

## Capital Budget Request

Improve System-wide Agriculture Research and Extension Centers	
Overview	
Agency	Virginia Cooperative Extension and Agricultural Experiment Station (229)
Project Code	none
Project Type	Improvements-Infrastructure Repairs
Biennium	2020-2022
Budget Round	Initial Bill
Request Type	New Project
Project Location	Multiple Regions
Facility/Campus	Multiple
Source of Request	Agency Request
Infrastructure Element	Agricultural Facility
Contains O & M costs? Yes	
Contains significant technology costs? No	
Contains significant energy costs? No	
Possible that project will be used by other than a state or local governmental entity, or for research under sponsored programs (higher education)? No	
Agency Narrative	
<p>Agency Description</p> <p>Executive Summary:</p> <p>Agency 229 impacts are vast and diverse and touch every sector of Virginia's economy. Innovative and applied research, education and training, and direct assistance to Virginians have led to nationwide recognition of Virginia as a producer of superior agricultural products, better business management practices, and environmental stewardship that improves quality of life and attracts millions of tourists annually. Ultimately, Agency 229 activity creates jobs and new investments through higher returns and profits for producers; technological innovation and new product launches for industry; billions in international exports; and talented, healthy citizens who contribute to a vibrant workforce.</p> <p>The Virginia Tech Cooperative Extension/Agriculture Experiment Station agency, Agency 229, operates 11 Agricultural Research and Extension Centers (AREC) that support a variety of key industries in the Commonwealth through research and extension programs. The network of ARECs are strategically positioned throughout the state to emphasize close working relationships between Virginia Agricultural Experiment Station (VAES), Virginia Cooperative Extension, and the industries they work with. The mission of the system is to engage in innovative, leading-edge research to discover new scientific knowledge and create and disseminate science-based applications that ensure the wise use of agricultural, natural, and community resources while enhancing quality of life.</p> <p>The ARECs serve as program sites for producers, school groups, and the state's citizens and field-research sites and laboratories for undergraduate and graduate students. AREC faculty and staff, along with faculty based at the main campus, deliver research and extension programs at these sites, which represent the Commonwealth's diversity and take advantage of the unique characteristics and challenges found in each location.</p> <p>Research is designed to provide knowledge that will enhance the quality of individual and family life and the social and economic vigor of Virginia. Researchers utilize the best techniques of qualitative and quantitative research to form the knowledge base for instruction of and application to the broader mission of the land-grant university. Apart from serving the needs of Virginia's animal, plant, and seafood industries, this research fosters conservation of natural resources and benefits consumers and all citizens of the state in rural, urban, and suburban communities.</p> <p>In 2018, a study was conducted by VAES staff and the AREC directors and superintendents to identify strategic facility needs relative to anticipated growth and investment in support of the Agency 229 Smart Farm Innovation Network Initiative. With the median age of facilities at some ARECs reaching over 50 years old, many existing research laboratories and supporting facilities across the ARECs are in poor condition, have surpassed their functional life expectancy, are not appropriate for conducting experiments required to respond to modern</p>	

agricultural issues, and cannot support demand for the program activities.

Each AREC has minimum requirements to meet the basic needs of Research/Support, Extension/Outreach, Housing, and Infrastructure. This project will renovate approximately 45,000 gross square feet and construct approximately 105,000 gross square feet of equipment storage, greenhouse, community education, and research facilities across the state to bring the system up-to-date and provide capacity to meet client demand for services.

#### Project Description:

Each AREC has minimum requirements to meet the basic needs of Research/Support, Extension/Outreach, Housing, and Infrastructure. The current deficiencies in these requirements are listed below.

#### Research / Support Facilities:

Research Laboratories: Many existing research facilities are outdated and need renovation or new construction to meet modern agricultural research requirements.

- Renovation of Plant Tissue Culture Lab at 1,804 sf is required at Alson H. Smith, Jr. AREC.
- Renovation of Basement Laboratory at 2,270 sf is required at Eastern Shore AREC.
- Renovation of Building 1101 Basement at 3,250 sf is required at Hampton Roads AREC.
- Renovation of Laboratories at 2,680 sf is required at Southern Piedmont AREC.
- New Research Laboratory Facility at 2,500 sf is required at Southern Piedmont AREC.
- New Analytical Laboratory at 3,000 sf is required at Middleburg AREC.
- New Laboratory Facility at 5,180 sf is required at Tidewater AREC.

Research Greenhouses: Controlled environment growth facilities are a critical component of the research program. Having state-of-the-art plant growing facilities is necessary for researchers to remain current with industry partners and find innovative solutions to current world problems.

- (7) New Smart Greenhouse at 3,000 sf each is required at the following ARECs: (1) at Alson H. Smith, Jr. AREC; (2) at Eastern Shore AREC; (2) at Hampton Roads AREC; (1) at Southern Piedmont AREC; (1) at Tidewater AREC.
- Renovation of Greenhouse 0878 at 1,660 sf is required at Alson H. Smith, Jr. AREC.
- Renovation of Greenhouse 0898 at 4,900 sf is required at Southern Piedmont AREC.
- Renovation of Slat House at 300 sf is required at Reynolds Homestead Forestry Resources Research Center.

Animal Handling Facilities: Several ARECs have animal-based programs as their primary areas of research and outreach. Additional facilities are necessary to replace aging structures and provide adequate space for ongoing animal management, extension programs, and data collection. These buildings are primarily pole barns for livestock stall/ bunk space and related support areas.

- New Animal Research Facility at 7,500 sf is required at Middleburg AREC.

Seed Handling and Processing Facilities: This location has an inadequate area for handling and processing seed materials.

- New Seed Handling Facility at 500 sf is required at Tidewater AREC.

Pesticide Handling Facilities: Each AREC handles a variety of pesticides and other chemicals in the research and agricultural operations. Many ARECs have inadequate means to safely store these chemicals, clean out sprayers and tanks, and dispose of wastewater and residual products to meet the safety requirements for pesticide storage and application. New Pesticide Handling Facilities will be similar to the one constructed at the Tidewater AREC in 2007.

- (3) New Pesticide Handling Facilities at 970 sf are required at the following ARECs: (1) at Hampton Roads AREC; (1) at Middleburg AREC; (1) at Shenandoah Valley AREC.

Multi-Purpose Buildings: Due to the increasing size of agricultural equipment and the diverse nature of activities, it is necessary to have large volume shed space available to accommodate a variety of uses at each AREC. These multi-purpose buildings consist of a clear span pre-engineered metal building with large sliding and/or roll-up doors on a concrete slab, with ancillary, climate-controlled office space for farm staff, including restroom facilities.

- New Multi-Purpose Building at 10,000 sf is required at Eastern Shore AREC.
- New Multi-Purpose Building and Shop at 7,500 sf is required at Southwest Virginia AREC.
- Renovation of Multi-Purpose Building at 3,500 sf is required at Eastern Virginia AREC.
- New Farm Support Buildings at 10,000 sf is required at Southern Piedmont AREC.

#### Extension and Outreach Facilities:

Education Facilities: One of the primary functions of each AREC is to engage with stakeholder groups and the local community through the Virginia Cooperative Extension. While many of the larger AREC stations have suitable meeting space for large group instruction, seminars, workshops, and meetings, many of the smaller ARECs have no ability to host such functions. New two-story education buildings are envisioned with a main level classroom seating approximately 100 people and an upper level for administrative offices, support spaces, conference rooms, and short-term housing for visiting faculty, graduate students, and scholars.

- (4) New Education Facilities at 5,000 sf are required at the following ARECs: (1) at Eastern Virginia AREC; (1) at Middleburg AREC; (1) at Shenandoah Valley AREC; (1) at Southwest Virginia AREC.
- New Classroom Expansion at 2,500 sf is required at Hampton Roads AREC.

#### Host Facilities:

Host Facilities: Because most ARECs are situated in remote locations of the state and often in areas where it is difficult to find available domicile options, there is a need to provide improved, consistent short- to mid-term housing system-wide for students, faculty, and staff staying on-site to conduct field research. This is particularly the case for graduate students who spend a large portion of their time at the ARECs to conduct research and outreach activities. Providing housing options allows these extended stays to be more cost effective and allow students, faculty, and staff to conduct long term experimentation at the ARECs. These housing facilities will be in addition to the employee housing program which currently affords some AREC staff to live on the property and provide after-hour support to the program. Some housing is currently provided in temporary FEMA trailers that are now over 20 years old and need to be removed because of their poor condition. New housing units could be three and four bedroom single-family style detached structures similar to those currently provided. Others could be a duplex style unit for separation by gender or job classification, depending on the need, with shared common areas to optimize available square footage.

- New Tenant House at 1,200 sf is required at Eastern Shore AREC.
- (3) New Tenant Housing at 1,600 sf each is required at the following ARECs: (1) at Southern Piedmont AREC; (2) at Tidewater AREC.
- (2) New 4-Bedroom Duplex at 2,000 sf each is required at the following ARECs: (1) at Alson H. Smith, Jr. AREC; (1) at Eastern Virginia AREC.
- New 6-Bedroom Duplex at 3,000 sf is required at Southern Piedmont AREC.
- Renovation of House 1102 at 2,450 sf is required at Hampton Roads AREC.
- Light Renovation of all houses at 15,146 sf is required at Middleburg AREC.
- Renovation of (2) Tenant Houses at 3,060 sf total is required at Shenandoah Valley AREC.
- Renovation of Duke Residence at 4,000 sf is required at Tidewater AREC.

#### Infrastructure Systems:

Information Technology Systems: VAES and Agency 229 are working closely with industry stakeholders to grow our future with public-private partnerships through the Virginia Agriculture and Natural Resources initiative. A critical priority of the initiative is the proposed Smart Farm Innovation Network. To facilitate the development of this network of interconnected technology centers in agriculture and natural resources industries, the Blacksburg campus and 11 ARECs are designated hubs for agricultural technology-based innovation. In support of this vision, the IT infrastructure and technology at each AREC must be updated.

- (11) Information Technology Systems Updates is required at each AREC.

Water Supply: A primary need for regular and reliable irrigation and water supply exists at many ARECs. Listed below are projects where improvements are needed to support the continued provision of the water for AREC needs.

- Rehabilitation of Pump Station at 290 sf is required at Alson H. Smith, Jr. AREC.
- Rehabilitation of Pump Station at 220 sf is required at Hampton Roads AREC.
- New Pump Station Backup Generator at 150 sf is required at Southern Piedmont AREC.

The collective items above represent an overall strategy to improve ARECs system-wide, bringing the system up to current standards and providing room for growth in new areas of study. New facilities will be flexible and open to the fullest extent for maximum configurability and to meet future needs for the ARECs and the commonwealth.

#### Justification

##### Program Description:

The Virginia General Assembly established the Virginia Agricultural Experiment Station (VAES) on March 1, 1886, in anticipation of the Federal Hatch Act of 1887, which created a network of state agricultural experiment stations nationwide as part of the land-grant higher education mission. This system links experiment station research to cooperative extension programs and college academic programs. The State Agricultural Experiment Stations were charged with conducting research and development projects on behalf of farmer, in forestry, animal health and disease, and multistate research programs.

Today, VAES research projects and activities encompass the work of more than 350 scientists in five colleges at Virginia Tech: College of

Agriculture and Life Sciences; College of Natural Resources and Environment; College of Liberal Arts and Human Sciences; College of Science; and Virginia-Maryland College of Veterinary Medicine. The VAES research network also includes 11 field stations located throughout the state. Known as Agricultural Research and Extension Centers, these field stations and emphasize the close working relationships between the Virginia Agricultural Experiment Station and Virginia Cooperative Extension.

VAES research directly supports agriculture, the state's largest industry, accounting for one in every five jobs and providing an economic impact of approximately \$55 billion annually with an additional annual contribution from the Forest Products industry of approximately \$27 billion.

While VAES's mandate is to support Virginia citizens through research that would have positive economic impact, VAES's goal is to conduct research programs that will enhance the quality of life for all people. The mission of the Virginia Agricultural Experiment Station is to perform basic and applied research on agricultural, environmental, natural, and community resource issues related to the future needs of Virginia, the region, the nation, and the world.

Research is designed to provide knowledge that will enhance the quality of individual and family life and the social and economic vigor of Virginia. Researchers utilize the best techniques of qualitative and quantitative research to form the knowledge base for instruction of and application to the broader mission of the land-grant university.

Apart from serving the needs of Virginia's animal, plant, and seafood industries, VAES-supported research fosters conservation of natural resources and benefits consumers and all citizens of the state in rural, urban, and suburban communities. Discoveries resulting from VAES-supported research have facilitated economic development in the state in the form of start-up companies located in Virginia Tech's Corporate Research Center. In addition, the VAES research programs include numerous activities in the international arena.

VAES supports research faculty in a wide range of disciplines in projects located at Virginia Tech and across the commonwealth, often in collaboration with Virginia Cooperative Extension, National Institute of Food and Agriculture, and other state and federal agencies.

VAES faculty are located at 11 Agricultural Research and Extension Centers and within the College of Agriculture and Life Sciences, the College of Natural Resources and Environment, and the Virginia-Maryland College of Veterinary Medicine at Virginia Tech.

AREC faculty and staff, along with faculty based at the main campus, deliver research and extension programs at these sites, which represent the commonwealth's diversity and take advantage of the unique characteristics and challenges found in each location.

The ARECs serve not only as field-research sites and field laboratories for undergraduate and graduate students, but also as program sites for producers, school groups, and the state's citizens.

Each AREC site has four basic programmatic needs: Research/Support, Extension/Outreach, Housing, and Infrastructure. This project contains several projects to meet or exceed minimum requirements for the four basic programmatic needs at each AREC.

The university's strategic plan includes the following principle strategies that will be supported by the completion of this project:

- Increase extramural research expenditures.
- Achieve top public, land-grant ranking.
- Increase graduate student enrollment.
- Advance the rural Virginia initiative.
- Increase and sustain excellence in research, discovery, and creativity.
- Increase institutional impact and visibility.
- Increase representational diversity, cultural competency, and address critical societal issues impacting humanity and equity.
- Attract, retain, and develop the talents of students, faculty and staff prepared to serve both the local and global communities while also supporting lifelong engagement and learning.
- Continue to develop the physical campus and technology infrastructure.

Existing Facilities:

In 2018, a study was conducted by Virginia Agricultural Experiment Station staff and the AREC directors and superintendents to identify strategic facility needs relative to anticipated growth and investment in support of the Agency 229 Smart Farm Innovation Network Initiative. This capital project request identifies needs for expansion and/ or renovation of all 11 AREC sites.

This project will help bring the AREC system up-to-date and provide capacity to meet client demand for services. With the median age of facilities at some ARECs reaching over 50 years old, many existing research laboratories and supporting facilities across the ARECs are in poor condition, have reached their functional life expectancy, are not suitable for conducting experiments required to respond to modern agricultural issues, and cannot support demand for the program activities. The ARECs have inadequate means to meet safety requirements, conduct appropriate experiments, and support their ongoing research and extension programs.

Funding Plan:

The program for this project is 100 percent Educational and General for the Cooperative Extension/Agricultural Experiment Station improvement project; thus, the funding plan calls for 100 percent General Fund support for this \$42.1 million project.

**Options Considered:**

Options considered and not selected include elimination or reduction of the research programs and deferring the project to a future biennium. Elimination or reduction of the programs is not feasible because of the significant negative impact to the program's support to industry and government. Deferring the project is not recommended because the facilities are no longer in a position to adequately support the research programs.

**Methodology**

**Cost Explanation and Methodology:**

**A. Methods Used to Estimate Costs:**

The method for estimating costs for the System-wide AREC Improvements project includes: 1) using unit costs in the Division of Engineering and Building's Construction Costs Database updated March 2018 with a regional market multiplier and a multiplier for soft costs; and 2) comparables as shown in the CR-1. Both methods are escalated to a construction midpoint of 2023 at four and a half percent escalation 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 \$280 per gross square foot. The unit construction costs of the project are \$188 per gross square foot, including self-performed construction work. The building types in this request are wet laboratory, dry laboratory, and classroom spaces in the Division of Engineering and Building's 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. The estimate also includes the cost of technology, specialized instruction, and energy efficiency goals of the institution.

Design bid Build is the intended delivery method for this project.

**B.** Due to the similar nature of the sub-projects this section is combined and chiefly speaks to the increase expenses to manage multiple projects located in different geographic regions of the commonwealth.

1) This capital project has packaged many smaller projects in multiple locations around the commonwealth with some unique construction types. To make the projects attractive to the contracting community, the university will package similar types of construction in a geographic area resulting in many bid packages that will combine to deliver this entire capital project.

2) Multiple bid packages will increase the bidding services required by the A/E thus increasing the soft costs for the project.

3) The university will not realize economy of scale when constructing smaller buildings with specific needs such as plant tissue culture lab, smart greenhouses, growth chamber facility, seed handling facility, pesticide handling facilities, and multiple other facilities. This will increase the construction costs.

4) Each bid package will require full time management by the General Contractor thus increasing the total quantity of contractor management across the entire capital project. This will increase the construction costs.

5) Each geographic location will require DEQ permitting. This will impact costs to bot the construction line item as there will be a greater percentage of general condition as compared to one larger project at one geographic location. Due to the expenses associated with travel times for Virginia Tech forces we intend to use third party inspectors to ensure compliance with DEQ regulations. This will increase soft costs for DEQ related expenses.

6) The AREC projects that are remote from main campus will require increased third party clerk of the works inspections thus increase soft costs. Utilizing third party inspection in lieu of Virginia Tech forces will be more economical than the expenses associated with travel times from main campus.

7) Establishing utility connections for potable water, sewer, natural gas, electricity and internet to server the new facilities will increase the cost beyond a standard square footage estimation.

**Funding Request**

Phase	Year	Subobject	Fund	Amount
Full Funding	2021	2322 - Construction, Buildings	01000 - General Fund	\$42,100,000

Total | \$42,100,000

**Project Costs**

Cost Type	Requested Funding
Acquisition Cost	\$0
Building & Built-in Equipment	\$28,374,682
Sitework & Utility Construction	\$0
<b>Construction Cost Total</b>	<b>\$28,374,682</b>
<b>DESIGN &amp; RELATED SERVICE ITEMS</b>	
A/E Basic Services	\$2,349,424
A/E Reimbursables	\$68,099
Specialty Consultants (Food Service, Acoustics, etc.)	\$175,923
CM Design Phase Services	\$0
Subsurface Investigations (Geotech, Soil Borings)	\$90,799
Land Survey	\$36,887
Archeological Survey	\$0
Hazmat Survey & Design	\$5,675
Value Engineering Services	\$107,824
Cost Estimating Services	\$36,887
Other Design & Related Services	\$646,943
<b>Design &amp; Related Services Total</b>	<b>\$3,518,461</b>
<b>INSPECTION &amp; TESTING SERVICE ITEMS</b>	
Project Inspection Services (inhouse or consultant)	\$837,054
Project Testing Services (conc., steel, roofing, etc.)	\$402,920
<b>Inspection &amp; Testing Services Total</b>	<b>\$1,239,974</b>
<b>PROJECT MANAGEMENT &amp; OTHER COST ITEMS</b>	
Project Management (inhouse or consultant)	\$692,306
Work By Owner	\$2,990,691
BCOM Services	\$11,350
Advertisements	\$5,675
Printing & Reproduction	\$42,562
Moving & Relocation Expenses	\$68,099
A/V Cabling	\$0
IT Cabling	\$0
Telephone Cabling	\$0
A/V Equipment	\$0
IT Equipment	\$567,494
Telephone Equipment	\$0
Signage	\$28,375
Demolition	\$0
Hazardous Material Abatement	\$0
Utility Connection Fees	\$85,124
Utility Relocations	\$0
Commissioning	\$31,212
Miscellaneous Other Costs	\$283,747
<b>Project Management &amp; Other Costs Total</b>	<b>\$4,806,635</b>
Furnishings & Movable Equipment	\$3,592,754
Construction Contingency	\$567,494
<b>TOTAL PROJECT COST</b>	<b>\$42,100,000</b>

Size and Scope			
Cost Type	Unit of Measure	Units	Cost Per Unit
Acquisition Cost		0	\$0
Construction Cost	GSF	150,610	\$188
Total Project Cost	GSF	150,610	\$280

Operating and Maintenance Costs						
Cost Type	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
GF Dollars	\$0	\$0	\$0	\$609,716	\$628,007	\$646,847
NGF Dollars	\$0	\$0	\$0	\$0	\$0	\$0
GF Positions	0.00	0.00	0.00	7.63	7.63	7.63
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="#">AREC Facilities Master Plan_Final_June_2019.pdf</a>	22,962,115	Cassidy Limer	7/23/2019	
<a href="#">229-3 AREC Improvements Program Chart.pdf</a>	442,093	Cassidy Limer	7/25/2019	
<a href="#">229-3 CR-1e AREC Improvements-VIRGINIA TECH-State Version.xlsx</a>	616,751	Cassidy Limer	7/29/2019	

Workflow History				
User Name	Claimed	Submitted	Step Name	Submit Action
Cassidy Limer	07/16/2019 04:17 PM	07/16/2019 04:17 PM	Enter Capital Budget Request	Continue Working
Cassidy Limer	07/16/2019 04:17 PM	07/25/2019 03:43 PM	Continue Drafting	Submit for Agency Review
Rob Mann	07/25/2019 04:36 PM	07/25/2019 04:36 PM	Agency Review Step 1	Return for Further Data Entry
Cassidy Limer	07/25/2019 09:48 PM	07/26/2019 12:58 PM	Continue Drafting	Submit for Agency Review
Rob Mann	07/26/2019 02:32 PM	07/26/2019 02:36 PM	Agency Review Step 1	Ready for DPB Bulk Submit
Rob Mann	07/26/2019 02:37 PM	07/26/2019 02:37 PM	Ready for DPB Submission	Submit to DPB
Anne Smith	07/26/2019 05:12 PM	07/26/2019 05:13 PM	DPB Review	Return to Previous Submitter
Rob Mann	07/29/2019 10:08 AM	07/29/2019 10:08 AM	Agency Review Step 1	Return for Further Data Entry
Cassidy Limer	07/29/2019 03:01 PM	07/29/2019 03:08 PM	Continue Drafting	Continue Working
Jennifer Hundley	07/30/2019 11:06 AM	07/30/2019 11:09 AM	Continue Drafting	Continue Working
Cassidy Limer	07/30/2019 04:44 PM	07/30/2019 04:45 PM	Continue Drafting	Submit for Agency Review
Rob Mann	07/31/2019 10:41 AM	07/31/2019 10:45 AM	Agency Review Step 1	Ready for DPB Bulk Submit
Rob Mann	07/31/2019 03:29 PM	07/31/2019 03:29 PM	Ready for DPB Submission	Submit to DPB
Anne Smith	07/31/2019 05:31 PM	07/31/2019 05:32 PM	DPB Review	Continue Review
			DPB Review	