CapitalBudgetRequest

Construct Data and Decision Sciences Building

Overview	
Agency	Virginia Polytechnic Institute and State University (208)
Project Code	none
Project Type	New Construction
Biennium	2018-2020
Budget Round	Amended 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 has implemented a cutting-edge academic program to meet the demands of commercial and government organizations seeking employees with strong skills and training in data analytics and related quantitative methods. In response to the call from technology-based industries and cyber security work in Virginia for specific talent needs, the University brought together key academic programs in engineering, computer science, statistics, mathematics, business, and international affairs to create a focused program area known as Data and Decision Sciences (DADS).

The goal of DADS is to advance the capability sought by commercial and government to translate an exponentially growing and unorganized sea of data into actionable intelligence and decisions. The University's program develops students thoroughly versed in data analytics and decision sciences and prepared to enter the work force with these skills and engage private industry. To advance this initiative, the University is expanding its faculty lines and is organizing faculty in new and unique ways that create powerful partnerships not available in traditional college and departmental arrangements. This capital project request is in accordance with the governor's stated priorities of economic development, workforce development and public education.

To implement the vision for the DADS program, the University requires new space to house the additional faculty and to teach the growing number of students seeking training in data and decision sciences. The University has developed a multi-part facility solution to support the space needs for the Data and Decision Sciences program. The solution is called the Global, Business, and Data Analytics Complex. The solution includes the four components listed below and reflects a unique partnership of the Commonwealth of Virginia, private donors, auxiliary enterprises, and self-generated revenue to fund the facilities.

1) Data and Decision Sciences Building (this request):
- 120,000 gross square feet undergraduate instruction classrooms, laboratories, and faculty offices
- $79 million of General Fund support

2) New College of Business Building:
- 104,000 gross square feet of undergraduate and graduate instruction classrooms and laboratories, and faculty offices,
- Entirely nongeneral fund support to be authorized by the University's Board of Visitors under restructuring authority,
- $75 million of private support,

3) Two residential buildings with living-learning communities focused on decision sciences, business, and international affairs:
- 700 new residential beds
- Entirely nongeneral fund support to be authorized by the University's Board of Visitors under restructuring authority,

- $84 million of auxiliary enterprise revenues,

4) International Affairs Facility:
- 30,000 gross square feet of conference and seminar rooms, student team space, instruction spaces, and offices
- Entirely nongeneral fund support to be authorized by the University's Board of Visitors under restructuring authority,
- $13 million of nongeneral fund self-generated revenue,

The facilities will be designed as a system with the intent to be implemented in phases as funding becomes available. The buildings will be located proximal to each other creating a data analytics and decision sciences precinct and adjacent to existing buildings of the College of Engineering and the College of Science.

Project Description:

This request and project description is for the Data and Decision Sciences Building component of the multi-part facility complex. The building would be located in the north academic region of campus and would contain 120,000 gross square feet to provide extensive instructional spaces and student project spaces bringing together students and faculty from engineering, computer science, statistics, and other programs that are increasing reliance and emphasis on data sciences, decision sciences, and data analytics.

The building will include 32 large classrooms, eight large data processing class laboratories, 19 student–team project spaces and conference spaces, and 106 shared faculty office spaces. The entire program breakdown is shown on the attached "Program Chart."

The DADS building will be connected to the University's intense computing power to handle vast amounts of data, state-of-the-art data visualization space, flexible classrooms spaces supporting multiple modes of instructional delivery, and support spaces where teams of students and faculty can explore and develop solutions for the unending stream of data-heavy problems. The spaces will include features for training students in the art of communicating with data and improving the judgment and decision making of individuals, groups, and organizations. It will also incorporate an emphasis on translating data-based information into actual problem resolution.

The envisioned building is three to four stories tall, clad in a combination of Hokie Stone, precast concrete panels and trim, and a combination of curtain wall glazing and punched opening windows.

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 Data and Decision Sciences (DADS) initiative is a specific response to the growing market demand, in virtually all areas of employment, for graduates with strong training in data analytic and related quantitative methods. Data-specific job categories include Data Scientist, Data Engineer, Analytics Manager, Database Administrator, Statistician, Information Security Analyst, Mathematician, Software Engineer, and Computer Systems Analyst. While job categories like Data Scientist are too new to be included in the current Bureau of Labor Statistics demand projections, the occupational group that holds data-type jobs is projected to grow between 11 and 34 percent by 2024.

The Data and Decision Sciences program will prepare students to use data science methods and techniques to conduct descriptive and predictive analyses in a variety of disciplines and across disciplinary boundaries, and to meet the employment demand for data analytic training.

Based on calls of demand from commercial and government organizations for graduates with data analytics training, the University has grouped six initial sub-themes in the Data and Decision Sciences initiative:

- Electronic commerce: commercial transactions involving the transfer of data and information over the internet.

- Cyber security analytics: application of modern statistical, algorithmic, and computer science methods to defense and national security data and problems.

- Financial and business analytics: financial analysis, econometrics, statistics, and large-scale computation to generate predictive information about financial policies and programs.

- Healthcare analytics: analytics of population health, precision medicine, and health decision-making.

- Infrastructure analytics: data as it relates to and revolutionizes the way we interact with the natural and built environment.

- Social and political analytics: data-driven, evidence-based, research to inform policy decision-making and improve health, well-being, and quality of life.

More generally, quantitative expertise, especially as emphasized in the data and decision sciences curricula, lies at the heart of STEM-related employment. Highlights from the recent Department of Commerce report on STEM employment include:

• There were 9.0 million STEM workers in the United States in 2015. About 6.1 percent of all workers are in STEM occupations, up from 5.5 percent just five years earlier.

• Employment in STEM occupations grew much faster than employment in non-STEM occupations over the last decade (24.4 percent versus 4.0 percent, respectively), and they are projected to grow by 8.9 percent from 2014 to 2024, compared to 6.4 percent growth for non-STEM occupations.

• STEM workers command higher wages, earning 29 percent more than their non-STEM counterparts in 2015.

• Nearly three-quarters of STEM workers have at least a college degree, compared to just over one-third of non-STEM workers.

• A STEM degree holder can expect an earnings premium of 12 percent over non-STEM degree holders, holding all other factors constant.

In 2014, Virginia Tech launched a new, Data and Decision Sciences (DADS)-centered degree program in Computational Modeling and Data Analytics. This rapidly growing program, with primary support from the Departments of Statistics, Computer Science, Mathematics, and Economics has grown to 431 majors in four years. To ensure the benefits of data analytic skills are available to all students, regardless of major or discipline, the University is developing a foundational course sequence that will provide basic data competency to every student at Virginia Tech.

Further, a flexible Data and Decisions-based minor that can be pursued by students in virtually every major is in development. As these programs grow, they will be built upon to provide professional certifications and degrees targeted to the National Capitol Region, with distance delivery based in the new DADS building. Virginia Tech is producing data-savvy graduates that will be in increasing demand across the employment spectrum.

The Data and Decision Sciences building is one piece of the University's plan to construct a complex of buildings, known as the Global, Business, and Analytics Complex, that will include the new home of the Pamplin College of Business, two 350-bed living-learning residential communities, and an International Affairs building as a center for global study.

The residential component also includes space to support the Data and Decision Sciences initiative, with its emphasis on international affairs, and the Pamplin College of Business. These living-learning communities will play a significant role in enhancing the educational experience for students in the DADS Destination initiative. The University has developed nongeneral fund financing plans in its auxiliary enterprise system to support the residential facilities component of this vision.

The Pamplin College program would be housed in a 104,000 gross square foot building and include the Department of Marketing, Department of Management, Department of Hospitality and Tourism Management, Department of Finance, Department of Business Information Technology, and Department of Accounting and Information Systems. The University is raising private support for this building, and the project will be entirely nongeneral fund supported.

The International Affairs Building would contain 30,000 gross square feet of conference and seminar rooms, student team space, instruction spaces, and offices. The University will use self-generated nongeneral fund revenues from International Affairs operations activities to fund the building; thus, the project will be entirely nongeneral fund supported.

Taken together, the Global, Business, and Analytics Complex represents a unique opportunity to create synergy through co-location of programs that are an essential part of the modern economic system. This symbiosis will result in new ideas and their eventual implementation in the marketplace. The DADS facility will provide training in real world data mining and report generation, tools that will allow students to become adept in providing the information required for informed decision making. This facility is unlike any currently existing on the Virginia Tech Campus and will pave the way for the creation of a new generation of global entrepreneurs.

The University's strategic plan includes the following principle strategies that this important project will help to achieve:
• Ensuring competency in data analysis and computational methods as a component of general education for all students.
• Increasing the number of our programs recognized as among the best internationally
• 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 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 labs."
• 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.
• Developing and implementing alternate pathways for the general education of all students.
• Continuing to investigate, develop, and utilize current and emerging technologies to enhance traditional classrooms, provide mobile access, and expand high-quality distance-learning opportunities.
• Identifying opportunities during construction and renovation to create flexible classroom spaces that fully support e-learning components.
• Pursuing quality-of-life initiatives in support of the University as a vibrant, dynamic, and sustainable workplace

Existing Facilities:

The College of Business occupies the 104,940 gross square foot Pamplin Hall with additional space in Wallace Hall plus rented space in the North End Center. The new College of Business building would consolidate Hospitality and Tourism Management and the off-campus faculty offices. Pamplin Hall was originally constructed in 1957 with an addition in 1987 and no major renovations since 1987. The facility condition index of the Pamplin Hall is 31 percent in the FICAS system as of June 9, 2017.

In the College of Science, the Departments of Economics, of Mathematics, and of Statistics each have reached their physical limits in their respective buildings (Pamplin Hall, McBryde Hall, and Hutcheson Hall). In particular, the presence of the Statistics Department in Hutcheson Hall, a College of Agriculture building, severely restricts that college's ability to grow. With an urgent need to expand in the data and decision sciences, and with no room to grow in their current locations,

Virginia Tech seeks new space with the DADS building to relocate the Statistics Department, and to accommodate targeted growth of all three departments. Existing activities for Economics and Mathematics will otherwise remain in their current locations.

Funding Plan:

This capital project request is for authorization and funding for the Data and Decision Sciences building, one of the four components of a system of projects that comprise the initiative. This building is an academic instruction building; thus, the funding plan calls for a request for a $79 million General Fund appropriation.

The balance of the facilities for the initiative is $172 million, and the University has developed financing plans to support these costs entirely with nongeneral fund resources. Thus, of the $251 million of costs for the entire set of four buildings, the University is requesting the state to partner with $79 million of General Fund support for the Data and Decision Sciences building.

Options Considered:

Options considered but rejected include leasing additional off-campus space which is costly and reduces program cohesiveness by distributing students, faculty and staff across several buildings and areas adjacent to campus.

Alternatives Considered

Costing Methodology

A. Methods Used to Estimate Costs:

The method for estimating costs for the Data and Decision Sciences Building project includes: 1) using unit costs in the Division of Engineering and Buildings' Construction Costs Database updated March 2018 with a regional market multiplier and a multiplier for softs costs (via an in-house cost estimating system); and 2) comparables as shown in the CR-1. The costs are escalated to a construction midpoint of 2021 at four percent.

On a total project cost basis, inclusive of design, construction, and equipment, the unit costs are $658 per gross square foot. The unit construction costs of the project are $480 per gross square foot, including self-performed construction work. The building types in this request are dry laboratory, classroom, and office in the Division of Engineering and Buildings' Virginia 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.

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.

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	Subobject	Requested Amount
Full Funding	2020	01000 - General Fund	2322 - Construction, Buildings	$79,000,000
			Total	$79,000,000

Project Costs

Cost Type	Requested Funding	DGS Rec
Acquisition Cost	$0	
Building & Built-in Equipment	$57,612,006	
Sitework & Utility Construction	$0	
Construction Cost Total	**$57,612,006**	
DESIGN & RELATED SERVICE ITEMS		
A/E Basic Services	$6,262,376	
A/E Reimbursables	$337,749	
Specialty Consultants (Food Service, Acoustics, etc.)	$3,121	
CM Design Phase Services	$159,373	
Subsurface Investigations (Geotech, Soil Borings)	$18,168	
Land Survey	$0	

Archeological Survey	$0	
Hazmat Survey & Design	$0	
Value Engineering Services	$0	
Cost Estimating Services	$1,731	
Other Design & Related Services	$8,822	
Design & Related Services Total	**$6,791,340**	
INSPECTION & TESTING SERVICE ITEMS		
Project Inspection Services (inhouse or consultant)	$556,214	
Project Testing Services (conc., steel, roofing, etc.)	$490,130	
Inspection & Testing Services Total	**$1,046,344**	
PROJECT MANAGEMENT & OTHER COST ITEMS		
Project Management (inhouse or consultant)	$627,316	
Work By Owner	$40,036	
BCOM Services	$12,201	
Advertisements	$4,859	
Printing & Reproduction	$4,731	
Moving & Relocation Expenses	$149	
A/V Cabling	$0	
IT Cabling	$0	
Telephone Cabling	$0	
A/V Equipment	$0	
IT Equipment	$706,953	
Telephone Equipment	$0	
Signage	$59,186	
Demolition	$0	
Hazardous Material Abatement	$0	
Utility Connection Fees	$0	
Utility Relocations	$2,326,545	
Commissioning	$646,509	
Miscellaneous Other Costs	$1,184,520	
Project Management & Other Costs Total	**$5,613,005**	
Furnishings & Movable Equipment	$6,428,007	
Construction Contingency	$1,509,298	
TOTAL PROJECT COST	**$79,000,000**	

Capacity

Cost Type	Unit of Measure	Units	Cost Per Unit
Acquisition Cost		0	$0
Construction Cost	GSF	120,000	$480
Total Project Cost	GSF	120,000	$658

Operating and Maintenance Costs (Agency)

Cost Type	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
GF Dollars	$0	$0	$0	$3,159,851	$3,254,647	$3,352,286
NGF Dollars	$0	$0	$0	$0	$0	$0
GF Positions	0.00	0.00	0.00	17.67	17.67	17.67
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
02_DADS Program Chart.pdf	68,004	Rob Mann	10/6/2018	DADS Building Program Chart
GBAC.jpg	152,088	Rob Mann	10/6/2018	GBAC - Entire Concept Image
CR-1 DADS.xlsx	612,154	Rob Mann	10/9/2018	

Workflow History

User Name	Claimed	Submitted	Step Name	Submit Action
Rob Mann	10/05/2018 09:38 AM	10/05/2018 09:38 AM	Enter Capital Budget Request	Continue Working
Rob Mann	10/05/2018 09:38 AM	10/05/2018 09:41 AM	Continue Drafting	Continue Working
Rob Mann	10/06/2018 05:04 PM	10/06/2018 05:08 PM	Continue Drafting	Continue Working
Rob Mann	10/08/2018 04:05 PM	10/08/2018 04:05 PM	Continue Drafting	Continue Working
Rob Mann	10/08/2018 04:08 PM	10/08/2018 04:16 PM	Continue Drafting	Continue Working
Rob Mann	10/09/2018 01:24 PM	10/09/2018 01:51 PM	Continue Drafting	Submit for Agency Review
Rob Mann	10/09/2018 04:00 PM	10/09/2018 04:11 PM	Agency Review Step 1	Ready for DPB Bulk Submit
Rob Mann	10/09/2018 04:40 PM	10/09/2018 04:46 PM	Ready for DPB Submission	Continue Review
Rob Mann	10/09/2018 04:46 PM	10/09/2018 04:46 PM	Ready for DPB Submission	Submit to DPB
Anne Smith	10/18/2018 12:06 PM	10/18/2018 12:07 PM	DPB Review	Continue Review
Anne Smith	10/23/2018 02:53 PM	10/23/2018 02:54 PM	DPB Review	Continue Review
Anne Smith	10/24/2018 11:36 AM	10/24/2018 11:38 AM	DPB Review	Continue Review
			DPB Review	