences, and the College of Veterinary Medicine.

At present, the University has three key facilities to support the Global Systems Sciences initiative and include the Human and Biosciences Building constructed in 2013, the Veterinary Medicine Infectious Disease Laboratory constructed in 2011, and Latham Hall constructed in 2006.

The University requires an approximately 135,000 gross square foot laboratory building to complete the facilities for a fully operational Global Systems Sciences program. The proposed location for the new building is adjacent to the existing three buildings which would form a complex of facilities and reduce redundant spaces and expensive laboratory instrumentation.

This project request is for authorization and funding to complete the proposed 135,000 gross square foot building for a total project budget of \$94.4 million.

**Project description:**

This project request is for a 135,000 gross square foot laboratory facility that would streamline integrative approaches to solving complex problems associated with food and water supply.

The proposed building would include the following essential components and features:

- Advanced research computing that would allow for data immersion with 3-Dimension capable viewing.
- Five large wet laboratories with exhaust hoods for chemical handling.
- Five large dry laboratories for the investigation of pollen, sediments, soils, cores, tree samples, or plants and animal samples.
- Six public training and education rooms with audiovisual equipment, instructional technology, and lighting controls.
- Five large project and teamwork rooms.

- 55 faculty offices and 30 research assistant workspaces.

- Specialized laboratory support spaces including cold storage equipment, frozen storage equipment, and walk-in environmental chambers.

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:

The Global Systems Sciences program is an integrated approach to solving complex challenges associated with food and water supply. The program includes disciplinary and interdisciplinary faculty of the College of Science, College of Natural Resources, College of Agriculture and Life Sciences, the College of Veterinary Medicine working in an interconnected environment forging science research, applied extension, and translational research.

The overriding framework of the Global Systems Sciences program embraces complexity, crosses disciplinary boundaries, and encourages nimble and innovative approaches to complex problems. Research conducted under the Global Systems Sciences program would extend our expertise in microbial genomics, genome-assisted plant breeding, and global and local food security.

Through the Global Systems Sciences program, Virginia Tech is positioned with significant expertise and visibility, both nationally and internationally, in four overarching areas of food and water supply as described below.

- Bio-geophysical Sciences: Combining knowledge from microbial communities along the food chain from across continental, oceanic, and atmospheric environments. This component is governed by the basic principles of physics, chemistry, geoscience, and biology.
- Translational medicine research: Close proximity between biomedical research laboratories and clinical service facilities greatly benefit the development of technologies for the diagnosis and treatment of animal and human diseases.
- Technology and Tools: Advanced modeling capabilities, high performance computing, and advanced computing resources, including sensors, may be used to develop state-of-the-art predictive/forecasting models for global government.
- School of Plant and Environmental Sciences: Creates multi-disciplinary interactions in the plant and allied sciences, capitalizing on research themes such as microbial genomics, genome-assisted plant breeding, as well as global and local food security.

The University strategic plan, A Plan for a New Horizon, includes the following principal strategies that will be supported by this project:

- Increasing the number of our programs recognized as among the best internationally.
- Establishing a distinctive and globally recognized profile.
- Emphasizing translational research and scholarship.
- Building upon existing and emerging strengths.
- 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.
- Creating meaningful partnerships with businesses and government entities to address complex problems by co-locating researchers and practitioners in "living laboratories."
- 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.

##### Existing facilities:

Virginia Tech does not have sufficient modern laboratory space to meet the demands of the rapidly evolving areas of microbial genomics, genome-assisted plant breeding, and global and local food security

Price Hall currently houses the departments of Entomology and Plant Pathology, Physiology, & Weed Science. It was built in 1907 and has a facility condition index of 41 percent in the FICAS system as of June 9, 2017. The building's condition has progressed beyond the scope of normal operations and maintenance reserve repairs and modern scientific equipment is exceeding the capabilities of the existing mechanical, electrical, plumbing, and environmental control systems.

Latham Hall which houses the departments of Crop & Soil Environmental Science, Horticulture, and Plant Pathology, Physiology, & Weed Science, as well as ten other departments, was built in 2006. Fralin Biotechnology Center houses the department of Plant Pathology, Physiology, & Weed Science as well as seven other department was built in 1995. These two buildings are at their maximum capacity and additional labs cannot be added.

## Funding Plan:

The scope of this project is for Educational and General programs of the Cooperative Extension/Agricultural Experiment Station; thus, the funding plan calls for 100 percent General Fund support for this \$94.4 million project.

## Options considered:

Options considered but not pursued include leasing the space at an off-campus location or delaying the project. Leasing space off-campus is not feasible because the local inventory of facilities do not include the laboratory or technology required for the program operations. Delaying the project would prevent the program from growing and conducting additional research.

## Alternatives Considered

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## Costing Methodology

### A. Methods Used to Estimate Costs:

The method for estimating costs for the Global Systems Sciences 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 \$699 per gross square foot. The unit construction costs of the project are \$509 per gross square foot, including self-performed construction work. The building types in this request reflect a combination of science wet laboratory, dry laboratory, and research laboratory 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 subsurface rock excavation and removal and deep foundations. Site costs may also require the relocation of parking spaces at the planned location.

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.

### Agency Funding Request

Phase	Year	Fund	Subject	Requested Amount
Full Funding	2019	01000 - General Fund	2322 - Construction, Buildings	\$94,400,000
Total				\$94,400,000

### Project Costs

Cost Type	Total Project Costs	Requested Funding	DGS Rec
Acquisition Cost	\$0	\$0	
Building & Built-in Equipment	\$68,688,000	\$68,688,000	
Sitework & Utility Construction	\$0	\$0	
<b>Construction Cost Total</b>	<b>\$68,688,000</b>	<b>\$68,688,000</b>	
<b>DESIGN &amp; RELATED SERVICE ITEMS</b>			
A/E Basic Services	\$9,837,356	\$9,837,356	
A/E Reimbursables	\$0	\$0	
Specialty Consultants (Food Service, Acoustics, etc.)	\$13,438	\$13,438	
CM Design Phase Services	\$708,022	\$708,022	
Subsurface Investigations (Geotech, Soil Borings)	\$103,926	\$103,926	
Land Survey	\$0	\$0	
Archeological Survey	\$0	\$0	
Hazmat Survey & Design	\$0	\$0	
Value Engineering Services	\$0	\$0	
Cost Estimating Services	\$15,105	\$15,105	
Other Design & Related Services			
<b>Design &amp; Related Services Total</b>	<b>\$10,677,847</b>	<b>\$10,677,847</b>	
<b>INSPECTION &amp; TESTING SERVICE ITEMS</b>			
Project Inspection Services (inhouse or consultant)	\$498,209	\$498,209	
Project Testing Services (conc., steel, roofing, etc.)	\$505,789	\$505,789	
<b>Inspection &amp; Testing Services Total</b>	<b>\$1,003,998</b>	<b>\$1,003,998</b>	
<b>PROJECT MANAGEMENT &amp; OTHER COST ITEMS</b>			
Project Management (inhouse or consultant)	\$720,175	\$720,175	
Work By Owner	\$89,311	\$89,311	
BCOM Services	\$35,089	\$35,089	
Advertisements	\$400	\$400	
Printing & Reproduction	\$4,594	\$4,594	
Moving & Relocation Expenses	\$84,734	\$84,734	
A/V Cabling	\$0	\$0	
IT Cabling	\$0	\$0	
Telephone Cabling	\$0	\$0	
A/V Equipment	\$0	\$0	
IT Equipment	\$827,290	\$827,290	
Telephone Equipment	\$0	\$0	
Signage	\$63,205	\$63,205	
Demolition	\$0	\$0	

Hazardous Material Abatement	\$0	\$0
Utility Connection Fees	\$0	\$0
Utility Relocations	\$2,383,193	\$2,383,193
Commissioning	\$805,634	\$805,634
Miscellaneous Other Costs	\$952,105	\$952,105
<b>Project Management &amp; Other Costs Total</b>	<b>\$5,965,730</b>	<b>\$5,965,730</b>
Furnishings & Movable Equipment	\$5,400,000	\$5,400,000
Construction Contingency	\$2,664,425	\$2,664,425
<b>TOTAL PROJECT COST</b>	<b>\$94,400,000</b>	<b>\$94,400,000</b>

**Capacity**

Cost Type	Unit of Measure	Units	Cost Per Unit
Acquisition Cost		0	\$0
Construction Cost	GSF	135,000	\$509
Total Project Cost	GSF	135,000	\$699

**Operating and Maintenance Costs (Agency)**

Cost Type	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
GF Dollars	\$0	\$0	\$0	\$1,795,056	\$1,848,907	\$1,904,375
NGF Dollars	\$0	\$0	\$0	\$0	\$0	\$0
GF Positions	0.00	0.00	0.00	10.65	10.65	10.65
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-229-1 GSS.xlsx</a>	419,940	Rob Mann	7/7/2017	CR-3 Form_Global Systems Sciences
<a href="#">229_01_Global Systems Sciences Program Chart.pdf</a>	70,731	Rob Mann	7/7/2017	Global Systems Sciences Program Chart

**Workflow History**

User Name	Claimed	Submitted	Step Name	Submit Action
Jennifer Hundley	06/06/2017 11:06 AM	06/06/2017 11:06 AM	Enter Capital Budget Request	Continue Working
Jennifer Hundley	06/06/2017 11:06 AM	06/06/2017 11:07 AM	Continue Drafting	Continue Working
Jennifer Hundley	06/09/2017 04:05 PM	06/09/2017 04:06 PM	Continue Drafting	Continue Working
Rob Mann	07/07/2017 12:25 PM	07/07/2017 01:40 PM	Continue Drafting	Submit for Agency Review
Rob Mann	07/07/2017 01:40 PM	07/07/2017 01:40 PM	Agency Review Step 1	Ready for DPB Bulk Submit
Bob Broyden	07/07/2017 03:10 PM	07/07/2017 03:10 PM	Ready for DPB Submission	Continue Review
Bob Broyden	07/07/2017 03:59 PM	07/07/2017 03:59 PM	Ready for DPB Submission	Continue Review
Bob Broyden	07/07/2017 04:03 PM	07/07/2017 04:04 PM	Ready for DPB Submission	Continue Review
Bob Broyden	07/07/2017 04:06 PM	07/07/2017 04:07 PM	Ready for DPB Submission	Continue Review
Bob Broyden	07/07/2017 04:13 PM	07/07/2017 04:14 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	