Virginia Department of Planning and Budget
Project Request Justification

2006-2008   **Biennium**   **Date:**   **July 22, 2005**

A. General Information

1. **Agency name:**   Virginia Tech   2. **Agency code:**   **208**

3. **Project title:**   Construct Engineering/Computational Sciences Instructional Facility   4. **Agency priority:**   **11**

5. **Contact Person:**   M. Dwight Shelton, Jr.

6. **Contact's telephone number:**   (540) 231-8775

7. **Contact's e-mail address:**   mdsjr@vt.edu

B. Proposed Project

1. Project Cost:

General Fund/General Fund supported debt	19,167,000
Nongeneral fund	
9 (c) revenue debt	
NGF supported 9 (d) revenue bonds	3,833,000
Total request	23,000,000

2. Project cost changes:

NONE.

3. Description:

- This project has been on the university's plan since 2003, formerly titled Computational Sciences Instructional Facility, to address a shortage of modern academic space capable of supporting the advanced technologies employed in the growing fields of computer science and engineering.

- To meet the current demands for modern instructional space in computational science, the university temporarily leases 45,000 square feet of off-campus space in the research center. In order to provide permanent space for the program, the university is requesting this proposed 61,000 gross square foot building to meet the needs of the Department of Computer Science for modern classroom, laboratory and academic office space. The project scope was established based on the faculty and student enrollment requirements of the computer sciences program.

- The proposed building will provide a highly advanced computing infrastructure with considerable flexibility in its instructional spaces and research laboratories. The computing infrastructure will include state-of-the-art wired and wireless communication services and provide abundant electrical and HVAC capacity to support large-scale servers and compute clusters. These servers and clusters provide the backbone of the technical infrastructure underlying the learning environment and are themselves objects of study for advanced courses in high performance computing and grid computing. The flexibility will permit the adaptation over time to the evolution of new technologies, shift in research programs, repurposing of teaching laboratories, and experience with the subtle effects of the spatial arrangements on student culture and community.

- The life expectancy of the building is 80 years with proper maintenance.

- The funding plan for the project calls for $19.167 million of General Fund support for the instruction program and 50 percent of the research program and $3.833 million of nongeneral fund debt authorization for the university's 50 percent support of the research program component.

4. Project scope change:

> NONE.

5. a. Approved Master Site Plan: Yes [X] No [   ]
> **If not, explain:**

  b. 2004-10 Capital Outlay Plan: Yes [X] No [   ]
> **If not, explain:**

6. Equipment for a previously funded project.

> NONE.

7. Supplement to a previously funded project.

> NONE.

C. Project Justification

1. a. Existing condition:

- Like the other science programs at Virginia Tech, the Computer Science Department finds itself "land-locked" in McBryde Hall with insufficient space or infrastructure to adequately support its growing research and teaching programs. McBryde Hall, built in the 1960's does not have the building systems – electrical power, ventilation and air conditioning – to support the new generation of computer systems and networking required to deliver the curricula of the department. Further, the existing facilities are cramped and not well configured to

support the interactive, hands-on, project-based course curricula that are now a dominate component of a high quality undergraduate program.

- The space deficit for this program is so severe the university is leasing 45,000 square feet off-campus in the research center to house a substantial part of the department's faculty and graduate students as a temporary, stopgap measure. In its current configuration, the department has supported research and teaching assistants with no assigned work space. The lease arrangement will alleviate the overcrowding, although it will result in the department being divided among two buildings, the off-campus leased space being approximately two miles from the other on-campus building. The overhead of frequent travel between these sites by shuttle van, the loss of faculty synergy, and the increased separation of faculty from undergraduate students argue strongly for the construction of proposed building at the earliest opportunity.

- This project requests authorization to construct new space to accommodate the program needs of the students and to provide a high quality environment for instruction and research. Further, the project will provide an on-campus space solution to replace the temporary, off-campus leased space.

Higher Education Only
  b. **Facility Condition Index:** FCI _____

  c. **Space deficit:** Yes [X] No [   ]

2. Programmatic information:

- The Department of Computer Science has an undergraduate program with a peak enrollment of over 1,100 majors that ranked it as the largest in the university. Further, it has burgeoning research and graduate programs. Two factors forecast on-going robust enrollments in the computing sciences. First, the pervasive use of computing technologies in industry, science, medicine, and engineering generates strong employer demand as reflected in projections of future labor needs by the Federal government. Second, the vitality and scope of the computing discipline offers students unparallel opportunities for professional futures that intersect with a broad array of creative activities including the arts (digital media), the life sciences (computational biology and bioinformatics), industry (software engineering), business (electronic commerce), and engineering (computational science and engineering).

- Within Virginia Tech, the recent placement of the Department of Computer Science in the College of Engineering creates new opportunities for courses of study and research in high performance computing and computational science and engineering. The emergence of computation modeling as a peer to experimental and analytical methods for scientific discovery and engineering design raises the level of competence in, and access to instruction about, computing needed by students across the sciences and engineering disciplines.

- A building for educating the Commonwealth's students in the computing sciences should connect learning to research, immerse students in the experiences of specialized

laboratories, and create an environment drawing students into a supportive community of learners. By connecting learning to research, students develop the ability to cope with unstructured problems that demand creative solutions. The Department of Computer Science supports research as a cornerstone of graduate education and engages undergraduate students in research through the Virginia Tech Undergraduate Research in Computer Science (VTURCS) program and a thriving program where student gain both a B.S. degree and an M.S. degree in a total of five years. The building can facilitate these programs by creating proximity to research laboratories and among faculty and students.

- Immersion in specialized laboratories for experience-based learning provides a crucial quality differentiator. The laboratory experiences supplement and motivate students' learning of underlying concepts and basic principles. Dedicated laboratories for networking, operating systems, high performance computing, human-computer interaction, and software engineering are examples of specialized facilities that raise the quality of courses currently being taught which now lack the laboratory-based experience.

- An environment that promotes a community culture, supports teamwork, and encourages peer-to-peer interactions prepares young professionals for careers that involve life-long learning, large-scale science or engineering projects, and technical leadership. All of these are important skills for professionals in the computing sciences battling the twin forces of rapid advance in computing technology and the competition of globalization.

3. Alignment to strategic plan:

This project will support Virginia Tech's strategic plan in the areas of Graduate Education and Undergraduate Education. When completed, the Engineering/Computational Sciences instructional Facility will provide a modern academic building that will facilitate employment of the latest advances in computer and instructional technology in support of the following university goals:

Graduate Education:
1. Increase the quality of the graduate programs.

Undergraduate Education:
1. Maintain a current, relevant, and comprehensive undergraduate curriculum.
2. Strengthen the quality of undergraduate instruction.
3. Create learning experiences for undergraduate students that maximize the benefits of attending a large research university.
4. Expand the university's leadership role in the effective integration of instructional technology and pedagogy.

D. Options Considered

Other options considered but not selected include continuing to lease space, renovating existing space, or delaying the project entirely. Constructing a new facility is the selected option because it is the most cost effective solution to the shortage of modern instructional space for the Department of Computer Science.

Leasing is not a feasible option as a permanent solution because it is not financially favorable long-term to enter into a capital lease for this project, particularly when the scheduling difficulties of students and faculty commuting to an off-campus location are considered.

Renovating an already existing facility is not a viable option because the University currently operates with a shortage of instructional space. Furthermore, the majority of classroom space on campus does not include adequate levels of essential infrastructure support and would be less economical to develop as opposed to new construction. Thus, no appropriate existing space is available to allocate for renovation to accommodate this expanding program.

Delaying the project to a future biennium is not a viable option because of the financial, programmatic, and logistical difficulties presented by the continued lease of off-campus space for the Department of Computer Science.

E. Project Schedule Changes:

NONE.