
**BOARD OF TRUSTEES
NORTH CAROLINA STATE UNIVERSITY
COMMITTEE MEETINGS: SEPTEMBER 20, 2018
FULL BOARD MEETING: SEPTEMBER 21, 2018**

THURSDAY, SEPTEMBER 20, 2018 (Reserved Parking at the Memorial Bell Tower)

- | | |
|---------------------------|--|
| 10:15 – 11:30 p.m. | Buildings and Property Committee
Winslow Hall Conference Room
Chip Andrews, Chair
Kelly, Murphy, Washington, Weisiger |
| 1:15 – 3:00 p.m. | Advancement and External Affairs Committee
Chancellor's Conference Room (12 Holladay)
Stan Kelly, Chair
Andrews, Murphy, Washington, Weisiger |
| 1:15 – 3:00 p.m. | University Affairs Committee
Winslow Hall Conference Room
Ann Goodnight, Chair
Cabaniss, Errico, Harrell, Prestage, Ward |
| 3:00 – 3:15 p.m. | Break |
| 3:15 – 4:45 p.m. | Audit, Risk Management and Finance Committee
Winslow Hall Conference Room
Tom Cabaniss, Chair
Errico, Goodnight, Harrell, Prestage, Ward |

FRIDAY, SEPTEMBER 21, 2018
DOROTHY AND ROY PARK ALUMNI CENTER

- 7:15 – 8:00 a.m. Executive Committee Meeting TAB 10**
Eury Room, Park Alumni Center
 Jimmy Clark, Chair
 Andrews, Cabaniss, Kelly and Goodnight
- 8:30 – 9:15 a.m. Dean’s Briefing – Interim Dean Frank Buckless, Poole College**
of Management

FULL BOARD MEETING
DOROTHY AND ROY PARK ALUMNI CENTER BOARD ROOM

- 9:00 a.m. ■ Call to Order – Reading of the State Government Ethics Act**
 Jimmy Clark
 Chair of the Board
- Roll Call**
- Approval of Minutes TAB 1**
 ✓ — July 19, 2018, Meeting of the Full Board
 ✓ — July 19, 2018, Meeting of the Closed Session of the Full Board
- Chair’s Report – Jimmy Clark TAB 2**
 — Ceremonial Oath for New Trustee Jess Errico
 — Endowment Board Report
- Chancellor’s Report – W. Randolph Woodson TAB 3**
 — Update of Activities and Topics of Interest
 to the Board
- COMMITTEE REPORTS:**
- Audit, Risk Management and Finance Committee TAB 4**
 Tom Cabaniss, Chair
On the Agenda: Committee Approvals and Informational Items
 — Review of Committee Responsibilities
 — Review Draft Agenda/Plan of Work for the Year
 — Review Internal Audit Charter and Approval
 — Internal Audit Update
 — Finance/Budget and Legislative Update
 — Compliance and Integrity Program Update
- Buildings and Property Committee TAB 5**
 Chip Andrews, Chair
On the Agenda: Board, Committee Approvals; Informational Reports
 — Committee Plan of Work for the Year
 — Review of Committee Responsibilities and Procedures
 — Property Matters
 — Disposition by Utility Easment: Duke Energy Progress proposes
 to install ±427 feet of electrical service to Wake County
 Emergency Management Service Station Number 8.

- Disposition by Utility Easement: Duke Energy Progress proposes To install ±1,240 feet of electrical service to be located on the Southern side of Varsity Drive.
- Disposition by Utility Easement: PSNC Energy has requested easement across state-owned land allocated to NC State University in order to provide underground gas service to The Horticulture Field Lab Greenhouses, located at 4301 Beryl Road, Raleigh, NC.
- Disposition by Access Easement: The owners (SRI GUKRUDEV, LLC) of the Ramada Inn have plans to develop a five-story improvement to the front of their existing hotel. This proposed improvement will require its current ingress and egress point to be relocated to the northern side of the building, which is located at 1520 Blue Ridge Road in Raleigh, NC. They have requested an access easement from the State of NC to address this issue.
- Disposition by Utility Easement: The City of Raleigh has requested an easement for the installation of an underground waterline and two water meter vaults to provide and monitor the distribution of a public water service as part of the renovation of the Gregg Museum.
- Disposition by Access Easement: This substitution of an existing easement allows the continuing development of the university. The proposed easement will be ±24 feet by ±113 feet containing ±2730 square feet running northeasterly from the Tammy Lynn Center to its point of terminus with the Capability Drive Parking Lot on Capability Drive.
- Disposition by Demolition: The College of Agriculture and Life Sciences located at the Upper Piedmont Tobacco Research Station at 2022 Wentworth Street, Reidsville, NC requests the demolition of one of the structures located at the research station.
- Disposition by Easement: An adjoining property owner (172 Asheland Avenue, LLC) has requested the conveyance of an easement for the purpose of increasing the width of the Federal Aly way, due to a permitting requirement by the City of Asheville.
- ✓ — Disposition by Cross Easement: This is a proposed easement between the State of NC and The Board of Trustees of the Endowment Fund of NC State University to facilitate the development and management of all Centennial Campus.
- Designer Selections
 - Creamery Café and Dairy Education Center
 - Memorial Belltower Renovation
 - Student Housing Master Plan
 - Approval of Designer Selections less than \$1M
- Acceptance of Completed Buildings and Projects
- Property Matters (Received after Full Board Mailing)
- Site Review and Approval
 - Sigma Kappa House, South Campus Precinct
 - Zeta Tau Alpha House, South Campus Precinct

- Plan Review and Approval
 - Sigma Kappa House, South Campus Precinct
 - Zeta Tau Alpha House, South Campus Precinct
 - Approval of Plans and Specifications less than \$2M
- Informational Reports
 - Capital Projects Update
 - Status of Projects in Planning

■ **University Advancement**

TAB 6

Stan Kelly, Chair

On the Agenda: Board, Committee Approvals; Informational Reports

- Review of Committee Responsibilities
- Review Plan of Work for the Year
- University Advancement Update
- Fundraising and Campaign Report
- Naming Opportunity Proposals
- ✓ — Closed Session
- University Advancement Road Mapping Presentation

■ **University Affairs Committee**

TAB 7

Ann Goodnight, Chair

On the Agenda: Committee Approvals; Informational Reports

- Review of Committee Responsibilities
- Plan of Work for the year
- Consent Agenda
 - Requests to Continue Centers/Institutes
 - Advanced Self Powered Systems of Sensors and Technologies Center (ASSIST)
 - Center for Marine Sciences and Technology (CMAST)
 - Designation of Time Limited Option for Distinguished Professorships
 - Requests to Confer Tenure
- Proposed Bonus Structure for Baseball
- Fall Enrollment Report
- UNC Employee Engagement Survey
- Student Body President Report
- Provost Update
 - 2018-2019 Faculty Salary Ranges
 - Update on Leadership Position Serches
- The Promotion and Tenure Process at NC State
- Closed Session

■ **Faculty Senate Report**

TAB 8

Carolyn Bird, Chair

■ **Staff Senate Report**

TAB 9

Jason Painter, Chair

■ **Items of Interest to Members of the Board**

■ **Motion to go into Closed Session**

- ✓ Requires full board approval

- ✓
 - **CLOSED SESSION**
 - **Reconvene in OPEN SESSION for Any Additional Items to Come Before the Board**
- 11:00 a.m.*
 - **Adjourn**

✓ Requires full board approval

Board of Trustees
North Carolina State University
Raleigh, North Carolina
July 19, 2018

The North Carolina State University Board of Trustees met in regular session in the Winslow Hall Conference Room on Main Campus, in Raleigh, NC, on Thursday, July 19, 2018.

Members present:

Jimmy D. Clark, Chair
Robert F. Andrews, III
Thomas E. Cabaniss
James A. Harrell, III
Stanhope A. Kelly
Wendell H. Murphy
Ronald W. Prestage, DVM
Susan P. Ward
Dewayne N. Washington
Edward I. Weisiger, Jr.
Jess Errico, *ex officio*

Chair Jimmy Clark called the meeting to order at 11:15 a.m. He reminded all members of their duty to avoid conflicts of interest and appearances of conflicts of interest under the State Government Ethics Act and inquired as to whether there were any known conflicts of interest or appearances of conflict with respect to any matters coming before the board at this meeting. Chair Clark called on Assistant Secretary PJ Teal for the roll call.

ROLL CALL

Assistant Secretary PJ Teal called roll and certified that a quorum was present.

MINUTES

Mr. Cabaniss made the motion, seconded by Mrs. Ward, to approve the April 19, 2018 closed session of the full board, and the open and closed session minutes of the April 20, 2018 meeting of the full board. The motion passed.

ELECTION OF OFFICERS FOR 2018-19 CHAIR SUSAN WARD

Mrs. Ward reported that the nominating committee has proposed the following slate of officers for the 2018-19 year:

Jimmy Clark, Chair
Tom Cabaniss, First Vice Chair
Stan Kelly, Second Vice Chair
Ann Goodnight, Secretary
PJ Teal, Assistant Secretary

In addition, the Nominating Committee recommends Chip Andrews to serve as the fifth member of the Executive Committee.

Mrs. Ward made a motion, seconded by Dr. Prestage, to approve the 2018-19 slate of officers as well as Chip Andrews as the fifth member of the Executive Committee. The motion passed.

CHAIR'S REPORT- JIMMY CLARK

Chair Clark reported that the Board would receive their committee assignments soon and he noted that much of the Board's work takes place in the committees.

Chair Clark reported that each year the ACC requires University Board of Trustees to certify that the authority for the administration of Intercollegiate Athletics has been delegated to the Chancellor. Mr. Murphy made the motion, seconded by Dr. Prestage, to approve the ACC Governing Board Certification for 2018-19. The motion passed.

Chair Clark reported that the Board would hear a lunch presentation by the Educational Advisory Board, or EAB, on the "State of the University." He noted that the EAB researches trends and best

practices in higher education and engages with universities across the U.S.

CHANCELLOR'S REPORT – RANDY WOODSON

Chancellor Woodson shared the following campus updates:

- He introduced new Vice Chancellor for External Affairs, Partnerships and Economic Development, Kevin Howell, who assumed the role on July 1, 2018.
- He also introduced Frank Buckless, Poole College of Management's Associate Dean for Faculty and Academic Affairs, who will serve as PCOM's Interim Dean as of August 1, 2018.
- He reported that Eileen Goldgeier, chief legal counsel, will leave NC State for a similar role at her alma mater, Brown University.

The Chancellor gave an Advancement update:

- The Engineering Building Oval is now called Fitts-Woolard Hall in honor of the Fitts and Woolards, who gave the university the single largest private alumni gift (\$25M) to a building in NC State's history. The \$137 million project broke ground April 2018 and will be complete June 2020.
- The Think and Do the Extraordinary campaign has continued to be a priority and thus the support remains strong. More than \$1.33 billion has been raised which is 83 percent to goal.

The Chancellor reported that 20 million dollars for salary increases will be allocated on the priorities of the UNC Board of Governors. To provide a 2 percent raise as other state employees the System would need \$50 million dollars. So raises for NC State employees will be based on market and merit.

The Chancellor gave an update on incoming freshmen. Of those admitted, 4,932 will enter (36 percent of admitted) as incoming freshmen. Twenty-eight percent are from rural counties and 49% are female. This fall, 1,421 transfer students will enroll. The spring-deferred admission, Spring Connections, is in its second year, with an anticipated 477 students enrolling. That is a total of 6,830 new students. Emphasis has been placed on enhancing the multiple paths a student can take to NC State, focusing on widening the pipeline for transfer students. NC State has agreements with eight regional community colleges for dual admission. This fall, about 120 students will start at community colleges with automatic acceptance to NC State and help along the way from NC State advisers but they have to maintain 3.0 GPA and get their Associates degree. Based on preliminary analysis, the graduation rate will be at an all-time high of over 80%.

Chancellor Woodson reported that the Advancement Office has reviewed the Watauga Medal policy and has made edits. Essentially these changes revise what "Significant and Distinguished Service" means to further clarify for those committee members and potential nominators. They also updated the selection committee and process to be more representative and allow for a more efficient and effective process, internally and externally. With the Board's approval, this policy will be implemented immediately for the fall 2018 nominations.

Mr. Cabaniss made the motion, seconded by Mr. Murphy, to approve revisions to the Watauga Medal policy. The motion passed.

Chancellor Woodson then brought two property matters before the Board:

The first, Strategic Acquisition of Real Property by Lease for University Towers, allows NC State to lease overflow residential housing for students and residential advisors for the 2018-19 academic year.

The second property matter, Acquisition of Real Property by deed, is to purchase 33 acres in Ellerbe, NC, to be an addition to the Sandhills Research Station, which will enhance the Station's ability to conduct water deficit research.

Mr. Andrews made the motion, seconded by Mr. Kelly, to approve these two property matters. The motion passed.

COMMITTEE REPORT

UNIVERSITY AFFAIRS COMMITTEE – CHAIR STAN KELLY

Mr. Kelly reported that the University Affairs Committee approved the following consent agenda items:

- Continuation of three Centers that have completed their required periodic review per university regulations;
- Designation that five Distinguished Professorships may be awarded on a time-limited basis;
- Conferral of tenure to nine new faculty members who will begin employment this fall; and
- Bonus structures for coaching staff in softball and rifle in accordance with non-salary and deferred compensation policy 05.15.03.

Mr. Kelly reported that the committee recommended approval for revisions to the following four policies to the full board:

- 05.25.01 Faculty Grievance and Non-reappointment Review Policy
 - There is one update to the policy, in Section 2.1, to adjust the requirements for the grievance/review committee membership to account for colleges that appoint faculty only on non-tenure track contracts.
- 04.25.05 Equal Opportunity, Non-Discrimination and Affirmative Action Policy
 - Addition of a values statement.
 - Updated for technical corrections and clarification edits.
- 11.35.01 Code of Student Conduct
 - Updated to comply with the previously discussed EEO policy and to provide technical corrections and clarification.
 - The effective date of these revisions is August 1, 2018, which is the conclusion of the Summer Session II.
- 05.15.01 Employees Exempt from the State Human Resources Act (EHRA) Policy
 - Two edits are being recommended at the Chancellor's discretion regarding method of discharge for cause notification and the transfer of leave from other institutions.
 - The effective date of these revisions is July 1, 2018.

Mr. Kelly made the motion, seconded by Dr. Prestage, to approve the revisions to the four policies. The motion passed.

Mr. Kelly reported that Provost Arden informed the committee of four graduate certificates that will be effective this fall. He also reported that in closed session, the committee approved head coach employment agreements for softball and rifle and recommended a salary action for approval by the Board of Governors. In addition, the committee recommended an emeritus status request which will be considered by the full board in closed session at the conclusion of this meeting.

CLOSED SESSION

With no further business in open session, Mr. Kelly made the motion, seconded by Mrs. Ward, at 12:05 p.m. to go into closed session to prevent the premature disclosure of an honorary award, to consult with our attorney in order to preserve the attorney client privilege, and to hear a report concerning an investigation of alleged criminal misconduct. The motion passed.

North Carolina State University
Board of Trustees Open Session Minutes
July 19, 2018
Page 4

RECONVENE IN OPEN SESSION

With no further business in open session, Chair Clark adjourned the meeting at 12:45 p.m.

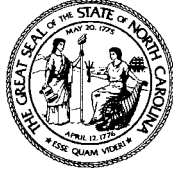
Respectfully submitted,

Assistant Secretary

Secretary

Approved:

Chair of the Board



NORTH CAROLINA STATE ETHICS COMMISSION

SAMPLE¹

ETHICS AWARENESS & CONFLICT OF INTEREST REMINDER

(to be read by the Chair or his or her designee at the beginning of each meeting)

In accordance with the State Government Ethics Act, it is the duty of every [Board] member to avoid both conflicts of interest and appearances of conflict.

Does any [Board] member have any known conflict of interest or appearance of conflict with respect to any matters coming before the [Board] today?

If so, please identify the conflict or appearance of conflict and refrain from any undue participation² in the particular matter involved.

Rev. 1-16-07

¹ N.C.G.S. §138A-15 (e): “At the beginning of any meeting of a board, the chair shall remind all members of their duty to avoid conflicts of interest and appearances of conflict under [Chapter 138A].” There is no set language required by the Act. Specific language can and should be tailored to fit the needs of each covered board as necessary.

² “A public servant shall take appropriate steps, under the particular circumstances and considering the type of proceeding involved, to remove himself or herself to the extent necessary, to protect the public interest and comply with this Chapter, from any proceeding in which the public servant’s impartiality might reasonably be questioned due to the public servant’s familial, personal, or financial relationship with a participant in the proceeding.” See N.C.G.S. §138A-36 (c). If necessary, the Chairman or individual member involved should consult with his ethics liaison, legal counsel, or the State Ethics Commission to help determine the appropriate response in a given situation.

NORTH CAROLINA STATE UNIVERSITY

BOARD OF TRUSTEES

RESOLUTION OF APPRECIATION

TO

DAVID R. NIMOCKS III

WHEREAS, David R. Nimocks III has been a loyal member of the NC State University family for over forty years, and

WHEREAS, David Nimocks, Member of the Board of Trustees, has led with integrity and leadership at NC State, working with the highest level of professionalism and pushing for greater levels of excellence in education, and

WHEREAS, David Nimocks demonstrated outstanding involvement within the university and its organizations, such as his active membership on the Board of Trustees, the NC State Alumni Association and the C.W. Dabney Lifetime Giving Society, and

WHEREAS, David Nimocks’ philanthropic generosity included his support of the Wolfpack Club and the creation of an endowment to the NC State College of Life Sciences’ Indoor Urban Entomology Program named in honor of his father, which continues to promote the highest-levels of student excellence, and

WHEREAS, David Nimocks has led his family’s company, Terminix, as an industry powerhouse holding its Presidency until 2004 and, as Chairman, pioneering the creation of a second company, Ensystex, which has gained renown for its impressive and innovative manufacturing presence, and

WHEREAS, David Nimocks’ generosity extended throughout the university and beyond into the surrounding community, exemplifying his good and positively contagious nature as a respected leader and valued member of the NC State family, and

WHEREAS, David Nimocks was a loving and devoted husband to wife Jayne Lynne and father to three sons, creating a NC State Legacy with two sons and one niece all as University Alumni, and

WHEREAS, David Nimocks has epitomized what it means to be an impactful member of NC State, portraying the university’s mission to empower its members and affiliates toward innovation and excellence.

NOW, THEREFORE, LET IT BE KNOWN, that the Trustees of North Carolina State University hereby honor and express their deepest appreciation, heartfelt admiration and enduring respect to David R. Nimocks III for his excellence as a hardworking leader, charitable public servant and inspirational university role model.

Resolved, this the 21st day of September, 2018.

W. Randolph Woodson, Chancellor

Jimmy D. Clark, Chair

Robert F. Andrews III

Dewayne N. Washington

Thomas E. Cabaniss

Edward I. Weisiger, Jr.

Ann B. Goodnight

Jess Errico, Student Body President, (Ex officio)

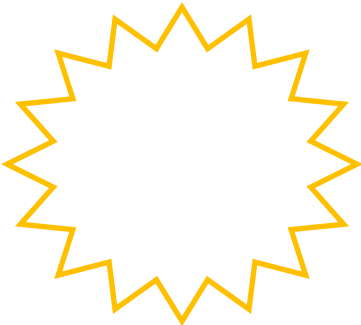
James A. Harrell III

Stanhope A. Kelly

Wendell H. Murphy

Ronald W. Prestage

Susan Ward



The Chancellor's Report

*September 2018***Faculty Success**

Our faculty are accomplishing amazing feats across many disciplines. The American Chemical Society named Melissa Pasquinelli a Fellow to honor her outstanding achievements in and contributions to the chemical sciences. Dr. Pasquinelli is associate department head and director of graduate programs in the Department of Textile Engineering, Chemistry and Science at the College of Textiles. Orlin Velez, INVISTA Professor in the Department of Chemical and Biomolecular Engineering, was also recognized by the American Chemical Society for his research in the field of colloid and surface chemistry. He will receive the 2018 Langmuir Lectureship Award. The Association of Government Accountants recognized Scott Showalter, director of Poole College's Master of Accounting Program and professor of practice in the Department of Accounting, with its prestigious International Achievement Award. This award honors Showalter's leadership and contribution to the exchange of ideas on auditing, accounting, and budgeting on an international level.

Human Health Impact Research

In the College of Veterinary Medicine, Ke Cheng was awarded an American Heart Association grant for research into repairing damage caused by heart attacks. The \$300,000 Transformational Project Award funds Cheng's study exploring heart failure's impact on the reparative ability of stem cells, which can lead to more effective therapies for heart disease. Additionally, researchers from the joint Biomedical Engineering program developed a drug-delivery system that allows rapid response to heart attacks without surgery. The solution relies on porous nanogel spheres, about 250 nanometers in diameter, which target a clot and deliver drugs to dissolve it. The nanogel spheres also limit long-term scarring to heart tissue and preserve more of the heart's normal function. This groundbreaking research will play a vital role in reducing the large number of deaths caused by heart disease in the U.S. every year.

2019 Chancellor's Innovation Fund Recipients

Ashley Brown, assistant professor in the Joint Department of Biomedical Engineering, has developed microgel-based materials that mimic blood platelets, and plans to use the Fund to evaluate further their safety and efficacy. Jose Bruno-Barcena, associate professor of microbiology in the Department of Plant and Microbial Biology has developed a new method for the production of a prebiotic that is yeast-based and cost-effective. Michael Daniele, assistant professor in the Department of Electrical and Computer Engineering and Biomedical Engineering, has created microneedle patches for biofluid extraction which will make interstitial fluid sampling methods painless and decrease the risk for infection. Paul Hess, associate professor of oncology and immunology in the Department of Clinical Sciences, has cultivated a potentially groundbreaking cancer vaccine for dogs, and plans to use the Fund to run a clinical trial of the vaccine in dogs with canine lymphoma. Finally, Srdjan Lukic and Srdjan Srdic, associate and research assistant professors in the Department of Electrical and Computer Engineering have developed a prototype fast charger for electric vehicles that is cheaper to install and faster at charging.

Student Success

Ziad Ali and Madison Maloney, both Park Scholars in the Class of 2019, received a 2018-19 Astronaut Scholarship. This prestigious award is given only to those who demonstrate great skill and dedication in the fields of science, technology, engineering, and mathematics. Madison has now won this award for two consecutive years, and plans to continue pursuing aerospace engineering to fuel her natural interest in human space exploration. Ziad wants to use his electrical and biomedical engineering knowledge to develop circuits and systems to solve issues related to neurological disorders.

The Foundation for Food and Agriculture Research (FFAR) announced 17 inaugural recipients of the FFAR Fellow award, among whom were NC State graduate students Lindsey Becker, Alison Deviney, and Camilo Parada Rojas. The program provides fellows with the resources they need to carry out research in the areas of food and agriculture, and to transition smoothly into the workforce.

Advancement

We are 84 percent of the way towards achieving our goal of \$1.6 billion for the 'Think and Do the Extraordinary' campaign. Nearly 80,000 people from all 100 counties in North Carolina, all 50 states, and 62 countries have donated to the campaign. These donations have created nearly 1,700 new funds providing scholarships, fellowships, programmatic and facility support. Seventy-five out of 203 endowed faculty positions have been established, including the first ever dean's chair within the Poole College of Management and the first endowed chair in the College of Veterinary Medicine. Due to funding provided by the campaign, NC State's Study Abroad Office awarded nearly \$2 million in scholarships to 1,333 students, which resulted in a 129 percent increase in study abroad enrollment. NC State's endowment has more than doubled since 2010 and stands at \$1.3 billion.

Money Magazine Ranking

NC State ranked number 31 out of 727 colleges in the U.S. in *Money's* "Best Colleges for Your Money 2018" and number one out of colleges in North Carolina. It is one of only two colleges in North Carolina in the top 50 rankings. The ranking is determined by educational quality, affordability, and alumni success, which proves that NC State is a great investment for college students. The article noted that 90 percent of NC State students who need financial assistance receive grants, and that after graduation students achieve early-career earnings of almost \$54,000 annually.

Athletics

The College Swimming Coaches Association of America named 25 men and women on the Wolfpack Swimming and Diving team Individual Scholar All-Americans. Additionally, both the men's and women's squads were recognized as Scholar All-America Teams for the 2018 spring semester by achieving a team GPA of 3.0 or higher. This honor is a testament to the intelligence and hard work of NC State's student-swimmers.



Accomplishments Report | July 2017-June 2018

Randy Woodson, Chancellor of North Carolina State University

Strategic Planning

Goal 1: Student Success

While balancing access with quality, NC State must ensure that our students make timely progress toward an NC State degree, while having educational opportunities that inspire them to lead, serve, challenge, build problem-solving skills, and engage with complex problems.

- In the 2017-18 academic year, NC State enrolled a competitive academic group of more than 4,700 incoming students. The group included 206 Valedictorians and Salutatorians along with 514 first-generation students.
- In 2017-18 NC State launched the Spring Connection program, welcoming its first cohort of more than 460 students in January 2018. Through this program, students that would have been denied for fall admission were able to be deferred until the following spring. Spring 2018 participants were diverse, with significant increases in underrepresented populations, women, and students from Tier 1 and Tier 2 designated counties; 24% of students were first-generation students, 38% were from rural NC counties and 34% were non-white. Students finished their first semester with 94% in good academic standing. Over 470 students made enrollment deposits for spring 2019, with a 26% increase in the number of students from rural counties.
- Graduation rates have increased since the strategic plan was implemented, with the four-year undergraduate graduation rate up 15 percentage points, and the six-year undergraduate graduation rate up six percentage points to 79%. Based on preliminary analysis, NC State is set to pass its goal of 80% in 2018-19.
- The university conferred 9,314 degrees this academic year, with the number of bachelor's degrees conferred up by 9%, master's 31%, and doctoral 36%.
- NC State students were recognized with the following prestigious scholarships and fellowships this year: one Marshall Scholar, one Goldwater Scholar, one Truman Scholar, one Udall Scholar, one Astronaut Scholar, one Fulbright U.S. Student Program grant recipient, 14 Gilman Scholars, one Critical Language Scholar, one Boren Scholar, one Mount Vernon Leadership Fellow, 22 (16 undergraduate and 6 graduate) National Science Foundation (NSF) Graduate Research Program Fellows, and two Hollings Scholars. Students from each college have been recognized for their scholarship, and here are a few highlights:
 - Kobi Felton, a senior majoring in chemical engineering, was awarded the prestigious 2018 Marshall Scholarship. Felton is the third NC State student to receive the scholarship, and he plans to study chemical engineering and nanomaterials. The British Parliament created the Marshall Scholarship, named after American soldier and statesman George C. Marshall, to give top American students the opportunity to earn

graduate degrees in the United Kingdom.

- Tyler Allen, a PhD student and graduate research assistant in the College of Veterinary Medicine, was named to *Forbes'* 30 Under 30 List for his groundbreaking research on the molecular mechanisms of cancer cells. His research has led to the innovative Cancer Exodus Hypothesis.
 - Madison Maloney, a senior majoring in aerospace engineering, was selected as a 2018 Goldwater Scholar. After graduation, Maloney plans to pursue a PhD in Aeronautics and Astronautics and conduct research on human space exploration systems at NASA or a national lab. Maloney is NC State's 51st Goldwater Scholar.
 - Ashley Lawson, a junior studying mathematics and mathematics education, and was selected as a 2018 Truman Scholar. The Truman Scholarship is a highly competitive, merit-based award offered to those who wish to attend graduate school in preparation for a career in public service. Lawson is the third NC State student to receive this prestigious award.
 - Meredith Bain, a junior majoring in mathematics and German studies, was recently selected as a 2018 Udall Scholar. The Udall Foundation awards its highly-regarded undergraduate Udall Scholarship to individuals committed to issues related to the environment and to Native Americans and Alaska Natives in fields related to health care and tribal public policy. Bain is NC State's 15th Udall Scholar. Thomas Reed, a junior studying fisheries, wildlife, and conservation biology, was selected as a 2018 Honorable Mention.
 - Students taking Professor Wayne Place's advanced studios course on airport design were invited to participate in the prestigious Biennale International Architecture Exhibition in Venice, Italy. They presented their "Airports of the Future" team project that addressed global challenges of geographic location, user experience, technology, and innovative design solutions.
- NC State will also have a competitive incoming Freshman class. The university received 29,861 applications, an increase of 12% from last year, and expects to enroll more than 4,750 freshmen. The university admitted 46% of applicants and the incoming freshmen class represents 95 NC counties, 40 states, and 19 countries. Committed to accessibility, especially for rural students, NC State admitted 47.4% of Tier 1 and 2 applicants.
 - Thanks to an expansion of private support, the Goodnight Scholars Program accepted its second class of transfer students, providing a full scholarship to 15 NC Community College students so they can continue their education at NC State and complete their STEM degrees. The Goodnight Scholars Office extended approximately 200 invitations to apply and received more than 100 applications from transfer applicants – more than twice the number they received in their first year. This brings the total number of Goodnight Scholars up to 225 in Fall 2018.
 - In order to increase opportunities for students in NC's rural areas, the university initiated a number of programs in recent years. Participants in these programs take a summer session at NC State, then their first year of coursework at an NC community college or other institution. While completing their coursework outside of NC State, students are supported through

mentoring and academic advising to ensure that the credits they receive will apply toward their degree at NC State. One example is the ACT Supplemental Preparation in Rural Education (ASPIRE) program is designed to help students from rural areas prepare for college entrance examinations. Another is the CONNECT program, designed for transfer students interested in the Forestry and Environmental Resources degree programs.

- As another means of increasing rural engagement, Rural Works!, created through a partnership between the Division of Academic and Student Affairs (DASA), the Office of Outreach and Engagement, and NC State Cooperative Extension, was launched in Spring 2018. Rural Works! is an internship program that supports NC State's commitment to social, economic, and technological development across North Carolina by offering an engaging internship experience for high-caliber students to work with employers to achieve their workplace goals in rural Tier 1 counties.
- NC State is also focused on helping students overcome class, social, and cultural barriers to higher education. Via the TRIO program, NC State supports a commitment to provide educational opportunity for all Americans to begin college, graduate, and move on to participate more fully in realizing "America's Economic and Social Dream."

Goal 2: Scholarship and Research

NC State's research culture permeates every aspect of the university. It is the foundation on which we build an innovative learning environment that engages our faculty, undergraduates, and graduate students alike. NC State's research quality determines our impact on the workforce, the economy, the advancement of knowledge, and the human condition.

- Over the past year, NC State faculty earned some of the world's most prestigious awards and accolades. These include the National Academy of Sciences Prize in Food and Agriculture Sciences, a Sloan Research Fellowship, a Heinz Award for Technology, the Economy and Employment, the U.S. Department of Energy Early Career Research Award, an Olney Medal and the O. Max Gardner Award, among others. The university also has 27 members of National Academies (one new member this year), 45 American Association for the Advancement of Science fellows, 44 active NSF CAREER Awards, 5 NSF Early Career Development Awards, and 11 National Academy of Inventors Fellows (two new members this year). In addition, NC State was recognized as a Fulbright Top Producing Institution with eight Fulbright Scholars and a Fulbright Distinguished Chair Award. Here are snapshots of some of these individuals:
 - NC State mathematician Tye Lidman received the 2018 Sloan Research Fellowship. Lidman is the fourth faculty member in university's history to receive this honor. His research is focused on gaining a better understanding of the nature of shape and "knottedness" of objects in 3 and 4 dimensions, which can be used to help predict how the actions of different enzymes alter DNA shape. The Sloan Research Fellowship is given to U.S. and Canadian researchers whose achievements mark them among the very best scientific minds working today.
 - Joseph M. DeSimone, the William R. Kenan, Jr. Distinguished Professor in Chemistry and Chemical Engineering received the 22nd Heinz Family Foundation's Award in Technology, the Economy and Employment for his achievements in the creation and commercialization of advanced technologies in several groundbreaking fields, including

3D printing, precision medicine, green chemistry and nanoparticle fabrication.

- Richard Longland, an Assistant Professor in the Department of Physics, received a 2017 U.S. Department of Energy Early Career Research Award. This award supports Longland's investigation into nuclear reactions occurring in stars.
- Peter Hauser, Professor in the Department of Textile Engineering, Chemistry and Science, is the 8th professor in NC State's history to receive the American Association of Textile Chemists and Colorists' (AATCC) Olney Medal Award for 2017. The AATCC presents the Olney Medal once a year to a leader in the field for outstanding achievements in both textile and polymer chemistry.
- Ruben Carbonell received the 2018 O. Max Gardner Award from the UNC Board of Governors. His work as a researcher, mentor, and educator has led to landmark studies, more than 40 patents, and a number of successful students. This is the highest honor awarded to teachers and researchers in our university system. Carbonell is NC State's 4th recipient in the last six years.
- Rodolphe Barrangou, Todd R. Klaenhammer Distinguished Scholar in Probiotics Research and Professor of Food, Bioprocessing and Nutrition Sciences, was elected into the National Academy of Sciences (NAS). The NAS is one of the world's most important and influential scientific societies. Barrangou is the 9th current faculty member to be elected. Barrangou also received the 2018 National Academy of Sciences Prize in Food and Agriculture Sciences. The award recognizes research by mid-career scientists at U.S. institutions who made extraordinary contributions to agriculture or to the understanding of the biology of a species fundamentally important to agriculture or food production. Barrangou was selected for his discovery of genetic mechanisms and proteins driving CRISPR-Cas systems. His research has worldwide applications in food and agriculture, including virus resistance and potential for translational genome editing in other microbes, crops and livestock.
- NC State's two new inductees into the National Academy of Inventors were Donald L. Bitzer, Distinguished University Research Professor of Computer Science, and William Ditto, Professor of Physics. They were nominated for outstanding contributions to innovation in areas of patents and licensing, discovery and technology, significant impact on society and enhancement of innovation.
- Patrick Rand, Distinguished Professor of Architecture in the College of Design, received the Distinguished Chair selection with the Fulbright U.S. Scholar Program in Finland.
- Other notable highlights of accomplishments from the past year included:
 - College of Sciences Dean and Professor of Pharmacology Chris McGahan was elected president of the International Society for Eye Research (ISER). ISER provides eye and vision researchers with the opportunity to connect with other researchers around the world to discuss contemporary topics in the field. McGahan will lead ISER's business affairs and other activities as well as oversee appointments to committees. McGahan is an expert in ocular physiology and pharmacology, and her research focuses on the

biochemistry of the ocular lens and retina.

- A team of researchers from the College of Textiles, College of Natural Resources, and College of Agriculture and Life Sciences developed an insecticide-free, protective, comfortable and breathable clothing linen that defends against biting insects. These products have proved to be more than 98% effective under extreme mosquito exposure. Further research is being conducted to investigate potential applications of the linen, specifically a line of maternity wear to protect pregnant women from exposure to mosquito-borne diseases like the Zika virus.
- John Thomas, John S. Risley Distinguished Professor of Physics, was inducted as a Fellow of the American Association for the Advancement of Science (AAAS), one of the nation's most prestigious scientific honors. Each year AAAS, the world's largest scientific society and publisher of the journal *Science*, elects members who have shown "scientifically or socially distinguished efforts to advance science or its applications." Thomas is honored by AAAS for his groundbreaking contributions to the study of ultra-cold atomic Fermi gases, in particular measurements of the equation of state and of transport properties. Thomas is the 14th NC State faculty member to become an AAAS fellow.
- Fran Ligler, the Lampe Distinguished Professor of Biomedical Engineering, received NC State's Innovator of the Year Award for her work in biosensors, fluid control technology, and her recent development of microfluidic devices for use as diagnostic tools.
- As the result of a rare tie vote, the John S. Risley Entrepreneur of the Year Award went to both Matthew Breen and Marian McCord. Breen is the Oscar J. Fletcher Distinguished Professor in Comparative Oncology Genomics. Founder of the Sentinel Biomedical company, he has made tremendous contributions to the biomedical field identifying genetic mutations that could lead to cancer in dogs. McCord, Associate Dean for Research in the College of Natural Resources, is a world-renowned pioneer in the field of atmospheric plasma treatment of fibers and polymers. McCord has been a dedicated scientific advisor to Sustainable Health Enterprises and contributed to the development of "Rynoskin Total", a product created to protect against Zika and other mosquito-borne diseases.
- Daniel Stancil, Alcoa Distinguished Professor and Head of the Electrical and Computer Engineering Department, was named President of the Electrical and Computer Engineering Department Heads Association. Stancil was selected for his dedication, expertise, and commitment to his field.
- Assistant Professor of Mathematics David Papp is working on an algorithm to personalize radiation treatments for cancer patients. Papp's "spatiotemporal fractionation" approach would reduce radiation dosage to healthy tissue while maintaining effectiveness against the tumor. Papp completed a proof-of-concept study on live tumor samples, the results of which were published in *Physics in Medicine and Biology*.
- Assistant Professor in the Department of Statistics Eric Chi received a Faculty Early Career Development Award from the National Science Foundation (NSF). This award is also known as the NSF CAREER award and one of the highest honors the NSF bestows

upon young faculty in the sciences. The five-year award helps Chi in his research to develop a new framework that will effectively analyze high-resolution data collected in fields such as bioinformatics and neuroscience.

- The Ecological Society of America honored Forestry Professor Zakiya Holmes Leggett with the Commitment to Human Diversity in Ecology Award. This award is presented to members who encourage and support minority students interested in ecology during their educational experiences. Leggett participated in one of the first cohorts of the Strategies for Ecology Education, Diversity, and Sustainability program at Tuskegee University and has remained involved as a mentor and member of the advisory board. At NC State, she serves as the Doris Duke Conservation Scholars program director and has created career development programs for minority students in the Minorities in Agriculture, Natural Resources and Related Sciences professional society.
- In 2012, the University Faculty Scholars Program was established to recognize and reward emerging academic leaders, with approximately 20 new scholars selected each year. The 2018-19 cohort of 20 University Faculty Scholars was announced in February 2018, bringing the total number of scholars named to 126. Starting this year, scholars carry the title for the duration of their faculty appointment at NC State and receive a 5% increase to their base salary.
- Regarding reappointment, promotion and tenure, 149 cases were reviewed in the 2017-18 cycle; 146 cases were successful, resulting in 49 reappointments, 30 promotions with tenure, 6 tenure conferrals of associate professors (no change in rank), 41 promotions to professor and 20 promotions of professorially ranked, non-tenure track faculty.
- With exceptional faculty come challenges of retaining them in a highly competitive environment. Regarding faculty retention and recruitment, of 27 retention/counteroffer efforts as of June 30, 2018, 23 (85%) were successful. The university also funded more than \$12M in faculty start-up packages (44 new in 2017-18 and 112 additional from previous years with multi-year funding) and facilitated two key underrepresented minority faculty recruitments through the Targets of Opportunity program.

Goal 3: Interdisciplinary Scholarship Addressing Grand Challenges

The history and mission of NC State call for us to address the major challenges that confront the world. Addressing complex problems with many disciplinary aspects requires assembling teams of scholars with varied skills and diverse perspectives. We maximize the impact of NC State's research by concentrating resources in areas where we have strategic strengths and by creating a culture of collaboration and interdisciplinarity, which enriches not only our research activities, but also our teaching and engagement.

- A portion of new faculty have been hired into clusters under the Chancellor's Faculty Excellence Program (CFEP), a key driver of enhancing interdisciplinary scholarship at NC State. All of the clusters leverage existing strengths and have the potential to establish NC State as a national leader in their respective fields. CFEP's strategic investments have attracted top faculty and graduate students from North Carolina and around the world, generated partnerships with government and industry, and garnered millions of dollars in external research funding. Since the program's inception in 2011, more than 70 new CFEP faculty have been hired for clusters including Leadership in Public Science; Global Water, Sanitation and Hygiene; and

Bioinformatics, among others. The CFEP website (facultyclusters.ncsu.edu) has the latest information on cluster achievements so the public can learn about the real-world challenges being researched, the diverse individuals involved, and their accomplishments.

- NC State has a national reputation for addressing society's grand challenges. The university is one of only two in the country currently leading two active National Science Foundation Engineering Research Centers. Both of these are creating innovative solutions to solve some of the world's most pressing grand challenges.
 - The Future Renewable Electric Energy Delivery and Management (FREEDM) Systems Center focuses on smart-grid technology and is working to create distributed energy resources that intelligently manage power using advanced power electronics.
 - The Center for Advanced Self-Powered Systems of Integrated Sensors (ASSIST) focuses on developing nanotechnology-enabled energy harvesting and storage, ultra-low power electronics, and sensors to create battery-free, body-powered, and wearable health monitoring systems.
- NC State is a top-tier research powerhouse. In FY 2016-17, NC State research expenditures exceeded \$500 million for the first time in the university's history. In FY 2017-18, research expenditures are expected to again exceed \$500 million.
 - This fiscal year, NC State researchers and research administrators submitted 3,413 proposals valued at \$1.15 billion in total funding requests.
 - NC State received \$335 million in extramural research awards to be dispersed over multiple years to 2,721 projects.
 - The Proposal Development Unit supported the development and submission of 56 large-scale, interdisciplinary team proposals that resulted in \$20.5 million in awards with another \$38.5 million requested still pending.
 - Since 2009, NC State total research awards have increased by 63%; however, sponsored award totals dropped from FY 2017 to FY 2018. The decrease in awards can be attributed to two factors. In FY 2017, NC State received an atypically large grant from the Golden Leaf Foundation in support of the Plant Sciences Initiative for \$48 million, which boosted the overall research award numbers. In addition, the FY 2018 numbers were negatively impacted by the uncertain budgetary climate at the federal level and the resultant restraint in making federal awards – especially large ones. This federal deficit is expected to be made up by the end of calendar year.
- NC State's research commercialization and startups continue to be a differentiator for the university. This year saw a record-breaking 20 startups form based on NC State intellectual property. The Association of University Technology Managers ranks NC State 2nd for licenses and options executed, 5th for invention disclosures, and 5th for startups launched among all US universities without medical schools. All of this was achieved while NC State continued to strengthen its partnerships with the public, government, and private sectors. This year Centennial Campus Partners opened 13 new offices on campus bringing the total number of Partner employees on campus to 4,800, a 4% increase from last year.

- NC State's Data Science Initiative (DSI) continues to promote coordinated efforts across campus and across the UNC system – with UNC Chapel Hill and UNC Charlotte – to provide extensive undergraduate, graduate and non-degree education in data science and analytics. This includes undergraduate, graduate and executive education courses, certificates and master's degrees in data sciences, and general non-degree training for students, faculty and the general public. In FY 2015-16, a series of one- and two-day education classes were created in partnership with the Odum Institute for Research in Social Science and the National Consortium for Data Science (NCDS). The weeklong series provided faculty, students, staff and researchers an opportunity to enhance their skills in data analytics. In FY 2017-18, the program included 15 courses with 191 attendees enrolled, comprising mostly graduate students who would use data science methods in their research. DSI also organized a series of invited talks by renowned Data Science experts, an IBM Watson system training boot camp, and a number of Smart Cities events and projects. Finally, DSI proactively helped with establishment of a new NSF Industry–University Cooperative Research Center called Center for Accelerated Real Time Analytics.
- The Research Leadership Academy (RLA) was established in fiscal year 2016 to promote the culture of research leadership at NC State. In its second year, RLA included 23 members with another eight memberships awarded in Spring 2018. This year, RLA focused on establishing programs to support the mentoring of faculty on campus. The programs included three Lunch and Learn workshops and two Research Forums with a total participation of 150 faculty members.
- Established in 2010 to bridge the gap between research and commercialization, the Chancellor's Innovation Fund helps teams bring their technology to market by providing winning teams with \$75,000 in proof-of-concept funding. The primary objective is to advance technologies through commercially relevant milestones over the course of 12 months. Since its establishment, \$2.6 million in funding has been awarded to 40 projects. These projects have led to \$33 million in external development funds, 35 commercialization agreements worth over \$1 million in license revenue and 16 startup companies.
- In the Fall of 2017, NC State was awarded an NSF Innovation Corps (I-Corps) Site and received \$500,000 to advance the commercialization of research discoveries. This collaborative six-session program awards teams \$3,000 to conduct 100+ voice-of-the-customer interviews. The program also prepares the teams to compete for the \$50,000 NSF I-Corps Teams program. Participation in the program establishes NSF lineage for applying to other NSF programs aimed at prototyping, Small Business Innovation Research and Small Business Technology Transfer. In its first year, the NC State program ran two I-Corp cohorts and graduated 19 teams.
- NC State was also selected as one of four locations in the United States for listening sessions held by the Secretary of Agriculture Sonny Perdue. The Biotech Ag Panel focused on increasing rural prosperity through the discussion of agricultural biotechnology and its impact on agricultural and rural economies. NC State was chosen as a host site because of a reputation as a pre-eminent research enterprise and demonstrated economic impact. Dean Linton from the College of Agriculture and Life Sciences moderated, while CALS faculty members Parr, Drach, Barrangou, and Ward served on the panel.
- In partnership with Research Triangle International and the Kenan Institute for Engineering Science and Technology, support continued for the Game-Changing Research Incentive Program (GRIP). The goal of GRIP is to enable visionary research projects that will have great societal

impact, result in significant follow-on extramural funding as well as superior interdisciplinary graduate education and training. Five teams of NC State faculty and their collaborators across the Triangle continued to pursue their project goals that led to a number of early tangible results, including a provisional patent, a start-up company, and follow-on state and federal funding.

- There are currently 14 public-private manufacturing institutes in the National Network for Manufacturing Innovation (NNMI). NC State is directly involved in seven of the 14 institutes — the most of any university in the country. The Office of Research and Innovation supports interactions with all seven of the NC State teams that are part of the NNMI (e.g., PowerAmerica, AFFOA, ARM, America Makes, NIIMBL, DMDII, CESMII, RAPID). This includes the stand-up phase of the National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL), an Institute based at the University of Delaware but heavily dependent on NC State's Biomanufacturing Training and Education Center. Construction of a new NIIMBL laboratory within BTEC was completed in FY 2018, and instrumentation was obtained to support NIIMBL-related research and workforce development projects. Funds provided by the State of North Carolina to support NIIMBL activities helped to attract 11 new research and workforce development projects to the State, enabled NC small and medium-sized enterprises to join NIIMBL and provided partial support for NIIMBL personnel based at NC State.
- Building on the 30-year partnership with IBM, on May 9, 2018, NC State became the first university-based IBM quantum-computing hub in North America. With access to the IBM Q Network's growing quantum computing ecosystem, the NC State Q hub will add a limited number of industry and university partners as members to work on projects that will address the grand challenges of society with true future-forward vision. Starting this fall, NC State faculty, students and hub members will have access to IBM Q commercial quantum computing devices, including the most advanced and scalable universal systems available. The current 20-qubit IBM Q system will be followed by a next generation 50-qubit prototype, anticipated in first quarter 2019.
- The Smart Cities Initiative continued to strengthen collaboration with the City of Raleigh and other strategic municipal and community partners, as well as advancing four joint research projects to solve local and global challenges. Building on the success of the Memorandum of Understanding (MOU) established with the City of Raleigh last year, discussions are underway to pursue an MOU with the Town of Cary. Last year's inaugural Smart Cities summit brought together city, industry, academic leaders and more than 350 attendees to share ideas aimed at making our region smarter and more connected. The 2018 Summit will be held on October 31, 2018 with \$10,000 in support from the City of Raleigh. The Smart Cities team is also collaborating with university and external partners on the submission of a large-scale NSF grant proposal called Platforms for Advanced Wireless Research.
- Here are several highlights that provide a snapshot of the range of research and scholarships taking place across NC State's campus:
 - Researchers at NC State and Duke University have developed a way to assemble and pre-program tiny structures made from microscopic cubes – “microbot origami” – to change their shape when actuated by a magnetic field. Then, using the magnetic energy from their environment, these microbots perform a variety of tasks – including capturing and transporting single cells. The findings pave the way for microbots and micro-origami assemblies that can serve as cell characterization tools, fluid micromixers, and

components of artificial muscles and soft biomimetic devices.

- A team of computer science and education researchers from NC State and museum researchers from the North Carolina Museum of Natural Sciences collaborated on a project to better understand how museum visitors interact with educational exhibits. Knowing how guests interact with such exhibits can influence the future design of museum areas to better engage and educate the public. The work was supported by a \$1.95 million grant from the National Science Foundation's Advancing Informal STEM Learning program that runs through 2021.
- Researchers with NC State's Center for Geospatial Analytics used immersive virtual reality to test perceptions of green enclosures and aid in the future development of city green spaces. Researchers used a robot to capture 360-degree, high-resolution images of a downtown Raleigh plaza and city park, then manipulated the vegetation to create several different environments. Study respondents provided mixed feedback on the different environments, which has prompted another round of research. Follow-up studies are being conducted in the College of Natural Resources, while a team of researchers from NC State and Clemson University are collaborating to study whether there are cultural differences in landscape preferences.
- An interdisciplinary group of NC State researchers from public administration, psychology, social work and sociology partnered to study North Carolina's Community Child Protection Teams (CCPTs). CCPTs are found in all North Carolina counties and look for community-based solutions to child abuse and neglect. The team of researchers studied how effectively CCPTs function in North Carolina and whether alternative models should be considered. The results will be compiled into a report and recommendations for state officials so they can make decisions that will better equip North Carolina to address child abuse and neglect.
- An economic analysis conducted by NC State, Oregon State University, and RTI International found that the economic benefits of biodiversity and habitat preservation significantly outweigh the costs of off-road vehicle restrictions at Cape Hatteras National Seashore. The study provided insight into the relative economic value of efforts to balance environmental protection with human access to public lands and avenues for boosting North Carolina's economy.
- The Namibia Wildlife Aerial Observatory Project was co-founded by NC State Professor Larry M. Silverberg and three Namibian partners: Naankuse, a private wildlife sanctuary; the Namibia Ministry of Environment and Tourism, which manages the country's national parks; and the Namibia University of Science and Technology. The program allows field units of 8-12 undergraduate students to gain professional, academic, and cultural experiences as they work with professors and researchers from each of the partnering organizations. The pilot program in fall of 2017 saw 10 undergraduate students studying the reactions of animal wildlife to unmanned aerial vehicles. It was such a success that the program will be expanded to multiple project teams and opened to students and instructors from Europe and other countries.
- NC State's Department of Social Work has received two federal grants totaling \$3.1M to train the next generation of integrated behavioral health and primary care providers. The

first grant will provide four years of funding to develop and enhance the credentials of professionals working in addiction and recovery interventions, child welfare, and schools. The specialized training will prepare students for certification and/or licensure. The second grant funds the Behavioral Health Scholars program, led by principal investigator and Assistant Professor of Social Work Jodi Hall. This program will educate and train 30 graduate social work students each year over the next four years.

- Oracle selected NC State as a university partner to pilot a new program that uses big data to solve grand challenges in everything from agriculture to textiles to engineering. Oracle will work with the university – and CALS in particular – to launch a project that focuses on sweet potatoes. Using big data could accelerate the pace at which crops like the sweet potato are bred. It took 10 years to develop the popular Covington variety, and new technologies derived from big data could whittle that to just three or four years.

Goal 4: Organizational Excellence

NC State's standard of excellence applies to all faculty and staff and to all departments, institutes, centers, and units. Achieving excellence requires constant attention, self-assessment, inclusion, and the courage to change and adapt.

- The Office of Research and Innovation, the Provost's Office and the Office of Finance and Administration partnered in the development of a new University Shared Core Research Facility, called the Molecular Education, Technology and Research Innovation Center (METRIC), was established. METRIC focuses on mass spectrometry, nuclear magnetic resonance spectroscopy and X-ray crystallography. Investments over the next several years in state-of-the-art instrumentation and refurbished research space has the potential to develop METRIC into the premier chemical and biochemical characterization facility in the South East.
- A new Enterprise Research Administration (ERA) system is in the works for our campus community. The ERA system project seeks to simplify and streamline research activities across the university with multiple objectives, including providing researchers and administrators with the software tools they need to more easily prepare and submit proposals and provide a means to ensure adherence to contractual and regulatory compliance requirements. The new system will increase research integration and collaboration prominence in the years to come, and portions of the system could go live as early as the end of 2018.
- NC State was featured in the 2017 *Diverse Issues in Higher Education* rankings. The list highlighted the top 100 institutions awarding bachelor's, master's, and doctoral degrees to African-American, Asian-American, Native American, and Hispanic students across all disciplines.
- NC State restructured all entrepreneurial activities under the Entrepreneurship Alliance, which seeks to instill students with an entrepreneurship mindset that they will need to thrive in the career of their choice, creating a smart-hub for thinkers and doers. The alliance incorporates a complete infrastructure of academic programs, faculty talent, cutting edge tools/spaces, investor networks and institutional support, including a technology transfer office that is among the best in the nation. Some of the amazing innovative spaces the program offers include the Entrepreneurship Clinic in Downtown Raleigh, the eGarage, the Albright Entrepreneurship Village and the Makerspace. These spaces couple with innovative ingenuity to create an emerging

creativity powerhouse on campus and in the surrounding community.

- The NC State Entrepreneurship Clinic in Poole College of Management was awarded the 2018 Excellence in Co-Curricular Innovation Award from the United States Association for Small Business and Entrepreneurship. The award recognizes the Entrepreneurship Clinic's novel approach to fostering innovation, serving as a classroom for experiential learning, a physical space where students can execute their ideas, a locus of interaction between the university and area startups, and a practical research lab for data collection. This is the second time that NC State has been recognized by the association.
- In FY 2016, the Office of Institutional Research and Planning (OIRP) undertook a partnership with OIT and SAS to establish an institution wide reporting database accessible by all university software platforms and users. Building on the SAS enterprise platform, OIRP—in partnership with OIT and Registration and Records— developed a new online Admission Status Report (ASR) that went into production in spring 2018. Data is captured nightly and displays each day's application counts compared to the same date in the prior year. Tables and charts include information on admission status, selectivity and yield, applicant 10 demographics and academic profiles of entering students, and counts by field of study. A related project is underway in partnership with SAS to develop and deliver optimal enrollment forecasting methods for incorporation with the ASR, provide data transparency for enrollment planners and offer "what-if", or sensitivity, analyses.
- OIRP has continued its support of the institutional implementation of Academic Analytics, a comprehensive scholarly productivity database that provides discipline level peer comparisons to support strategic planning and decision-making. This year, Academic Analytics reports were incorporated into the annual college review process.
- The Office of General Counsel (OGC) created content for the new Free Speech webpage and training at New Student Orientation. OGC continues to lead the Organizational Compliance and Integrity Program and made progress in developing our research compliance training efforts. Further efforts also led to administering NC State's first self-assessment and reporting cycle for compliance owners. The results of the assessment will provide the University Compliance Steering Committee and the Board of Trustees with metrics to better inform strategies, initiatives and resource allocations. The OGC completed their first year utilizing the EthicsPoint hotline with 12 complaints received.
- The university handled a significant number of complex business transactions, the most impactful being the PNC Bank Retail Services Agreement, which provides for sponsorship as the "official bank" of NC State. The agreement is worth \$9 million over fifteen years.
- NC State's alternative transportation programs have had an impressive year:
 - In August 2017, a partnership with LimeBike was launched to bring an affordable bike share program to the campus and the Raleigh area, as well as to help further reduce our carbon footprint and encourage healthy travel habits. By June 30, there were 421 active LimeBikes. Through June 30, LimeBike registered 21,521 unique users who took 84,307 trips, resulting in 41,017 miles of travel by bike, reducing fossil fuel use by 1,270 gallons, automobile trips by 30,229 and 41,017 pounds of Carbon Dioxide from our campus and neighboring areas.

- In August 2017, TransDev began operating the University's iconic Wolfline transit service. The new ten-year contract brought forty new clean diesel buses to operate Wolfline's ten routes. During the 2017-2018 academic year, Wolfline transported 3.5 million passengers between the University's three campus and park and ride lots.
- Within the last fiscal year, NC State encountered a critical challenge: ensure that all research projects with the Department of Defense (DoD) meet the International Traffic in Arms Regulations (ITAR) and the National Institute of Standards and Technology 800-171 security requirements by December 31, 2017, or risk losing federal and state funding. The solution, the Secure University Research Environment, transpired as an urgent need for the university to develop and launch a secure, compliant infrastructure to support sensitive research contracts or grants.
 - The Office of Information Technology (OIT) worked with the Office of Research and Innovation (ORI) and principal investigators to identify all projects requiring DoD security controls and to analyze their unique workflows and determine how to secure each individual project.
 - Constrained by limited time and resources to meet over 100 technical security controls within a few months, OIT quickly developed a short-term solution: use Amazon Web Services GovCloud to address ITAR requirements, which are significantly more restrictive than those of the NIST 800-171 controls.
 - The effort required successful collaboration with stakeholders and subject matter experts across campus. OIT and ORI achieved high compliance, with only a limited need to develop a System Security Plan to work towards full compliance by June 30, 2018.
- Data and privacy have been recurring issues this year. With the European Union's General Data Protection Regulation, the Office of General Counsel worked with campus partners to assess the effectiveness of our compliance efforts and make adjustments. Areas that are affected include international admissions, international employment and NC State's European Center in Prague. We have also initiated a campus wide review of HIPAA compliance with Sports Medicine, Human Resources, Disability Services, Student Health Services and the Counseling Center. The OGC has advised the HR Search Process and Recruitment Work Group on a weekly basis and conducted a thorough examination of search, recruitment and hiring processes and procedures in order to assess areas for improvements and efficiencies. We continue to work with the EHRA Administration Unit in HR and Faculty Affairs in the Provost's Office to revise and improve offer letters and other templates.
- In October, OIT and campus partners implemented a new tile-based navigation that offered a modern look and a mobile, user-friendly interface for the online Portal, the Human Resources System and the Student Information System (SIS). The Employee Self Service and Financial System also underwent a similar upgrade in March of last year. Portal users are now easily able to create new homepages and customize existing ones based on their personal preferences. OIT is continuing to make improvements to SIS, including changes to the online withdrawal process, appeal process, transfer credit process, database architecture, and the admission system.
- Throughout NC State's campus, there are three generations of cabling. Back in the mid-1990s, NC State laid the foundation for its first network infrastructure in its residence halls, installing

Category 5 cabling with a maximum speed of 100 megabits per second. In the early 2000s, Communication Technologies (ComTech) began installing the new Category 6 cabling until 2011 when the new Category 6A standard emerged, capable of 10 gigabits per second and much faster than typical internet speeds today.

- Each year, while most students were on summer break, ComTech worked to complete the massive project, replacing roughly 2 million feet or 370 miles with Category 6A cabling. It also installed 247 new network switches, components that manage devices plugged into a network, upgrading those from 100 megabits per second to 1 gigabit per second. The new cable and network switches provide students with faster internet services when they use the wired or wireless network.
- To improve wireless connectivity, ComTech installed 4,367 access points, or devices that provide wireless access to a wired Ethernet network, in each room of the 20 residence halls and in Wolf Ridge and Wolf Village apartments. The new system means students can freely move around their residence halls and apartments and remain on the network. All residence halls now have either Category 6 or Category 6A cabling, and ComTech is working to replace Category 5 cabling in 15 academic buildings by 2020. Excluding work done before 2012, the project totaled \$6.7 million and came under the projected budget by 1.4%.
- To strengthen wireless connectivity for interactive teaching, ComTech has installed one access point per 40 seats in 160 of the university's general purpose classrooms. The largest auditorium on campus, 3400 Nelson Hall, required 12 access points. The goal is to upgrade the remaining 77 classrooms by the end of December 2018.
- Strategic, on-brand and impactful communications and events have proven essential in achieving university strategic goals. These successful efforts have significantly elevated the recognition and reputation of NC State, its colleges and units. Following are a few highlights:
 - Throughout the year, University Communications' multi-channel advertising/promotion efforts generated more than 100 million impressions and excellent engagement with thought leaders throughout the state and beyond through digital and print advertising. Many millions more impressions were driven via broadcast channels.
 - These efforts drove more than 35,000 media clips – representing a publicity benefit value of approximately \$40 million -- from a media strategy focused on NC State research, academic success, and the university's brand drivers. Examples of outlets include: *NY Times*, *Washington Post*, NPR, PBS, CNN, *Newsweek*, *National Geographic*, *Popular Mechanics*, *Associated Press*, Reuters, BBC, *Wall Street Journal*, *US News*, *Scientific American*, and many others.
 - A priority to amplify stories with federal agencies resulted in NC State research stories being featured on federal agency news sites — including the NSF — more than 50 times.
 - The Social Media Hub generated more than 50 million total impressions and over 1.3 million engagements, and 2.5 million video views with more than 3.4 million minutes watched.

- A Digital Philanthropy communications focus, emanating from the Social Media Hub, resulted in the distribution of 265+ philanthropy-focused posts and tweets across Facebook, Twitter, LinkedIn and Instagram, generating nearly 2 million impressions and thousands of direct engagements.
- NC State also hosted more than 10,000 guests at special events ranging from private dinners at the Point to athletics events to signature Advancement events, ensuring all attendees had a positive, on-brand experience that promoted the Think and Do the Extraordinary Campaign.

Goal 5: Engagement and Partnerships

As the world has changed, NC State's reach has expanded beyond our borders and across the globe, challenging us to be locally responsive to the needs of our community and our state while globally engaged in solving the grand challenges facing our global community.

- An investment in NC State creates an excellent return. Each year, NC State adds \$6.5 billion to the statewide economy, equivalent to creating more than 90,000 new jobs. That represents significant return on investment for our State's citizens in the form of research advances, innovative technologies, successful companies, and skilled graduates ready to join the workforce. In fact, the Milken Institute named Raleigh as the #2 best performing metro area economy in the nation, citing NC State's Centennial Campus and the university's leadership in research, industry partnerships and workforce development as key drivers of the city's booming economy.
- NC State's Centennial Campus is the university's proving ground for highly effective public-private partnerships. The campus is now home to more than 75 corporate, government and nonprofit partners working alongside an equal number of academic departments and units, resulting in real-world opportunities for students and increased innovation. Centennial Campus partners hire more than 300 NC State students each year.
- The Office of Partnerships and Economic Development (OPED) was engaged in more than 50 statewide economic development projects in collaboration with the Economic Development Partnership of NC, Regional Prosperity Zones, Wake County Economic Development and economic development organizations across the state. OPED provided strategic support in recruiting new companies and facilitating the expansion of existing companies statewide. This year's efforts resulted in twelve project announcements with a projected impact of 6,185 potential jobs and \$1.9 billion in potential capital investment created across North Carolina. A few examples are in the following table:

Economic Development Projects – FY 2018

Company	Description	Location	Capital Investment
Eggers (Austria)	700 jobs in manufacturing	Davidson County	\$700M
Triangle Tyre (China)	800 jobs in manufacturing	Edgecombe County	\$800M
Premex (South America)	10 jobs in animal nutrition	Durham County	\$2M
GKN (United Kingdom)	100-200 job expansion in automotive and aviation manufacturing	Alamance County	\$179M

- NC State's Office of Technology Commercialization and New Ventures (OTCNV) launched a record 15 startup companies, executed a record 169 licenses and options, and filed 241 patents in FY 2017. OTCNV expanded its Executive in Residence program to bring experienced entrepreneurs, investors, and industry executives to campus to connect with university innovators and early stage startup companies. OTCNV was also part of a cross-campus initiative to launch an alumni investor network to support university-affiliated startup companies. The Wolfpack Investor Network, launched last fall to connect NC State alumni angel investors with promising university-affiliated startup companies, already has over 70 new members and has invested in six startups to date.
- The Plant Sciences Initiative is a \$160.2 million project to create a highly collaborative and interactive environment where the College of Agriculture and Life Sciences can build multidisciplinary partnerships with government, industry, and regulatory agencies regarding the grand challenges of agriculture, agribusiness, and plant research (e.g., food production, sustainability, disease resistance, and climate change). Plant Sciences is anticipated to be completed on Centennial Campus in June 2022.
- NC State's industry and community partnerships continue to prosper and grow. Some examples include:
 - ABB, Centennial Campus's first corporate partner, focuses primarily on advancements in smart grid and clean energy technology. ABB has hired more than 250 graduates and employs students as interns. The corporation is also a partner with many Centers and Institutes including FREEDM, PowerAmerica, and the Center for Additive Manufacturing and Logistics.
 - The Golden Leaf Biomanufacturing Training and Education Center is a unique, cross-disciplinary instructional center that provides educational and training opportunities to develop skilled professionals for the biomanufacturing industry. Undergraduate and graduate courses are taught here, industry training is provided, and it also offers bioprocess development and analytical services to academia and industry.
 - The School of Knowledge Economy and Management (SKEMA), a highly ranked and highly regarded French business school, offers undergraduate and graduate business program on Centennial Campus. The partnership between NC State and SKEMA creates international opportunities for students and faculty to study, research, and work, and opens the door for new economic development.
 - NC State and VF Corporation announced a strategic partnership to support student development at NC State and advance apparel and textiles innovation within VF. The collaboration will offer students in the College of Textiles and the Poole College of Management opportunities for innovative research and real-world experience through internships, student projects and competitions.
 - The Wake STEM Early College High School won the Magnet Schools of America's 2017-18 Magnet School of Excellence Award. Wake STEM Early College High School is a joint program between the College of Education and Wake County Public School System, and it is the only magnet school in Wake County to receive the honor this year. The Magnet Schools of America recognizes top magnet schools in the United States annually for demonstrating a commitment to high academic standards, curriculum innovation,

diversity, and consistent high-quality educational services provided to all stakeholders.

- NC State has its first and only permanent international facility with the inauguration of NC State's European Center in Prague. Dating back to 1991, the center has its roots in summer programs sponsored by the College of Design. The program continued to grow until it was moved to the Office of Global Engagement. This center exists to support the educational and outreach objectives of both students and faculty and is expected to be NC State's gateway to Europe for creating further international networks and experiences in the future. This marks not only an important expansion for NC State's international growth, but also for the growth of the university's impact on creating and providing opportunities to provide a more dynamic and holistic education for future generations of scholars and researchers.
- In 2017-18, the Study Abroad Office served 1,567 outgoing undergraduate students, an increase of 14.4% and a 20% increase in participation rates among underrepresented minority students over the previous year. Of particular note, NC State has met and surpassed the Generation Study Abroad goal for 2019 one year early to increase the overall study abroad participation by 50% and of underrepresented student populations by 50% by 2019.
- The Office of Global Engagement oversees global research, education and partnership efforts that tackle the grand challenges of our interconnected society and elevates NC State's reputation at the international level. In the past year, NC State signed 45 academic and research MOUs and agreements (35 new and 10 renewals).

Advancement

- NC State also appreciates the need for increased private support to help achieve strategic objectives. In October 2016, NC State launched the most significant philanthropic campaign in the university's history. University Advancement made excellent progress on the Campaign, reaching a total of \$1.33 billion: 83% toward goal with 63% of the planned Campaign period elapsed.
- Gifts and new commitments totaled \$215.4 million, driving NC State above the \$200 million mark for the second consecutive year.
 - \$62.9 million in gifts and commitments supported the endowment; \$38.2 million supported facilities; \$114.3 million supported current operations.
 - \$33.4 million was committed in the form of bequests and \$2.9 million was received in realized bequests.
- Gift receipts totaled a record \$165.08 million.
- The College of Agriculture and Life Sciences led the way in college/unit development success, raising \$41.1 million, followed by the College Engineering at \$39.3 million and the Wolfpack Club/Athletics at \$27.9 million. Several colleges/units posted impressive gains (gifts and commitments) versus the previous year:
 - College of Sciences +227%

- College of Education +138%
 - Alumni Association +108%
 - College of Natural Resources +40%
 - College of Design +28%
- Central Major Gifts secured \$18.15 million in new commitments, far surpassing its goal of \$6.5 million.
- All gifts to NC State are noteworthy. Nevertheless, three from the last year are worth particular mention:
 - A \$25 million commitment from Edward P. Fitts and Edgar Woolard Jr. to name Fitts-Woolard Hall.
 - A \$10.86 million commitment from the Belk Foundation to the College of Education to help create access to NC State for community college graduates.
 - A \$10.75 million gift from the Park Foundation in support of the Park Scholars program.
- Corporate and foundation gifts, pledges and matching gifts totaled \$97.68 million, well exceeding the \$60 million goal.
- An all-time high, 810 members of the senior class made gifts. In addition, 1,407 total students – another record - made gifts throughout the year.
- In addition, the endowment value passed \$1 billion for the first time in the university's history, with the FY 2017 fund value at \$1.123 billion, a 12.5% increase from the FY 2016 value of \$998.6 million. More than \$250 million in cash gifts (out of over \$610 million in total commitments to the endowment) have augmented the endowment total during the campaign.
- Giving toward the campaign to date has created nearly 1,500 new funds, benefiting students, faculty, programs and facilities. These funds have allowed NC State to create nearly 150 new endowed scholarship and fellowship funds, which can provide support in perpetuity potentially benefiting thousands of students. They have also created more than 70 distinguished professorships, allowing NC State to recruit and retain top faculty.
- Through their generosity, NC State alumni Bill and Frances Henry will enable the university to complete the installation of 54 bells in the iconic Memorial Belltower. The three-year project will also install a carillon and interior stairs that were part of the tower's original design when it was conceived in 1921. It will also fund some renovation, structural repairs and stabilization, and update the tower's plaza, which will be renamed Henry Square.
- Dr. Natasha Olby, professor of neurology and neurosurgery in the College of Veterinary Medicine, was recently awarded the Dr. Kady M. Gjessing and Rhana M. Davidson Distinguished Chair in Gerontology. This is the first named chair at the College of Veterinary Medicine and the third at NC State. Additionally, it is the largest endowed chair in NC State University History and provides

the foundation for a veterinary gerontology program at the College of Veterinary Medicine, making NC State the first and only vet school in the United States with a concentrated Gerontology Program.

- An anonymous couple made a \$4.5 million bequest to the College of Sciences Foundation to benefit students and faculty in the department of Applied Mathematics. The gift will endow a \$2.5 million distinguished faculty chair, a \$1.5 million undergraduate scholarship fund, and a \$500,000 graduate fellowship.
- The Alumni Association Outreach team continued to provide outstanding engagement support to the Think and Do the Extraordinary Campaign, including visiting 30 cities in North Carolina and across the country:
 - North Carolina events were held in Asheville, Elizabeth City, Charlotte, Greensboro, Kinston, Morehead City, New Bern, Washington, Wilmington and Yadkinville.
 - Outside the state, events were hosted in Atlanta, GA; Austin, TX; Bluffton, SC; Charleston, SC; Columbia, SC; Denver, CO; Hilton Head, SC; Hollywood, FL; Los Angeles, CA; Miami, FL; Myrtle Beach, SC; New York, NY; Palm Beach, FL; Pittsburgh, PA; Portland, OR; San Francisco, CA; Seattle, WA; Tampa, FL; Washington, DC; and West Palm Beach, FL.

Facilities

- The Connect NC Bond is making two key infrastructure investments possible for NC State: Engineering Building Oval and Plant Sciences Research Complex (see Engagement and Partnerships section). The Engineering Building Oval, hereafter referred to as Fitts-Woolard Hall (see Advancement section), is a \$137 million project to build the fourth engineering building on Centennial Campus. Fitts-Woolard Hall broke ground in April 2018 and is on track to be complete in June 2020.
- The Case Commons Residence Hall and the Carmichael Addition and Renovation are also on track, and these will enhance students' experiences on campus.
- The Gregg Museum of Art and Design held a ribbon-cutting ceremony on August 26, 2017 as part of a public grand reopening in its permanent home: the historic Chancellor's residence. The residence has been completely renovated and updated, and now includes a 15,000-square-foot LEED-certified expansion that houses most of the exhibits. Guests explored the museum's three opening exhibits and took docent-led tours of the new facility. Artists performed on-site live demonstrations, including pottery making by Jennifer Siegel and woodturning by Zach Gregory of the Crafts Center, and bamboo sculpting by Will Hooker, a professor of horticultural science.
- The StateView hotel opened in October 2017 on Centennial Campus. Adjacent to the Park Alumni Center and Lake Raleigh and across the street from the Lonnie Poole Golf Course, the hotel offers 164 rooms, suites, a restaurant and bar, and meeting rooms. The StateView is Raleigh's first hotel in Marriott's Autograph Collection Hotels and is silver-level LEED-certified.
- Academic Success Center: Work continued on the development of a new one-stop academic support space – the D.H. Hill Academic Success Center. This will bring together the University Tutoring Center, academic coaching, drop-in advising, career counseling and the Undergraduate

Research Office. The project, now in the design development phase and planned to open in fall 2020, includes the complete renovation of the second and third floors of the bookstacks towers and a new open stairwell connecting these floors with the Ask Us lobby. In addition to the DASA Academic Success Center spaces on the second floor, new Libraries spaces will include an Innovation Studio, an enlarged and upgraded Visualization Studio and a Dataspace. Libraries and DASA staff are working together to build mutual understanding of and integrate their services for students, and to share strategies and methodologies for assessing those services.

- NC State also completed a comprehensive real estate strategy for acquisition of critical properties and management, and operation and development of the university's real estate portfolio, ensuring prudent use of current and future resources. In addition, a comprehensive assessment was conducted and established a planning methodology to vet development ideas and infrastructure needs when determining the most urgent and impactful projects across campus. This resulted in a collaborative, focused approach to capacity planning and development.

Legislative, Policy and Advocacy

The following were achieved during the 2017 Long Session:

- No management flexibility reduction in FY 2017-18
- Research Opportunity Initiative (\$1 million in FY 2017-18)
- Faculty Recruitment and Retention Fund (\$1 million in FY 2017-18)
- Repairs and Renovations Reserve (50% of \$125 million to the UNC System)
- Funds for NC State's participation in the National Institute for Innovation in Manufacturing Biopharmaceuticals (\$2 million in FY 2017-18)
- NC State's Cooperative Extension (\$700,000 continuing in FY 2017-18 and \$800,000 continuing in FY 2018-19)
- Food Processing Innovation Center, to be housed at the NC Research Campus in partnership with the College of Agriculture and Life Sciences (\$5.1 million in FY 2017-18, \$700,000 of which is continuing)

Rankings and Recognition

Here are highlights from rankings and recognitions for NC State in the past year:

- *U.S. News & World Report*
 - #5, Best Value Public Schools
 - #33, U.S. Public Universities
 - #44, Best Colleges for Veterans
 - #15, Statistics
 - #3, Graduate Veterinary Medicine
 - #4, Online Graduate Computer Information Technology Programs
 - #9, Online Graduate Engineering Programs
 - #25, Graduate Engineering Programs

- *Princeton Review*
 - Named to the "Colleges That Pay You Back" list
 - Named a "Best Southeastern College"
 - #7, Best Health Services
 - #38, Top 50 Game Design (Undergraduate)
 - Named a "Green College"
 - #19, Top 25 Entrepreneurship (Undergraduate)
- *Kiplinger's Personal Finance*
 - #9, Best Value for In-State Students Among Public Colleges
 - #7, Best Value for Out-of-State Students Among Public Colleges
- *U.S. News Online Programs*
 - #4, Graduate Computer Information Technology Programs
 - #9, Graduate Engineering
 - #14, MBA Programs
 - #15, Graduate Education Programs
- *Forbes*
 - Top 100, Best Employers for Diversity in America
- *Money Magazine*
 - #1, Best North Carolina College for Your Money
- *Center of World University Rankings*
 - #5, Entomology
 - #7, Material Science, Textiles
 - #8, Agricultural Economics and Policy
- *Times Higher Education World University Ranking*
 - #5, Entomology Program
- *SoFi*
 - #4, Best Return on Investment, MBA Programs
- *Peace Corps*
 - #22, Top Volunteer-Producing Colleges and Universities

Athletic Excellence

- NC State Athletics had its finest year competitively, finishing the Fall ranked No. 7 nationally in the Directors' Cup, completing the Winter in the No. 5 position nationally, leading all ACC institutions, and finishing the year with NC State's all-time high of No. 15.
- Key competitive achievements from this year included:
 - Twelve teams finished in the Top 25 of their respective sports, including three teams in the Top 10. A program record 20 of 23 teams competed in NCAA Championship competition. Collectively, these results contributed to the first-ever Top 25 finish in the Directors' Cup.

- Four team conference championships: Women's Cross Country (ACC), Men's Swimming & Diving (ACC), Wrestling (ACC Regular Season Dual Title), Gymnastics (EAGL).
- Claimed six individual national titles associated with 12 student athletes (2 men's swimming relay titles, 3 men's swimming individual event titles, 1 wrestling national champion)
- Four Coaches of the Year:
 - Braden Holloway, ACC Men's Swimming & Diving Coach of the Year
 - Laurie Henes, ACC Women's Cross Country Coach of the Year and USTFCCCA Southeast Region Cross Country Coach of the Year
 - Pat Popolizio, ACC Wrestling Coach of the Year and WIN Magazine Dan Gable NCAA Coach of the Year
 - Kim Landrus, NAGCW Southeast Region Coach of the Year.
- Team-specific highlights include:
 - Women's Cross Country won their second consecutive ACC Championship and achieved a third-straight NCAA Top 10 finish.
 - Volleyball made the NCAA tournament for the first time since 2012 and achieved their first NCAA victory in program history.
 - Men's Soccer made the NCAA tournament for the first time since 2009.
 - Women's Soccer returned to the NCAA Championship, which was their first time earning consecutive NCAA appearances since 1995.
 - Football finished with a bowl victory and a No. 23 final ranking, their first time concluding the season with a Top 25 ranking since 2010.
 - Men's Swimming & Diving claimed a program-best 5 National Titles and finished No. 4 at the NCAA Championships. They also won their fourth consecutive ACC Championship.
 - Wrestling achieved a program-best 4th place finish at NCAAs, including one National Title and a program-best four All-Americans.
 - Women's Basketball advanced to the Sweet 16 for the first time since 2007.
 - Men's Basketball returned to the NCAA Tournament after a two-year absence.
 - Men's Golf advanced to the NCAA Championships for the first time since 2011.

- NC State athletes achieved an all-time high Graduation Success Rate score of 85%. In addition, student athletes have earned the following academic recognitions:
 - 59 Academic All-American Student Athletes, an all-time high
 - 94 Academic All-Conference Student Athletes, an all-time high
 - 254 ACC Honor Roll
 - 226 NC State Deans List
 - 439 NC State Honor Roll
 - 4 ACC Scholar Athletes of the Year: Anton Ipsen (Men's Swimming), Michael Macchiavello (Wrestling), Stephen Franken (Men's Golf), Brian Brown (Baseball)
 - Arthur Ashe Female Sports Scholar Athlete of the Year: Claire Zonti (Rifle)
 - NCAA Jim McKay Post-Graduate Scholarship Recipient: Soren Dahl (Men's Swimming)
 - The cumulative average GPA for student athletes is at an all-time high of 3.05, which is the first time the university has posted a cumulative average over 3.0.

Leadership Changes

In the past year, NC State's new leaders included:

- Kevin Howell was named the new Vice Chancellor for External Affairs, Partnerships, and Economic Development in 2018.
- Christine McGahan became the Dean of the College of Sciences in 2017.
- Peter J. Harries was named Interim Dean of the Graduate School in 2017.
- Sheri Schwab became the Interim Vice Provost for Institutional Equity and Diversity in 2018.

Professional Service

Chancellor Woodson was engaged with the following organizations, further elevating NC State's reputation:

- Association of Public and Land-Grant Universities (APLU)
- NCAA Division I
 - Presidential Forum, the primary presidential advisory body for the Board of Directors
 - Presidential Forum's Steering Committee, providing strategic direction for the Forum
- Executive Committee of the US Council on Competitiveness
- Executive Committee of the Business-Higher Education Forum

Thought Leadership

Chancellor Woodson also represented NC State in numerous events as a keynote speaker, panelist, and host. These include:

- Biotechnology Discussion with US Secretary of Agriculture Sonny Perdue (one of four national listening sessions focused on increasing rural prosperity)
- International Society of Exposure Science
- Food Processing Innovation Center Committee
- UNC's My Future NC event
- Triangle Smart Cities Summit
- Innovate Raleigh Summit
- Laboratory for Analytic Sciences Annual Research Symposium
- Mexican Consulate's Secretary of Education event
- Food Systems Leadership Institute
- Chrysalis Network and Counseling Center Conference
- Numerous alumni events – locally, nationally and globally -- since the campaign launched to drive engagement with the university and build a greater network of advocacy.

UNC Performance Metrics

NC State is also making excellent progress for the UNC Performance Metrics, established this year:

- Rural Enrollments: By fall 2021, NC State will enroll 5,836 rural students, over the 2016-17 base of 5,501. In 2017-18, the university enrolled 5,347. We are proud that NC State educates more North Carolina students than any other university, and enrolls students from all 100 of the state's counties. We will continue our efforts to increase rural students' enrollment. NC State houses several programs that help ensure a variety of pathways for enrollment at the university. For example, NC State's College of Agriculture and Life Sciences provides a unique opportunity through STEAM (Student Transition Enrollment Advising and Mentoring), a program that helps make higher education more accessible to rural students interested in pursuing an agriculturally-related major. Participants take part in a summer session at NC State and then take their first semester of coursework at a North Carolina community college (or other institution). In addition, TRIO programs like Talent Search and Upward Bound also serve rural students and encourage them to apply to NC State, and provide equal access to high-quality education by facilitating retention and promotion from middle schools through post-baccalaureate completion. Talent Search serves 800+ middle and high school students, while Upward Bound serves 180+ high school students. These efforts also align with Goal 1.
- Five-year Graduation Rates: By 2022, NC State will improve its five-year graduation rate to 81.6%, over the 2015 base of 78.2%. In 2017, we achieved 81.0%. We have implemented

several initiatives and programs to help our students succeed, and we are seeing strong results, including graduation-rate improvements. In fall 2015, NC State implemented a new advising platform — Student Success GPS (Go, Plan, Succeed) — which incorporates advising, scheduling, calendaring, student communication tools, student data and predictive analytics with existing student information. This improved information flow has been instrumental in increasing student graduation and retention rates. MyPack Portal, an online tool that includes the Enrollment Wizard, online degree audits and the Pack Planner, allows students to monitor their academic progress and choose schedules that ensure timely graduation.

- **Undergraduate Degree Efficiency:** By 2021-22, NC State will improve its undergraduate degree efficiency to 24.9 over the 2015-16 base of 24.0. Our 2016-17 performance was 24.3. As part of our ongoing efforts to enhance student success, this will come in part as a result of efforts to increase our undergraduate graduation rates and decrease students' average time to earn a degree. Expanded academic advising services give students more options, like the Academic Recovery Program, to get and stay on track to earn their degree in four years. DASA supports efficiency by creating a centralized home for the majority of student and academic support programming on campus. Our Change of Degree Application process helps students change degree programs more efficiently and achieve a timely graduation. We offer many programs and services like these to encourage efficiency while placing primary importance on educational quality.
- **Critical Workforces:** By 2021-22, we will produce 6,064 critical workforce credentials, over the 2015-16 base of 5,399. In 2016-17, NC State awarded 5,501. K-12 teachers make up a large number of critical workforce credentials. We are helping to put the state's brightest minds in K-12 classrooms in North Carolina in part through the return of the North Carolina Teaching Fellows program. We supply North Carolina's booming Research Triangle region, and the state and country at large, with highly sought-after graduates with science, technology, engineering and mathematics (STEM) degrees. The Goodnight Scholars program targets low- and middle-income students (four-year and transfer) studying in the STEM disciplines or affiliated education majors, developing scholars into leaders within the STEM and/or STEM education fields.
- **Research Productivity:** By 2021-22, NC State will receive \$404.0 million in research and development sponsored program awards and licensing income, over the FY2015 base of \$311.3 million. FY2017 sponsored program awards and licensing income is \$403 million. NC State is recognized as a research powerhouse. More than 125 startups and spin-offs have been based on our research, attracting more than \$1.6 billion in venture capital. We are ranked 6th nationwide in commercialization agreements based on university research; we're among the top 25 universities for technology transfer. From our research, more than 950 patents have been issued in the U.S. and nearly 2,000 worldwide, yielding 550+ consumer products. We have also focused on supporting undergraduate research productivity and increased funding by \$100,000 for more than 1,100 students conducting research and/or attending conferences. Participating in research at undergraduate and graduate levels, NC State students are better positioned for future careers.
- **Low-income Enrollments:** By fall 2021, we will enroll 4,925 low-income students, over the 2015 base of 4,625. In 2016, the university enrolled 4,543 low-income students, but we have a number of programs to increase low-income access to a high-quality college education. In 2015, NC State joined the Coalition for Access, Affordability and Success, a free platform of online tools for planning and applying to college. The TRIO programs Upward Bound and Talent Search serve 1,000 low-income and first generation middle and high schools students each year. The NC State

Community College Collaboration (C3) is a dual-admission program between NC State and eight regional community college partners. C3 helps low-to-moderate income students who aspire to transfer to NC State after completing their associate degree. PackTrac is a collaboration with 10 North Carolina Community Colleges to provide academic training and advising to students passionate about agriculture with a desire to earn a degree from NC State. The Juntos Program helps Latino students have more success in middle and high school and continue on to post-secondary education. These efforts also align with Goal 1.

- **Rural Completions:** By 2021-22, NC State will produce 1,400 rural graduates, over the 2015-16 base of 1,300. In 2016-17, we had 1,309 rural completions. The university supports rural students throughout the lifespan of their undergraduate careers by offering programs and services focused on academic success. This includes a recent increase in the number of professional advisors to better serve students and ensure timely progress toward a degree. The University Tutorial Center also encourages degree completion among these students by providing academic assistance for many 100- and 200-level math, chemistry and physics courses, as well as writing and speaking support. In the past five years, the University Tutorial Center has diversified tutoring services by adding math and chemistry drop-in tutoring, and academic support for the Summer Start program, which has resulted in a 20% increase in the number of students served.
- **Achievement Gaps in Undergraduate Degree Efficiency:** By 2021-22, we will reduce the achievement gap in undergraduate degree efficiency among rural students by 50% to meet a goal of 23.2. In 2016-17, NC State achieved 23.5, over the 2015-16 base of 21.4. Setting rural students up for success includes changes in our academic policies to help close the aforementioned achievement gaps. We have changed policies regarding the continuation of undergraduate enrollment, satisfactory academic progress, undergraduate grade exclusion and withdrawals. These policy changes were supported by in-depth data analysis and were designed to promote student behaviors that are consistent with on-time graduation. We are also implementing initiatives for larger fall freshmen cohorts and more intentional paths to transfer into NC State from North Carolina community colleges. We also launched a deferred spring admissions program where freshmen applicants are admitted if they delay their enrollment to the first spring semester after high school graduation. All of these initiatives are gradually helping to close an achievement gap for rural students.
- **Low-income Completions:** By 2021-22, NC State will produce 1,681 low-income graduates, over a 2015-16 base of 1,579. In 2016-17, NC State had 1,495. We seek to help ease the financial burden for these students, and offer programs like Dollars and Sense, a financial literacy program offered with help from the Office of Scholarships and Financial Aid, which helps students make better financial decisions while in school and after graduation. The Provost's Professional Experience Program gives students the chance to earn an income on-campus while working on research and professional development. The program debuted in the 2015-2016 academic year in response to faculty advocating for more opportunities for students to work on campus, as off-campus jobs are not an option for many students. By continuing to provide strong support to low-income students, we are fulfilling our land-grant mission and helping them complete a valuable college education.

**BOARD OF TRUSTEES
NORTH CAROLINA STATE UNIVERSITY
AGENDA**

**Audit, Risk Management and Finance Committee
3:15 p.m. – 4:45 p.m., September 20, 2018
Winslow Hall Conference Room**

**Members: Thomas E. Cabaniss, Chair, Jess Errico, Ann B. Goodnight, James A. Harrell, III,
Ronald W. Prestage, DVM, Susan P Ward**

CALL TO ORDER

Tom Cabaniss, Chair of Committee

ROLL CALL

Tom Cabaniss, Chair of Committee

READING OF STATE GOVERNMENT ETHICS ACT CONFLICT OF INTEREST STATEMENT

Tom Cabaniss, Chair of Committee

RESPONSIBILITIES OF THE COMMITTEE

TAB 4.0

- | | | |
|----|---|------|
| A. | Review Committee Responsibilities as established in Bylaws
Office of Finance and Administration
<i>Mary Peloquin-Dodd, Associate Vice Chancellor, Finance
and University Treasurer</i> | 4.0A |
| B. | Review Draft Agenda/Plan of Work for the Year
Office of Finance and Administration
<i>Tom Cabaniss, Chair, Audit, Risk Management and Finance Committee
Mary Peloquin-Dodd, Associate Vice Chancellor, Finance
and University Treasurer</i> | 4.0B |

1. APPROVAL OF MINUTES

TAB 4.1

Approval of April 19, 2018 Open and Closed Session Minutes

2. ACTION ITEMS

TAB 4.2

- | | | |
|----|--|------|
| A. | Internal Audit Charter Review and Approval
(Internal Audit Act)
Office of Internal Audit
<i>Cecile Hinson, Director, Internal Audit</i> | 4.2A |
|----|--|------|

3. INFORMATIONAL REPORTS

TAB 4.3

- | | | |
|----|---|------|
| A. | Internal Audit Update
(NC State Pol 01.05.1, Appendix 1, I.a.i-viii)
Office of Internal Audit
<i>Cecile Hinson, Director, Internal Audit</i> | 4.3A |
|----|---|------|

- B. Legislative and Finance/Budget Update 4.3B
(UNC Pol, Ch. 100.1, Appendix 1 (V), NC State Pol 01.05.1, Appendix 1, I.b)
Office of External Affairs, Partnerships & Economic Development
*Kevin Howell, Vice Chancellor, External Affairs, Partnerships
& Economic Development*
Office of Finance and Administration
Scott R. Douglass, Vice Chancellor, Finance and Administration
Barbara Moses, Associate Vice Chancellor, Budget and Resource Management
Mary Peloquin-Dodd, Associate Vice Chancellor, Finance and University Treasurer
- C. Enterprise Risk Management and Compliance Update 4.3C
(NC State Pol 01.05.1, Appendix 1, I.c.i, ii)
Preventative Risk Management: Strategies and Practice
Office of General Counsel
Robert Hoon, Interim General Counsel
Office of Finance and Administration
David Rainer, Associate Vice Chancellor, Environmental Health and Public Safety
Mary Peloquin-Dodd, Associate Vice Chancellor, Finance and University Treasurer

4. COMMITTEE DISCUSSION TAB 4.4

5. ADDITIONAL INFORMATIONAL MATERIALS TAB 4.5

- A. NC State Investment Fund Performance Review 4.5A
(NC State Pol 01.05.1, Appendix 1, I.b, d.i)
- B. NC State Intermediate Term Fund Performance Review 4.5B
(NC State Pol 01.05.1, Appendix 1, Ib, d.i)

ADJOURN

NC STATE UNIVERSITY
Policies, Regulations and Rules

Authority	Board of Trustees
Title	Bylaws
Classification	POL01.05.01
PRR Subject	Board of Trustees
Contact Info	Vice Chancellor and General Counsel (919-515-3071); Secretary of the University (919-515-2191)

APPENDIX 1

NC State Board of Trustees' Delegations of Authority, Assignments and Guidelines

Audit, Risk Management and Finance Committee Delegated Authority and Assignments

a. Audit

- i. Provide oversight of the internal audit function.
- ii. Review and approve the annual internal audit plan at the beginning of the audit cycle.
- iii. Receive quarterly activity reports from the internal auditor.
- iv. Receive direct verbal and/or written reports from the university's internal auditor regarding out of the ordinary reviews and findings that may involve senior level university employees, trustees or affiliates.
- v. Review a comparison of the annual internal audit plan to the actual internal audits performed.
- vi. Provide oversight of the annual financial statement audit.
- vii. Assure that the university is performing self-assessments of operating risks and evaluations of internal controls on a regular basis.
- viii. Meet with representatives of the State Auditor's Office to review the annual state auditor's report and the university's corrective action, if any.
- ix. Review audit reports of University-associated entities.

b. Finance

- i. Advise the Chancellor with respect to the development of budget estimates for the university, and with respect to the execution and administration of the budget as approved by the General Assembly and the Board of Governors.

c. Risk Management

- i. Provide oversight of the risk management and compliance functions.
- ii. Receive annual reports on risk management, compliance and legal issues.

d. Planning**e. Policy Development**

- i. Recommend to the Board of Trustees for approval policies regarding the preservation, maintenance and management of institutional trust funds.
- ii. Upon recommendation of the chancellor, recommend to the Board of Trustees for approval policies related to the maintenance of campus security.
- iii. Upon recommendation of the chancellor, recommend to the Board of Trustees for approval, policies related to information technology and cyber security.

**NC STATE BOARD OF TRUSTEES
AUDIT, RISK MANAGEMENT AND FINANCE COMMITTEE RESPONSIBILITIES**

Plan of Work/Calendar

- Review of Committee Responsibilities (Annual)
- Review of Draft Agenda Items for the Year (Annual)

Approvals (Action Items)

- Minutes
- Internal Audit Charter Review and Approval (Annual) (Audit)
- Internal Audit Yearly Plan (Annual) (Audit)
- Recommendation to full Board – policy changes related to institutional trusts (Policy Development)
- Recommendation to full Board – campus security policy changes
- Recommendation to full Board – information technology and cybersecurity policy changes (Policy Development)
- Recommendation to full Board – Bond/Debt (Finance)

Review of Required Annual Reports

- Annual Financial Report/Audit (State Auditors attend) (Audit)
- Annual Report on Endowment and Investments (Annual) (Finance, Policy Development)
- Associated Entities Review (Annual) (Audit)
- University Debt Update (Annual) (Finance)
- Intercollegiate Athletics Finance and Budget Reporting (Annual) (Finance)

Receive Informational Reports

- Enterprise Risk Management & Compliance Update – (Audit, Risk Management, Policy Development)
- Finance and Budget Update (Finance)
- Legislative Priorities (Audit, Finance, Risk Management, Policy Development)
- Internal Audit Update (Audit)
- Investment and Institutional Fund Performance Review (Finance, Policy Development)

**Board of Trustees
North Carolina State University
Audit, Risk Management, and Finance Committee
Agenda Topics for FY18-19 (listed alphabetically) (Per Bylaws POL01.05.01, Appendix 1, I)**

SEPTEMBER 2018

**Approval of Bonds/Debt (if needed) (Finance, Policy Development)
Enterprise Risk Management & Compliance Update (Audit, Risk Management, Policy Development)
Proposed Topic: TBD
Legislative/Budget/Finance Update (Audit, Finance, Risk Management, Policy Development)
*Internal Audit Charter Review and Approval (Annual) (Audit)
Internal Audit Update (Audit)
*Minutes Approval
Investment and Institutional Fund Performance Review (Finance, Policy Development)
Review of Committee Responsibilities (Annual)
Review of Draft Agenda Items for the Year (Annual)

NOVEMBER 2018

**Approval of Bonds/Debt (if needed) (Finance, Policy Development)
Enterprise Risk Management & Compliance Update (Audit, Risk Management, Policy Development)
Proposed Topic: TBD
Intercollegiate Athletics Finance and Budget Reporting (Annual) (Finance)
Legislative/Budget/Finance Update (Audit, Finance, Risk Management, Policy Development)
Internal Audit Update (Audit)
Investment Performance Review (Finance, Policy Development)
*Minutes Approval
State Auditor's Report (State Auditors attend) (Audit)

FEBRUARY 2019

Annual Financial Report (Audit)
Annual Report on Endowment and Investments (Annual) (Finance, Policy Development)
Associated Entities Review (Annual) (Audit)
Enterprise Risk Management & Compliance Update (Audit, Risk Management, Policy Development)
Proposed Topic: TBD
Legislative/Budget/Finance Update (Audit, Finance, Risk Management, Policy Development)
Internal Audit Update (Audit)
*Minutes Approval

APRIL 2019

Budget Outlook/Legislative Priorities (Audit, Finance, Risk Management, Policy Development)
Enterprise Risk Management & Compliance Update (Audit, Risk Management, Policy Development)
Proposed Topic: TBD
Legislative/Budget/Finance Update (Audit, Finance, Risk Management, Policy Development)
Internal Audit Update (Audit)
*Internal Audit Yearly Plan Review for Upcoming FY (Annual) (Audit)
Investment Performance Review (Finance, Policy Development)
*Minutes Approval
University Debt Update (Annual) (Finance)

Except as noted, all update reports are as needed.

*denotes action item

**denotes Requires Full Board Approval

**NC STATE BOARD OF TRUSTEES
AUDIT, RISK MANAGEMENT AND FINANCE COMMITTEE
2018 – 2019 PLAN OF WORK (Annual Calendar)**

July

- New Trustee Orientation (as needed)

September

- Approval of Bonds/Debts (NC State Pol 01.05.01, Appendix 1, I.b, and di) (as needed)
Desired outcome and measure of success: Consider and recommend bond resolution approval to BOT when presented. BOT bond approval
- Budget Outlook/Legislative Priorities (NC State Pol 01.05.1 App 1, I. a-d) (as needed)
Desired outcome and measure of success: Receive informational report on Legislative budget priorities and understanding possible impacts to University
- Enterprise Risk Management, and Compliance Update (NOTE: Do we want to change the name of this to include Safety and Security as referenced in the UNC Policy, or do you think that Risk Management covers it? (UNC Pol, Ch.100.1, Appendix 1 (XV) and UNC Pol., Ch 1300.9) (NC State Pol 01.05.1, Appendix 1, I. a.vi, c, d.ii)
Desired outcome and measure of success: Receive informational reports on University security, risk and compliance issues. Review risk, security and compliance processes, including but not limited to Title IX, Cleary Act, information technology, campus safety and other specifically related.
- Finance and Budget Update (UNC Pol, Ch. 100.1, Appendix 1 (V) (NC State Pol 01.05.1, Appendix 1, I.b)
Desired outcome and measure of success: Receive informational reports on budget, institutional trust funds and investments to better understand resources and priorities that impact the University.
- Internal Audit Charter Review and Approval (Req by Internal Audit Act)
Desired outcome and measure of success: Review the Internal Audit Charter to be compliant with the Internal Audit Act
- Internal Audit Update (NC State Pol 01.05.1, Appendix 1, I.a.i-viii)
Desired outcome and measure of success: Receive informational reports quarterly on current activity, so that Trustees are aware of any issues that could impact the University. In addition, Trustees would receive bi-annual report on the activities by the Internal Audit Office in reference to the annual plan, and offer guidance when needed.
- Investment/Institutional Fund Performance Review (NC State Pol 01.05.1, Appendix 1, I.d.i)
Desired outcome and measure of success: Inform Trustees of Investment Fund valuation and changes to market affecting the same via written materials provided at each meeting.
- Policy Approvals (NC State Pol 01.05.1, Appendix 1, I.d) (as needed)
Desired outcome and measure of success: Recommend appropriate policies to the full Board for approval.
- Review of Committee Responsibilities (Annually)
Desired outcome and measure of success: Understand Committee scope and develop an effective plan of work for the year.

November

- Annual Audit Review (NC State Policy 01.05.1, Appendix 1, I.a.viii)
Desired outcome and measure of success: Receive a clean audit opinion from the State Auditor's Office.
- Approval of Bonds/Debts (NC State Pol 01.05.01, Appendix 1, I.b and .d.i) (as needed)
Desired outcome and measure of success: Consider and recommend bond resolution approval to BOT when presented. BOT bond approval
- Enterprise Risk Management and Compliance Update (NC State Pol 01.05.1, Appendix 1, I. a.vi, c, d.ii)
Desired outcome and measure of success: Receive information report of University any known risks,
- Finance and Budget Update (UNC Pol, Ch. 100.1, Appendix 1 (V) (NC State Pol 01.05.1, Appendix 1, I.b)
Desired outcome and measure of success: Receive informational reports on budget, institutional trust funds and investments to better understand resources and priorities that impact the University.

- Intercollegiate Athletics Finance and Budget Reporting (Annual) (UNC Pol, Ch. 1100.1.1(R) I.B)
Desired outcome and measure of success: Receipt of financial indicators contained in the NCAA Dashboard “Presidential View” with both annual and 5-year information as well as review of annual budget including major sources of revenue and expenses. Informational report promotes transparency of Athletics financial operations.
- Internal Audit Update (NC State Pol 01.05.1, Appendix 1, I.a.i-viii)
Desired outcome and measure of success: Receive informational reports quarterly on current activity, so that Trustees are aware of any issues that could impact the University. In addition, Trustees would receive bi-annual report on the activities by the Internal Audit Office in reference to the annual plan, and offer guidance when needed.
- Investment Performance Review (NC State Pol 01.05.1, Appendix 1, I.d.i)
Desired outcome and measure of success: Inform Trustees of Investment Fund valuation and changes to market affecting the same via written materials provided at each meeting.
- Policy Approvals (NC State Pol 01.05.1, Appendix 1, I.d) (as needed)
Desired outcome and measure of success: Recommend appropriate policies to the full Board for approval.

February

- Annual Financial Report (NC State Policy 01.05.1, Appendix 1, I.a.viii)
Desired outcome and measure of success: Review the University Financial Statement after receiving a clean audit opinion from the State Auditor’s Office..
- Annual Report on Endowment and Investments (Annual) (UNC Pol, Ch 100.1, Appendix 1 (VII) (NC State Pol 01.05.1, Appendix 1, I.d.i)
Desired outcome and measure of success: To provide Committee with more understanding about University Endowment and Investments and progress over time.
- Enterprise Risk Management and Compliance Update (NC State Pol 01.05.1, Appendix 1, I. a.vi, c , d.ii)
Desired outcome and measure of success: Receive information report of University any known risks,
- Finance and Budget Update (UNC Pol, Ch. 100.1, Appendix 1 (V) (NC State Pol 01.05.1, Appendix 1, I.b, I.d.i)
Desired outcome and measure of success: Receive informational reports on budget, institutional trust funds and investments to better understand resources and priorities that impact the University.
- Internal Audit Report (as required by BOG) (NC State Policy 01.05.1, Appendix 1, I.a.iii, 1.a.v)
Desired outcome and measure of success:
- Internal Audit Update (NC State Pol 01.05.1, Appendix 1, I.a.iii, I.a.iv, I.a.v)
Desired outcome and measure of success: Receive informational reports quarterly on current activity, so that Trustees are aware of any issues that could impact the University. In addition, Trustees would receive bi-annual report on the activities by the Internal Audit Office in reference to the annual plan, and offer guidance when needed.
- Policy Approvals (NC State Pol 01.05.1, Appendix 1, I.d) (as needed)
Desired outcome and measure of success: Recommend appropriate policies to the full Board for approval.

April

- Associated Entities Review (UNC Pol, Ch. 600.2.1.5,) (NC State Policy 01.05.1, Appendix 1, I.a.ix)
Desired outcome and measure of success: To inform Committee on the activities and broad overview of annual performance of associated entities as reported to UNC General Administration.
- Budget Outlook/Legislative Priorities (NC State Pol 01.05.1 App 1, I. a-d) (as needed)
Desired outcome and measure of success: Receive informational report on Legislative budget priorities and understanding possible impacts to University
- Enterprise Risk Management and Compliance Update (NC State Pol 01.05.1, Appendix 1, I. a.vi, c , d.ii)
Desired outcome and measure of success: Receive information report of University any known risks,

- Finance and Budget Update (UNC Pol, Ch. 100.1, Appendix 1 (V) (NC State Pol 01.05.1, Appendix 1, I.b, I.d.i)
Desired outcome and measure of success: Receive informational reports on budget, institutional trust funds and investments to better understand resources and priorities that impact the University.
- Internal Audit Update (NC State Pol 01.05.1, Appendix 1, I.a.iii, I.a.iv, I.a.v)
Desired outcome and measure of success: Receive informational reports quarterly on current activity, so that Trustees are aware of any issues that could impact the University. In addition, Trustees would receive bi-annual report on the activities by the Internal Audit Office in reference to the annual plan, and offer guidance when needed.
- Internal Audit Yearly Plan Review and Approval (NC State Policy 01.05.1, Appendix 1, I. a.ii)
Requires Committee Approval Desired outcome and measure of success: .
- Investment/Institutional Trust Performance Review (NC State Pol 01.05.1, Appendix 1, I.d.i)
Desired outcome and measure of success: Inform Trustees of Investment Fund valuation and changes to market affecting the same via written materials provided at each meeting.
- Policy Approvals (NC State Pol 01.05.1, Appendix 1, I.d) (as needed)
Desired outcome and measure of success: Recommend appropriate policies to the full Board for approval.
- University Debt Update (NC State Pol 01.05.1, Appendix 1, I.b.)
*Desired Outcome: Receive informational report regarding the University Debt, and debt standings/rating
Measure of Success: Knowledgeable regarding University Debt, standings and ratings*

Meeting of Audit, Risk Management and Finance Committee
North Carolina State University
Board of Trustees
April 19, 2018

Chair Cabaniss opened the meeting at 3:11 p.m. in the Chancellor's Conference Room in Holladay Hall. Roll was taken and a quorum was present. Committee members present for the meeting were:

Mr. Tom Cabaniss, Chair
Mr. Chip Andrews
Mr. Jim Harrell
Dr. Ron Prestage
Ms. Susan Ward
Mr. Dewayne Washington

All members of the Committee were reminded of their duty to avoid conflicts of interest and appearances of conflicts of interest under the State Government Ethics Act. It was inquired as to whether there were any known conflicts of interest or appearances of conflict with respect to any matters coming before the Committee at this meeting. There being none, the meeting continued.

Minutes from the February 15, 2018 meeting were presented for approval, and Ms. Ward requested that Mr. Ron Prestage be changed to Dr. Ron Prestage. Dr. Prestage made a motion to accept the minutes and Mr. Washington seconded. With no additional changes, the minutes were approved.

The Internal Audit Annual Audit Plan for Fiscal Year 2019 was presented. There are nine planned audits in addition to engagements that are anticipated to still be in progress as of July 1, 2018. The Committee heard about the Continuous Risk Assessment and Audit Planning process used for developing the Plan and referenced the illustration of that process in the materials. Time was allowed for any questions related to the proposed plan. Dr. Prestage made a motion to accept the Plan as presented, Mr. Cabaniss seconded the motion. The Committee unanimously approved the FY 2019 Audit Plan.

Highlights of the 2017-2018 state appropriation budget were reviewed. There was an increase in appropriations and reductions were less than projected. Projections for future year state appropriations were also reviewed including potential employee salary and benefit increases, campus initiated tuition increase, enrollment change funding and cooperative extension increases. A Management Flex reduction from the UNC System is also expected. The University will watch potential change in enrollment funding as well as data modernization

The Committee heard about UNC System budget priorities for FY 18-19, which are geared to inform, innovate and empower individual campuses.

The attached Interim financials for third quarter were reviewed. Performance is consistent with prior years, and the net position increased for the first three quarters, compared with the same period last year.

The Annual Review of Associated Entities was reported to satisfy the annual Associated Entity review required by the Board of Governors. All audits have been sent to General Administration and the copies of the Audits were made available to the Committee. There were no management issues this year in the

audits for these entities and all of the entities have an operating agreement with the University in place. Information on net assets and endowments for the Associated Entities was also presented.

The committee heard a debt update, which included a review of the ten-year history of the University's Outstanding Debt, by amount, type, and purpose. Debt outstanding remains close to the same levels for the last several years. There have been no major changes in debt by purpose, the three largest components being housing, Talley Student Union and energy savings. Future debt will be incurred in 2019 or 2020 due to funding of Carmichael Renovations, Engineering Oval, and Plant Sciences projects. The Committee was apprised of the impact of recent tax changes on the debt markets. Reference was given to the S&P Global Ratings for NC State, provided in the pre-materials, and the university remains in strong standing with an AA/stable rating.

A report on University Campus Security and Safety was heard. Campus safety programs include Integrated Organizational Structure, Violence Prevention and Threat Management, Response and Notification and Strategic Security Planning. The University Police Department is made up of 56 sworn law enforcement officers. The department has its own 911 Center, an extra-territorial jurisdiction agreement with the City of Raleigh and communications interoperability with all local law enforcement, fire and EMS. The Security Master Plan has several goals including centrally managing security risk, enhancing security awareness, integrating planning into new buildings and enhancing security of campus perimeter and outdoor space.

The University's Violence Prevention and Threat Management is a robust program. It integrates University Police, Behavioral Assessment Team, Division of Academic and Student Affairs, policies and training to identify threats, prevent crisis and keep the campus safe for student and staff. The University also conducts emergency response drills and uses the Wolf Alert messaging system, which can quickly broadcast information to all facets of campus.

Tabitha Groelle made a motion that the Committee convene to closed session to plan, conduct and hear a report concerning an audit under N.C. General Statutes 132-6.1© and 143-318.11(a)(1) to protect from disclosure security features of electronic data processing systems and information technology systems. Dr. Prestage moved to convene to closed session, Mr. Andrews seconded, and with no dissent the Committee convened to closed session at 4:45 p.m.

The Committee reconvened to open session at 5:06 p.m.

A quarterly update on Internal Audit activity since the last meeting was given. In process are: twelve audits, six follow-ups, nine consultations and six Committee and Task Force engagements.ongoing tasks. Two investigations have been closed after all corrective actions were satisfactorily implemented, and one operational audit has been completed.

Chair Cabaniss referenced informational materials provided to the Committee.

With no further business, the Committee adjourned at 5:08 p.m.

Submitted by _____
Secretary to the Committee

Approved _____
Chair of the Committee

NC STATE UNIVERSITY**INTERNAL AUDIT DIVISION****INTERNAL AUDIT CHARTER****MISSION**

The mission of the Internal Audit Division (IAD) is to support the University in the successful achievement of its strategic goals. This is accomplished by serving as an independent partner to University leadership, faculty, and staff in the identification and balancing of their units' risks through objective, flexible, and proactive audit and consultation services. IAD provides independent evaluation of the effectiveness of risk management, control, and governance processes and makes recommendations for improvement.

SCOPE OF WORK

IAD's scope of work includes assessing whether:

- Risks are appropriately identified and managed across the University
- University governance processes support the organization's strategies and objectives
- Financial, process, and information technology controls are effective and efficient
- Policies, regulations, rules, and other guidance and training are consistent in their information, effective, and do not create undue bureaucracy or inefficiencies
- University units are compliant to University, **UNC-System Office (UNC-SO)**, State, and Federal requirements, related processes are administered correctly, and issues are recognized and addressed properly and promptly
- Significant financial, managerial, and operating information is accurate, reliable, secure, and timely
- Actions of University personnel are in compliance with policies and applicable laws and regulations
- University resources are acquired economically, used efficiently, and adequately protected
- Quality and continuous improvement are fostered in the University's processes

INDEPENDENCE AND ACCOUNTABILITY

All internal audit activity must be free from undue influence or interference in the selection of activities to be examined, determination of the scope or methodology of work, and in communication of the results in accordance with the international standards of independence as set forth by the Institute of Internal Auditors (IIA).

The **Chief Audit Officer &** Director of Internal Audit (**CAO**) reports functionally and administratively directly to the Chancellor. The **CAO** is also accountable to the Board of Trustees (BOT) through its Audit, Risk Management and Finance Committee (Committee) as required by the University of North Carolina (UNC) Board of Governors (BOG) and the IIA standards. The

CAO communicates and interacts directly and independently with the Committee. In addition, the CAO has informational reporting accountability to the Executive Vice Chancellor and Provost and the Vice Chancellor for Finance and Administration.

RESPONSIBILITY

The CAO has the responsibility to ensure IAD achieves the following:

- Maintain compliance with North Carolina General Statute (GS) Chapter §116-40.7 (which establishes the independent audit function at state universities); NC GS Chapter §143 Article 79, The NC Internal Audit Act; and audit-related requirements from the UNC BOG
- Establish a risk assessment process to support the development of a risk-based audit plan and a risk-based approach to individual engagements
- Submit, at least annually, a risk-based audit plan to the Chancellor and the Committee for approval and implement that audit plan
- Continually re-evaluate the audit plan based on changing conditions and emerging issues and revise as necessary to ensure that the highest risk items are given priority
- Consider the scope of work of the external auditors and regulators, as appropriate, for the purpose of providing optimal audit coverage to the organization
- Appropriate and necessary interactions with the various external audit-related governance groups occur as needed, including interactions with UNC-SO, the state's Council of Internal Audit, Office of the State Auditor (OSA), Office of the State Controller, and the State Bureau of Investigation
- Appropriate and necessary interactions with the various internal audit and investigation related units occur as needed, including interactions with Office of the General Counsel, University Police Department, Employee Relations, and Student Conduct
- Investigate suspected fraudulent activities and notify the Chancellor, the Committee, and other management of any significant results; assist OSA or other external investigators with investigation of allegations as necessary
- Issue audit reports or engagement letters as appropriate to the Chancellor and other management summarizing the results of audit or consulting activities
- Report recent activities and high-risk issues to the Committee at regular quarterly meetings
- Perform consulting services, beyond internal auditing's assurance services, to assist management in meeting its objectives and to proactively address issues
- Coordinate with other control and monitoring functions both internal and external regarding areas such as risk management, compliance, security, legal affairs, environmental health, and external audits and investigations
- Keep the Chancellor, the Committee, the Executive Vice Chancellor and Provost, and the Vice Chancellor for Finance and Administration informed of emerging trends and successful practices in the internal auditing profession
- Educate the campus-community on University policies, State and Federal regulations, best practices, and the importance of effective internal controls
- Participate on various committees, compliance task forces, and system development projects to provide guidance, proactively address potential issues and internal control weaknesses, improve inefficiencies, and increase effectiveness
- Evaluate and assess significant University functions and new or changing services, processes, operations, major systems, and control processes coincident with their development, implementation, and/or expansion

- Develop and maintain a continuous improvement and quality assurance program covering all aspects of IAD's activities
- Internal audit activity is governed by adherence to The Institute of Internal Auditors' Mandatory Guidance, which includes the Core Principles for the Professional Practice of Internal Auditing, the Code of Ethics, the *International Standards for the Professional Practice of Internal Auditing*, and the Definition of Internal Auditing.

AUTHORITY

The CAO is authorized to:

- Have direct and unrestricted access to senior management and the BOT
- Have (and delegate to the IAD staff as appropriate) unrestricted, independent access to all personnel, units, functions, records, and property relevant to the performance of engagements and risk assessment activities
- Allocate resources, set frequencies, select subjects, determine scopes of work, and apply the techniques required to accomplish audit objectives
- Obtain the necessary assistance of personnel in units of the organization where they perform audits as well as other specialized services from within or outside the organization as needed

The CAO and staff of the IAD are not authorized to:

- Perform any operational duties for the organization or its affiliates
- Initiate or approve accounting transactions external to the IAD
- Make decisions that are the responsibility of management

**To Be Approved by the NC State University Board of Trustees
Audit, Risk Management and Finance Committee
September 20, 2018**

FISCAL YEAR 2018**NCSU INTERNAL AUDIT DIVISION ANNUAL REPORT****OUR MISSION**

Our mission is to support the University's successful achievement of its strategic goals by serving as a partner in identifying and balancing risks through objective, flexible, and proactive audit and consultation services.

OUR VALUES

Teamwork:	We each view the University and Division's success as primary
Integrity:	We hold ourselves to the same high standard to which we hold others
Accountability:	We hold ourselves and others accountable and expect them to do the same
Service:	We give back to the University and local community

CONTINUOUS IMPROVEMENT

Continuous improvement is embedded within the Internal Audit Division's (IAD) culture and is incorporated within all of our activities. This ensures IAD remains agile in its mindset creating a more responsive, efficient, and effective audit program. With this culture as the norm rather than the exception, IAD is able to make thoughtful, timely decisions and focus efforts on issues, challenges, and risks that most affect the University's ability to implement its strategy, address risks, and achieve its goals. All staff participate and take ownership in improving internal processes through active discussion during weekly management meetings, staff meetings, and performance appraisals.

QUALITY ASSESSMENT REVIEW

A Quality Assessment Review (QAR) is mandated by the *Institute of Internal Auditors (IIA) Professional Standards* and by the State of North Carolina for all internal audit units every five years. This year's QAR was the second for our unit.

Preliminary results from the assessment indicate that IAD passed this year's review with "flying colors!" Specifically, the reviewer has noted that IAD:

- Conforms to the IIA Standards
- Is very effective, often exceeding the expectations of leadership
- Has implemented "cutting edge" best practices
- Provides forward-focused, risk-based services that positively impact the University

Additionally, it was noted that IAD has strong support from the Audit, Risk Management, and Finance (ARMF) Committee of the NCSU Board of Trustees, the Chancellor, and other University administrative and academic management. The Chancellor and the ARMF ensure IAD's ability to work independently and objectively and promote management's prioritization of IAD's recommendations and the timely implementation of corrective actions to identified concerns.

The final report for the QAR will be issued in August 2018.

FISCAL YEAR 2018

NCSU INTERNAL AUDIT DIVISION ANNUAL REPORT

HIGHLIGHTS OF THE YEAR

IAD receives requests every week for consultative input and advice on University projects, new initiatives, process improvements, self-assessments, and for proper handling of University issues that arise. IAD is in a unique position to elicit positive change and add value to the University through:

- **Collaborations** - IAD provides value by assisting University Administration in achieving the University's Strategic Plan goals with collaborations between the various units and departments on campus.

Compliance and Integrity Program – Compliance Manager Services	We collaborated with Compliance Manager Services to enhance University-wide compliance activities by increasing collaboration and expanding reporting opportunities for student, faculty, and staff for ethical or compliance related concerns.
Office of Information Technology, Security and Compliance (OIT S&C)	We worked with OIT S&C to: • Assess Information Technology (IT) environment for Power America and identify gaps between the current information processing environment and the standards outlined in the Power America Information Security and Compliance Program (Program) • Assist in the identification of potential solutions and resources needed to address identified gaps and maintain ongoing compliance with the Program • Leverage the results of the assessment to facilitate similar improvements for the broader secure research IT
OIT S&C and the Health Insurance Portability and Accountability Act (HIPAA) Compliance Sub-working Group	We helped to facilitate a complete HIPAA security assessment and privacy review for the HIPAA covered health care components at NC State.

- **Consultations and Special Assignments** - IAD strengthens the University's Strategic Risk Management initiatives through consultations and special assignments.

Office of Finance and Administration (OFA)	We reviewed existing research management and research support structures across campus including identifying: • gaps in compliance • best practices • improvements to general business and central processes • gaps in current available guidance documents • efficiency and effectiveness of customer support structure • ability to adapt to the growing and changing University research environment
Office of Research, Innovation and Economic Development (ORIED), Office of General Counsel, OFA, and OIT	We provided advisory and consulting services to this group as they developed a collaborative compliance process. This process aims to ensure the University achieves its research goals while maintaining compliance with National Institute of Standards and Technology (NIST) 800-171 "Protecting Controlled Unclassified Information in Nonfederal Information Systems and Organizations" and NIST 800-53 "Security and

FISCAL YEAR 2018

NCSU INTERNAL AUDIT DIVISION ANNUAL REPORT

	Privacy Controls for Federal Information Systems and Organizations." This collaboration raised awareness of research compliance requirements, provided compliance educational opportunities, and created new processes that will optimize compliance activities.
ORIED and OFA	We assisted in identifying research administration business processes and University-wide requirements for a proposed new Enterprise Research Administration (ERA) system to replace multiple legacy systems.
Human Resources	We consulted on implementation of the new PeopleSoft timekeeping and absence management module (July 2017). The implementation automated 90% of the business processes that were previously completed manually for timekeeping for Fair Labor Standards Act (FLSA) non-exempt personnel.
Office of Contracts and Grants	We assisted in the National Science Foundation's (NSF) review of selected Federal grants awarded by NSF.
OIT S&C	We assisted in the Office of State Auditor's audit of NCSU's Information Technology General Controls.

- **Search Committees** - These committees play a vital role in evaluating and recommending the most qualified candidates for critical positions across the University.

College of Agriculture and Life Sciences (CALS)	We participated in the Search Committee for the Director of CALS Business Services. This position provides broad leadership over the management of the college's centralized financial and business processing operations for CALS departments, centers, County Extension Service offices, the NC Agricultural Research Services Office and its agricultural research stations, and the NC Agricultural and Tobacco Foundations.
University Controller's Office	We participated in the Search Committee for the Financial Reporting Director. This position plays a critical role in overseeing all aspects of the University's financial reporting including: 1) preparing the University's Annual Financial Report, 2) managing the audit of the University's financial statements, and 3) completing the Office of the State Controller's Comprehensive Annual Financial Report reporting package.

- **Audit Recommendations** - During audits, collaborations, consultations, and investigations, issues are identified and discussed with management and stakeholders to allow for process improvements and corrective actions. This year improvements and corrective actions included:

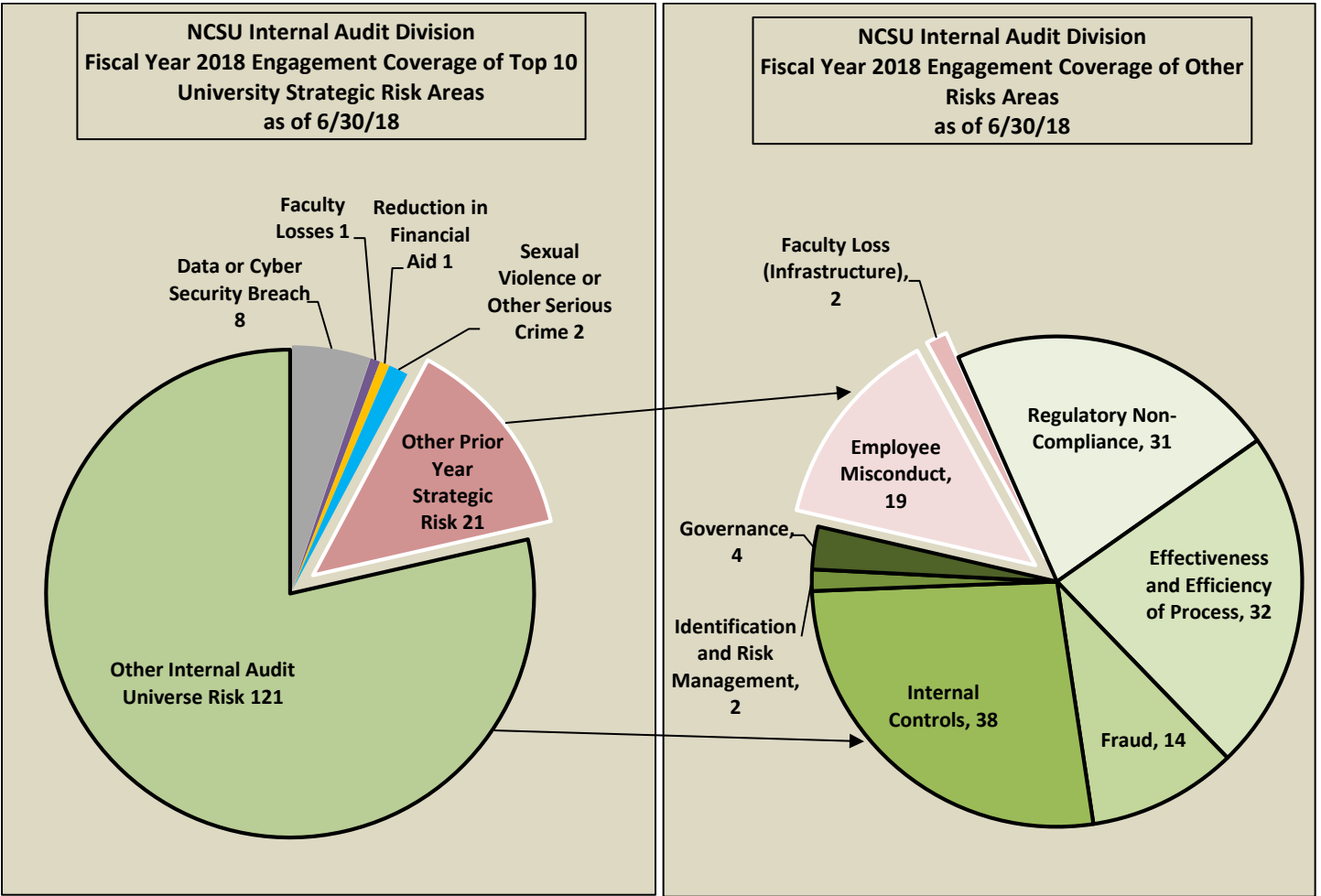
<u>Greater Employee Awareness:</u> • The protection of ultra-sensitive data • How to report concerning behavior • Conflict of interest disclosures • Financial oversight best practices • State and University Purchasing requirements and procedures	<u>Enhanced Processes and Procedures:</u> • Management and oversight of funds • Review of financial transactions for documentation of allowability, allocability, and appropriateness • Governance and security of ultra-sensitive data • Securing State and University property • Accurate time reporting
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FISCAL YEAR 2018

NCSU INTERNAL AUDIT DIVISION ANNUAL REPORT

CONTINUOUS RISK ASSESSMENT

IAD developed and implemented a Continuous Risk Assessment process in 2008, well before it became a nationwide best practice. This process is at the core of our audit and consulting engagements and is used as an objective tool in the development of our risk-based Audit Plans. Our view of risk encompasses all elements of the NC State Mission: academics, research, and engagement. To ensure comprehensive input, all team members visit faculty and staff across the University every week to discuss their unit’s strategic plans, goals, and risk posture in relation to the University’s Mission. As a result, in Fiscal Year 2018, 8% of our engagements directly related to the Top Ten Risks identified by the University’s Strategic Risk Management program and the remaining 92% related to risks identified through the continuous risk assessment process. IAD engagement activities covering the University’s Strategic Risk Areas during Fiscal Year 2018 are noted in the charts below.

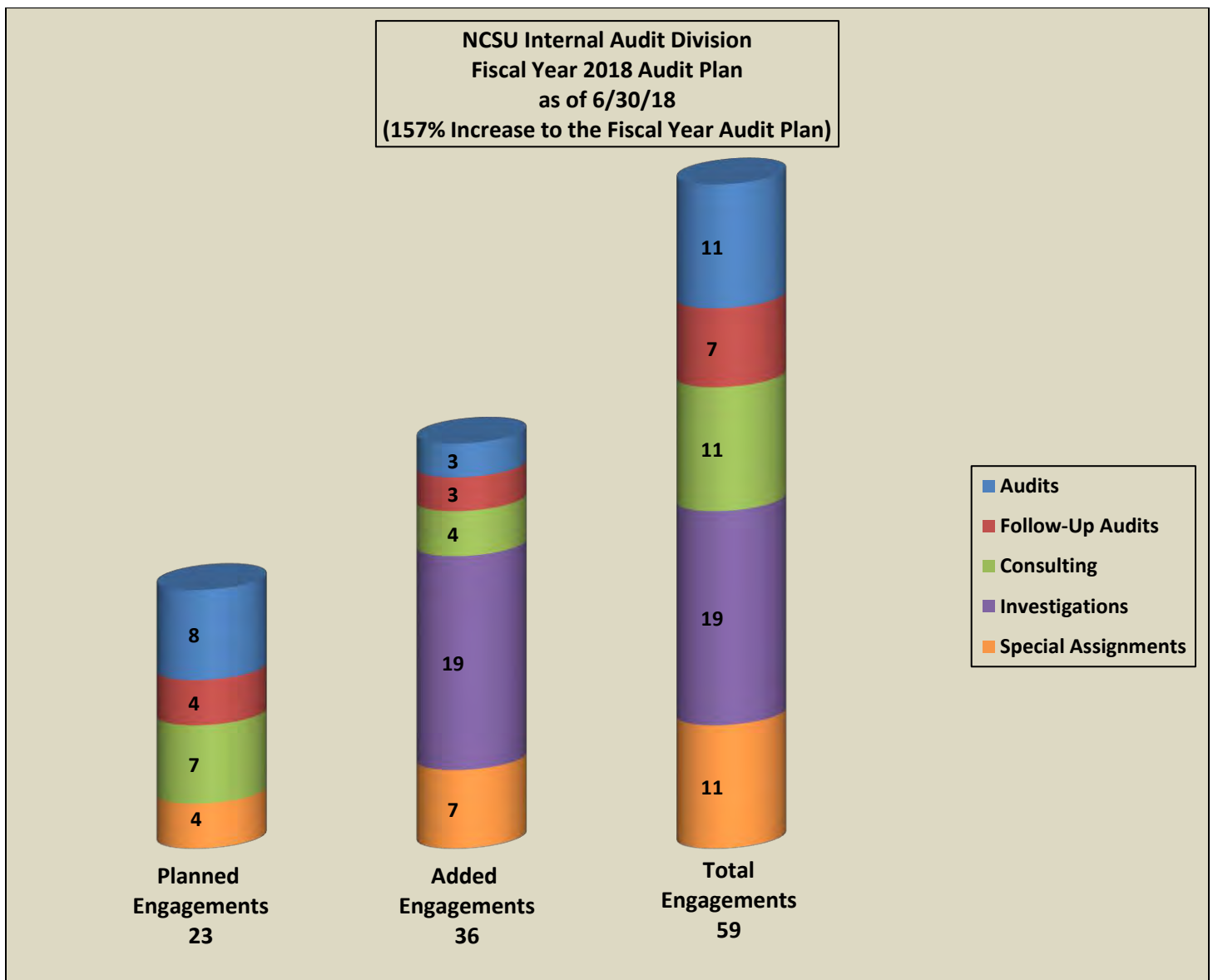


IAD’s proactive risk assessment approach assists in the anticipation of and deeper insights into issues impacting University Strategy. IAD communicates those risks so that management can build mitigating controls into systems, processes, and initiatives prior to implementation. This is more efficient and cost effective than recommending changes after implementation.

FISCAL YEAR 2018**NCSU INTERNAL AUDIT DIVISION ANNUAL REPORT****AUDIT PLAN**

Each year in April, the NCSU Board of Trustees reviews and approves a new Audit Plan for the coming fiscal year. That Plan is a “snapshot in time” of the current risks identified as of February 1 (the end of our planning year) that are selected to be addressed through engagements during the up-coming fiscal year. The Plan is subject to change throughout the year as we weigh emerging areas of risk, management requests, and potential investigations received against the engagements on the original approved Plan. The impact of this is that some engagements on the Plan will be postponed as new engagements carrying higher or more immediate risk are added to the plan. All planned engagements that are not completed during the fiscal year are returned to our Continuous Risk Assessment process for on-going monitoring and potential inclusion in a later plan. This results in a more responsive, agile, and comprehensive audit process.

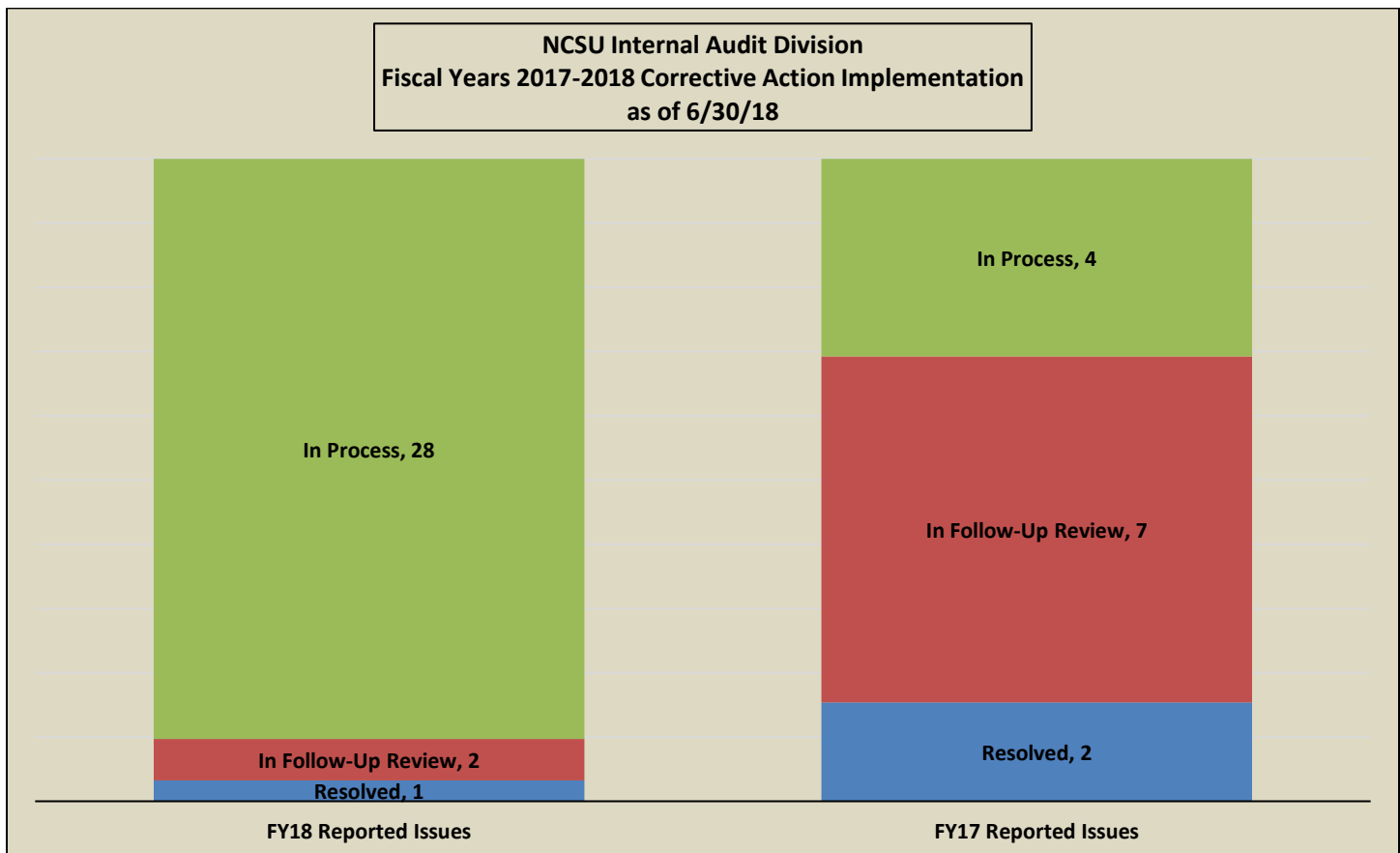
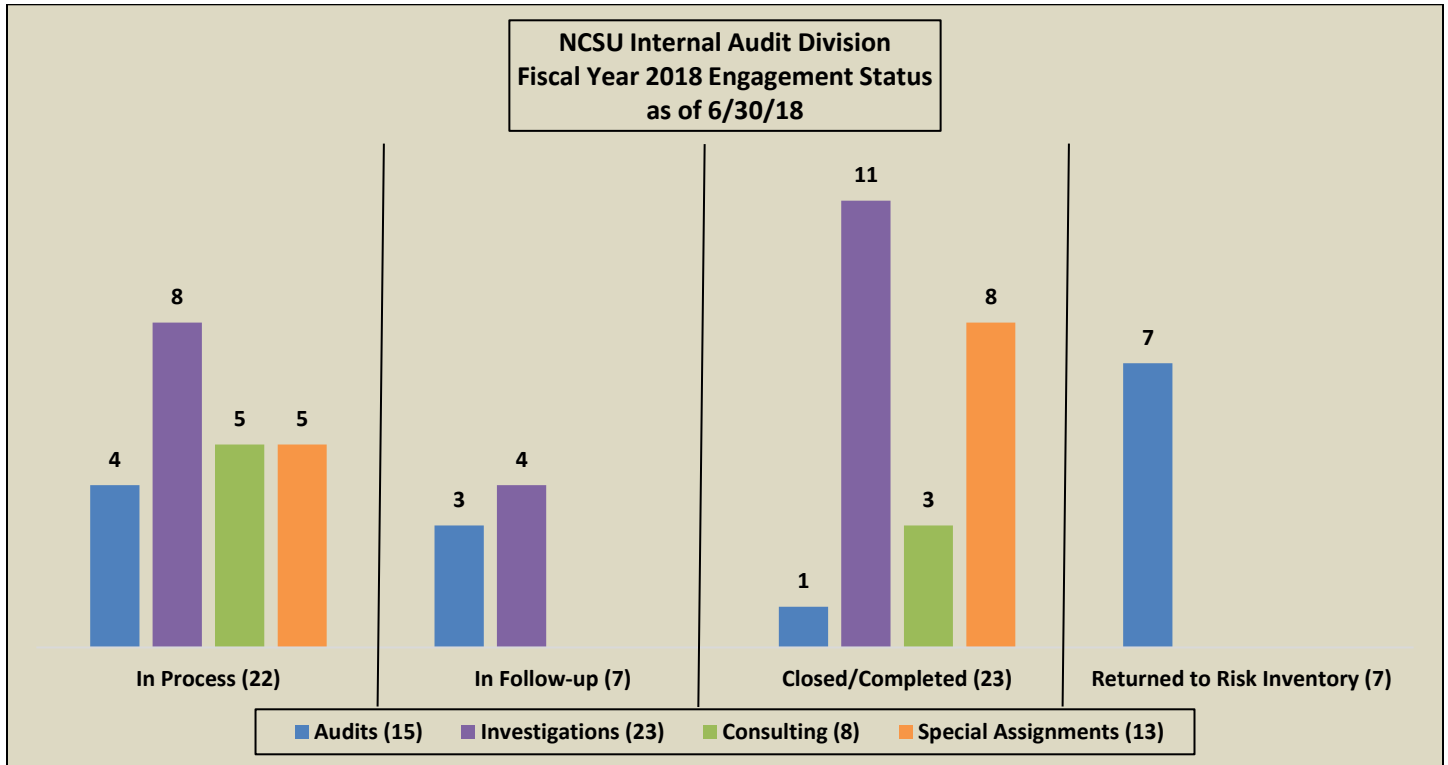
As illustrated in the chart below, 36 engagements were added to the original approved Fiscal Year 2018 Audit Plan. That represents a 157% increase to the plan.



FISCAL YEAR 2018

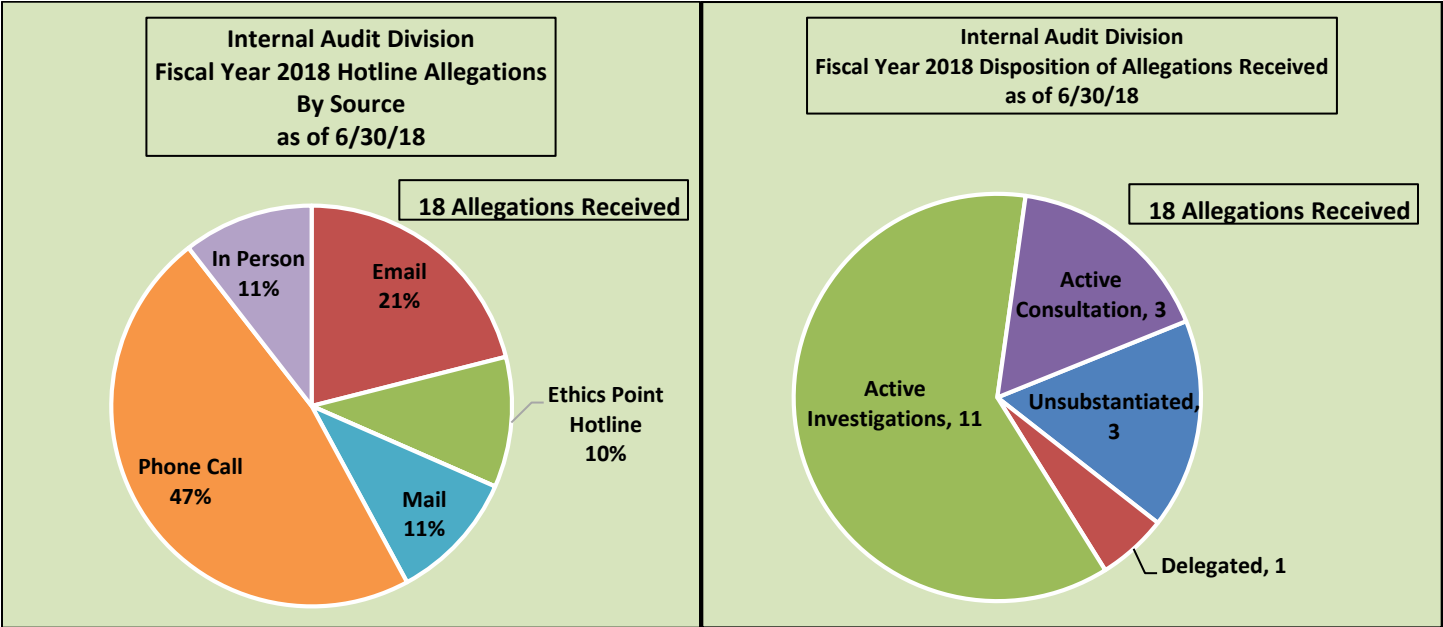
NCSU INTERNAL AUDIT DIVISION ANNUAL REPORT

ENGAGEMENTS

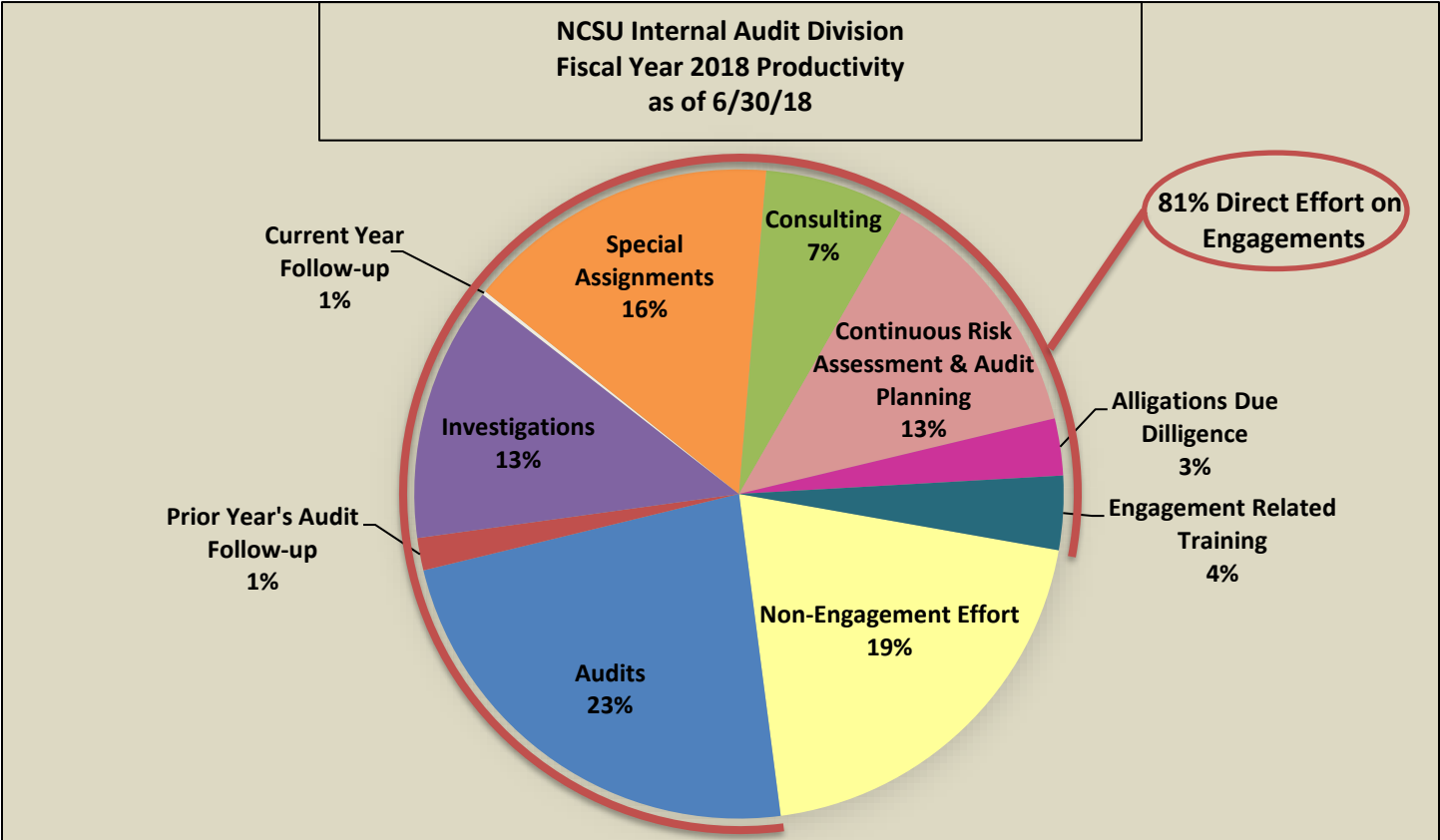


FISCAL YEAR 2018

NCSU INTERNAL AUDIT DIVISION ANNUAL REPORT



In Fiscal Year 2018, our success was due to a dedicated staff, full time and temporary, who devoted 81% of their time directly to these engagements as illustrated in the chart below. Non-engagement effort includes activities such as professional development, administration, attending University functions (e.g., Awards for Excellence ceremonies), and personnel management.



FISCAL YEAR 2018**NCSU INTERNAL AUDIT DIVISION ANNUAL REPORT**

As of the end of Fiscal Year 2018, all team members have been in place for over two years; the Chief Audit Officer & Director and the Assistant Director have been at the University for over 15 and 20 years, respectively. The stability of the team combined with longevity enables a deeper and more holistic understanding of the organization structurally, culturally, and operationally. In addition, it ensures a solid understanding of the risks in a complex higher education environment.

New Staff Appointment

Sandra Soto joined the IAD in December 2017 as an Auditor. She has over 20 years of accounting experience in various industries. Sandra has a B.S. in Accounting with a concentration in Internal Audit from NC State and she is currently enrolled in the MBA program at NC State. Sandra is a Certified Fraud Examiner (CFE). She is also trilingual: speaking English, Spanish, and French.

Staff Kudos, Professional Activities, and Recognition

Frank Dziepak, Investigative Auditor, won the Chancellor's Unit Awards for Excellence in February 2018. He then represented the Chancellor's Unit during the University level Awards for Excellence in June 2018. Frank also graduated from the NC State Equal Opportunity Institute in May 2018.

Neil Holloway was promoted to Audit Manager in May 2018. He also earned his MBA from NC State this fiscal year graduating in December 2017.

M'Shiela Hawthorne, Auditor, served as Treasurer for the UNC Auditor Association for fiscal year 2018. She also earned her CFE certification in November 2017. The CFE covers four major disciplines that comprise the fraud examination body of knowledge: Fraud Prevention and Deterrence, Fraudulent Financial Transactions, Fraud Investigation, and Legal Elements of Fraud. This body of knowledge will further assist IAD in reducing the University's risk of fraud.

Cecile Hinson, Chief Audit Officer & Director, earned a Certified Compliance and Ethics Professional (CCEP) certification in August 2017. A CCEP professional has knowledge of relevant regulations and expertise in compliance processes sufficient to assist organizations with their legal obligations and promotes organizational integrity through the operation of effective compliance programs.

Staff Transitions

Gail Kashulon, part-time Information Technology Auditor, retired in July 2017.

Anthony Workman, Information Technology Auditor, left the team in December 2017 and is pursuing new career opportunities.



FISCAL YEAR 2018**NCSU INTERNAL AUDIT DIVISION ANNUAL REPORT****ACHIEVEMENTS TOWARDS UNIVERSITY STRATEGIC GOALS****UNIVERSITY GOAL 1 – ENHANCE STUDENT SUCCESS**

Jennifer (Jenna) Corey joined IAD as an intern from the Poole College of Management's (PCOM) Internal Auditing concentration program. She worked as a part-time temporary auditor during the summer of 2017. Jenna graduated from NC State in December 2017 with a B.S. in Accounting and a concentration in Internal Auditing. She is now a staff auditor with Calibre CPA Group, PLLC in Bethesda, Maryland.

Internships with our team provide a student with total immersion in the "real world" of the internal auditing profession. The student is assigned to audit and consulting projects and, with the coaching and mentorship of a senior auditor, performs all aspects of a typical project from risk assessment and planning to developing audit findings and writing the report. This experience positions the student ahead of many new graduates and even some experienced junior auditors; thus, improving their ability to compete for jobs in the market place.

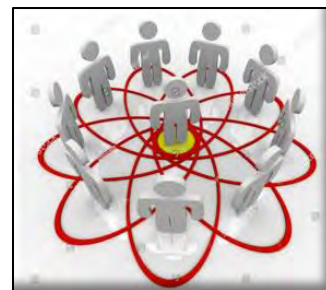
Anthony Workman, former Information Technology Auditor, presented on information technology and network security to about 35 undergraduate students in a PCOM information technology class in November 2017.

UNIVERSITY GOAL 4 – PURSUE ORGANIZATIONAL EXCELLENCE**Data Analytics**

IAD has been using data analytics increasingly over the last five years. Currently, IAD is using data analytics tools to perform in-depth risk analysis and visualize audit results. IAD is planning on expanding use of data analytics tools in the upcoming year as the team continues to build technical competency.

Shared Best Practices

During the consultation review of University-wide Post Award Research Management Business Processes, IAD identified organizational structures, processes, and tools in several units that stood out as best practices. These best practice examples were added (with permission) to the IAD website to benefit other campus Research Administration units as needed.

**Facilitating Efficiency and Effectiveness**

IAD's broad-based perspective of the University uniquely positions it to identify opportunities to improve efficiency and effectiveness through facilitation of collaboration between units and increasing the awareness of available University services and resources.

UNIVERSITY GOAL 5 – ENGAGE LOCALLY AND GLOBALLY

Throughout the year, IAD participates in opportunities to give back to both our local and global communities. Each year the team spends 8-12 hours in community service by volunteering for unanimously selected activities in the community. These activities not only benefit our communities but also provide a valuable opportunity for strengthening our team bonds. This year the IAD staff:

- Prepared food boxes for senior citizens at the Food Bank of Central and Eastern North Carolina. IAD assisted in packing 604 boxes with 17,880 pounds of food in just 2 hours. That equates to 15,056 meals! Way to go Pack!
- Collected funds to contribute to the Toys for Tots toy drive on NC State's campus. Toys for Tots is a non-profit charitable organization run by the US Marine Corps Reserve which distributes toys to children whose parents cannot afford to buy them gifts during the holidays.
- Collected nearly 50 gently used stuffed animals to donate to Stuffed Animals for Emergencies (SAFE), Inc. SAFE collects new and gently used stuffed animals to be redistributed to emergency organizations, children's services, hospitals, homeless shelters and many other places that help children during times of crisis.
- Achieved a 100% participation rate in the State Employees Combined Campaign (SECC).



**NC STATE UNIVERSITY INTERNAL AUDIT DIVISION
FISCAL YEAR 2018 AUDIT PLAN AND ENGAGEMENT STATUS
AS OF JUNE 30, 2018**

<u>Engagement</u>	<u>On Original Fiscal Year 2018 Audit Plan?</u>	<u>Coverage of Top 10 University Strategic Risks</u>	<u>Fiscal Year 2018 University Strategic Plan Goals</u>	<u>Status</u>	<u>Comments</u>
AUDITS					
Division of Academic and Student Affairs - Student Health Services Investigation	No - Carried Forward From Prior Year	Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance		Closed	The objective of this audit was to investigate an allegation from an internal source related to the new medical records system implementation. 8 issues were reported related to operation and functionality of the new system. The investigation occurred in 2 phases: Phase 1 - Focused on potential compliance issues. Phase 2 - Focused on correction of system issues. Phase 1 - Allegations were unsubstantiated. Report issued 4/27/17. Investigation closed. Phase 2 - Allegations were substantiated and corrective actions for the issues reported were fully and successfully implemented. Report issued 7/18/17. Investigation closed.
College of Engineering - Material Science and Engineering Investigation	No - Carried Forward From Prior Year	Other - Prior Year Strategic Risk - Employee Misconduct Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance		Closed	The objective of this audit was to investigate an allegation from an internal source regarding summer salary paid to a faculty member and to determine if it was in compliance with Federal, State, and University requirements. 1 issue was reported related to summer salary being charged to an incorrect account. Allegation was substantiated and corrective action for the issue reported was fully and successfully implemented. Report issued 8/24/17. Investigation closed.
The Friday Institute for Educational Innovation Investigation	No - Carried Forward From Prior Year	Other - Prior Year Strategic Risk - Employee Misconduct Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance		Closed	The objective of this audit was to investigate an allegation from an internal source regarding possible inappropriate charges made to a faculty member's PCard during summer 2016. 1 issue was reported related to unsupported travel expenses. Allegation was substantiated and corrective action for the issue reported was fully and successfully implemented. Report issued 9/20/17. Investigation closed.
Environmental Health and Public Safety - University Police Investigation	No - Carried Forward From Prior Year	Other - Prior Year Strategic Risk - Employee Misconduct Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process		Closed	The objective of this audit was to investigate an allegation received from an internal source regarding proper performance of required background checks and concerns related to possible misuse of funds. Allegations were unsubstantiated. Report issued 10/9/17. Investigation closed.
College of Agriculture and Life Sciences - Agricultural and Human Sciences Investigation	No - Added	Other - Prior Year Strategic Risk - Employee Misconduct Other - Internal Audit Universe Risk - Regulatory Non-Compliance		Closed	The objective of this audit was to investigate allegations from an internal source regarding a potential conflict of interest existing between a faculty member and a relative who was providing services to the University. 1 issue was reported related to a conflict of interest. Allegation was substantiated and corrective action for the issue reported was fully and successfully implemented. Report issued 11/20/17. Investigation closed.
College of Sciences - Department of Biological Sciences Investigation	No - Added	Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance Other - Prior Year Strategic Risk - Employee Misconduct		Closed	The objective of this audit was to investigate allegations from an internal source regarding potential non-compliance with State and University procurement policies and regulations. Allegations were unsubstantiated. Report issued 1/31/18. Investigation closed.

Key:	Closed	In Process	Returned to Continuous Risk Assessment
	Complete In Follow-up	Canceled	

**NC STATE UNIVERSITY INTERNAL AUDIT DIVISION
FISCAL YEAR 2018 AUDIT PLAN AND ENGAGEMENT STATUS
AS OF JUNE 30, 2018**

<u>Engagement</u>	<u>On Original Fiscal Year 2018 Audit Plan?</u>	<u>Coverage of Top 10 University Strategic Risks</u>	<u>Fiscal Year 2018 University Strategic Plan Goals</u>	<u>Status</u>	<u>Comments</u>
College of Sciences - The Science House Investigation	No - Added	Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance		Closed	The objective of this audit was to investigate allegations from an internal source regarding potential misuse of funds and non-compliance with University policies. Allegation was substantiated and corrective action for the issue reported was fully and successfully implemented. Report issued 3/12/18. Investigation closed.
College of Agriculture and Life Sciences (CALS) - Foundations Internal Controls Review	Yes	Other - Prior Year Strategic Risk - Employee Misconduct Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process		Closed	The objective of this audit was to review Foundation financial processes, internal controls, and assess compliance with University policy. No occurrences of non-compliance within the CALS Foundations processes were noted. Report issued 4/5/18. Engagement closed.
Department of Athletics - Women's Basketball Transportation Investigation	No - Added	Other - Prior Year Strategic Risk - Employee Misconduct Other - Internal Audit Universe Risk - Fraud		Closed	The objective of this audit was to investigate allegations from an internal source regarding potential misuse of funds for personal benefit and falsification of documentation. Allegations were substantiated. No reportable issues required management corrective action. Report issued 6/22/18. Investigation closed.
Poole College of Management - Development and External Relations Investigation	No - Added	Other - Prior Year Strategic Risk - Employee Misconduct Other - Internal Audit Universe Risk - Fraud		In Process	The objective of this audit is to investigate allegations from an internal source regarding the potential misuse of funds using a University PCard.
College of Agriculture and Life Sciences Poultry Sciences - Feed Mill Education Unit Investigation	No - Added	Other - Prior Year Strategic Risk - Employee Misconduct Other - Internal Audit Universe Risk - Fraud Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Processes		In Process	The objective of this audit is to investigate allegations from an internal source regarding potential non-compliance with State and University procurement and PCard policies.

Key:	Closed	In Process	Returned to Continuous Risk Assessment
	Complete In Follow-up	Canceled	

**NC STATE UNIVERSITY INTERNAL AUDIT DIVISION
FISCAL YEAR 2018 AUDIT PLAN AND ENGAGEMENT STATUS
AS OF JUNE 30, 2018**

<u>Engagement</u>	<u>On Original Fiscal Year 2018 Audit Plan?</u>	<u>Coverage of Top 10 University Strategic Risks</u>	<u>Fiscal Year 2018 University Strategic Plan Goals</u>	<u>Status</u>	<u>Comments</u>
College of Natural Resources - Parks, Recreation, and Tourism Management Investigation	No - Carried Forward From Prior Year	Other - Prior Year Strategic Risk - Employee Misconduct Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process		In Process	The objective of this audit is to investigate an allegation from an internal source regarding potential undeposited receipts, mismanagement of funds, and misuse of funds.
Campus Enterprises - University Dining Vendor Processes Fraud Risk Assessment	No - Carried Forward From Prior Year	Other - Internal Audit Universe Risk - Fraud Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process	4. Pursue organizational excellence	In Process	The objective of this audit is to assess the effectiveness of University Dining's financial processes and internal controls at reducing the risk of fraud.
Campus Enterprises - NCSU Bookstores Investigation	No - Added	3 - Data or Cyber Security Breach Other - Prior Year Strategic Risk - Employee Misconduct Other - Internal Audit Universe Risk - Fraud Other - Internal Audit Universe Risk - Internal Controls	4. Pursue organizational excellence	In Process	The objective of this audit is to assess the effectiveness of NCSU Bookstores' financial processes and internal controls at reducing the risk of fraud.
College of Agriculture and Life Sciences Department of Food, Bioprocessing, and Nutrition Sciences Investigation	No - Carried Forward From Prior Year	Other - Prior Year Strategic Risk - Employee Misconduct Other - Internal Audit Universe Risk - Fraud Other - Internal Audit Universe Risk - Internal Controls		In Process	The objective of this audit is to investigate an allegation from an internal source regarding possible falsification of timesheets.

Key:	Closed	In Process	Returned to Continuous Risk Assessment
	Complete In Follow-up	Canceled	

**NC STATE UNIVERSITY INTERNAL AUDIT DIVISION
FISCAL YEAR 2018 AUDIT PLAN AND ENGAGEMENT STATUS
AS OF JUNE 30, 2018**

<u>Engagement</u>	<u>On Original Fiscal Year 2018 Audit Plan?</u>	<u>Coverage of Top 10 University Strategic Risks</u>	<u>Fiscal Year 2018 University Strategic Plan Goals</u>	<u>Status</u>	<u>Comments</u>
College of Agriculture and Life Sciences Department of Crop and Soil Sciences Investigation	No - Added	Other - Prior Year Strategic Risk Employee Misconduct Other - Internal Audit Universe Risk - Fraud Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process		In Process	The objective of this audit is to investigate allegations from an internal source regarding the potential misuse of funds using a University PCard.
College of Agriculture and Life Sciences Department of Crop and Soil Sciences - Consortium Uniting People for Sustainability (CUPS) Investigation	No - Added	Other - Prior Year Strategic Risk Employee Misconduct Other - Internal Audit Universe Risk - Regulatory Non- Compliance		In Process	The objective of this audit is to investigate allegations from an internal source to determine if fundraising activities are compliant with Federal, State, and University regulations.
Office of Finance and Administration - Facilities - Utilities and Engineering Department Timekeeping and Pay Investigation	No - Added	Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process	4. Pursue organizational excellence	In Process	The objective of this audit is to investigate allegations from an external source regarding the potential incorrect payroll payments for Facilities' employees.
Non-Salary Year End Transfer of Expenses	No - Carried Forward From Prior Year	Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non- Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process	4. Pursue organizational excellence	In Process	The objective of this audit is to test non-salary year end transfer of expenses for allowability, allocability, and appropriateness.
Audit of Expenditures from Special Academic Program Resources	Yes	Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process	1. Enhance student success 4. Pursue organizational excellence	In Process	The objective of this audit is to assess expenditures from special academic program resource funds for compliance.
Corrective Actions for National Science Foundation (NSF) Performance Audit of Incurred Costs	No - Added	Other - Internal Audit Universe Risk - Regulatory Non- Compliance Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process		In Process	The objective of this audit is to perform follow-up activities on all audit issues reported in the NSF external audit.

Key:	Closed	In Process	Returned to Continuous Risk Assessment
	Complete In Follow- up	Canceled	

**NC STATE UNIVERSITY INTERNAL AUDIT DIVISION
FISCAL YEAR 2018 AUDIT PLAN AND ENGAGEMENT STATUS
AS OF JUNE 30, 2018**

<u>Engagement</u>	<u>On Original Fiscal Year 2018 Audit Plan?</u>	<u>Coverage of Top 10 University Strategic Risks</u>	<u>Fiscal Year 2018 University Strategic Plan Goals</u>	<u>Status</u>	<u>Comments</u>
Cooperative Extension Services (CES) Financial Governance	Yes	Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non- Compliance Other - Internal Audit Universe Risk - Governance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process	4. Pursue organizational excellence	Returned to Continuous Risk Assessment	The objective of this audit was to assess NCSU CES central office governance and financial processes. This audit was returned to the Continuous Risk Assessment process based on reassessment of the audit plan in relation to other priority engagements.
Grant Expenses at Award End	Yes	Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non- Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process	4. Pursue organizational excellence	Returned to Continuous Risk Assessment	The objective of this audit was to test financial expenditures at the end of the federal grant award life cycle to ensure they are allowable, allocable, and reasonable. Compliance of the expenditures to applicable regulations and provisions of the award agreements were to also be assessed. This audit was returned to the Continuous Risk Assessment process based on reassessment of the audit plan in relation to other priority engagements.
Academic Information Technology Disaster Recovery Planning	Yes	3 - Data or Cyber Security Breach Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process	4. Pursue organizational excellence	Returned to Continuous Risk Assessment	The objective of this audit was to assess the strategic alignment between college and departmental information technology disaster recovery (DR) planning and their related business continuity plans (BCP). Primary focus was to be on academic and instructional DR and BCP. This audit was returned to the Continuous Risk Assessment process based on reassessment of the audit plan in relation to other priority engagements.
Security Applications and Technology (SAT) Services	Yes	Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process	4. Pursue organizational excellence	Returned to Continuous Risk Assessment	The objective of this audit was to assess the processes and related controls governing the system used by SAT to provide physical access controls for campus locations. This audit was returned to the Continuous Risk Assessment process based on reassessment of the audit plan in relation to other priority engagements..
Title IX	Yes	6 - Reduction in Financial Aid 10 - Sexual Violence or Other Serious Crime Other - Internal Audit Universe Risk - Regulatory Non- Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process	4. Pursue organizational excellence	Returned to Continuous Risk Assessment	The objective of this audit was to assess the University's compliance to the Federal Office of Civil Rights Title IX requirements relating to sexual violence in the student population. This audit was returned to the Continuous Risk Assessment process due to other University entities performing reviews of various aspects of Title IX and revision of current processes. Internal Audit Division will monitor progress of process changes.

Key:	Closed	In Process	Returned to Continuous Risk Assessment
	Complete In Follow- up	Canceled	

**NC STATE UNIVERSITY INTERNAL AUDIT DIVISION
FISCAL YEAR 2018 AUDIT PLAN AND ENGAGEMENT STATUS
AS OF JUNE 30, 2018**

<u>Engagement</u>	<u>On Original Fiscal Year 2018 Audit Plan?</u>	<u>Coverage of Top 10 University Strategic Risks</u>	<u>Fiscal Year 2018 University Strategic Plan Goals</u>	<u>Status</u>	<u>Comments</u>
Internal Controls Over Salary Supplements	Yes	5 - Faculty Losses Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process		Returned to Continuous Risk Assessment	The objective of this audit was to evaluate internal controls over the administration of supplemental salary payments (e.g., honor, interim, administrative, and temporary) to employees and compliance to University requirements. This audit was returned to the Continuous Risk Assessment process based on reassessment of the audit plan in relation to other priority engagements.
Fraud Controls in the Accounts Payable Vendor Account Management Process	Yes	Other - Internal Audit Universe Risk - Fraud Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process Other - Internal Audit Universe Risk - Identification and Risk Management		Returned to Continuous Risk Assessment	The objective of this audit was to assess newly implemented internal controls intended to prevent fraud in the vendor account management process. This audit was returned to the Continuous Risk Assessment process based on reassessment of the audit plan in relation to other priority engagements.

CURRENT YEAR AUDIT FOLLOW-UP

College of Agriculture and Life Sciences - Animal Science Department Investigation - Follow-up	Yes	10 - Sexual Violence or Other Serious Crime Other - Prior Year Strategic Risk - Employee Misconduct Other - Internal Audit Universe Risk - Fraud Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance		Complete - In Follow-up	The objective of this audit was to investigate an allegation from an internal source regarding the potential misuse of funds in University accounts. 2 issues were noted related to student organization financial training and University procedures for reporting concerning behavior. Report issued 10/16/17. Number of Audit Issues Remaining Open: 2 (corrective actions in progress) Number of Audit Issues Closed: 0
Campus Enterprises - NCSU Dining Timesheet Investigation - Follow-up	No - Added	Other - Prior Year Strategic Risk - Employee Misconduct Other - Internal Audit Universe Risk - Fraud Other - Internal Audit Universe Risk - Internal Controls		Complete - In Follow-up	The objective of this audit was to investigate allegations received from both external and internal sources regarding the manipulation of employee time sheets by the supervisor. 3 issues were noted related to inconsistent application of policy, insufficient documentation, and lack of audit trail for changes to employee time punches. Report issued 3/15/18. Number of Audit Issues Remaining Open: 3 (corrective actions in progress) Number of Audit Issues Closed: 0

Key:	Closed	In Process	Returned to Continuous Risk Assessment
	Complete In Follow-up	Canceled	

**NC STATE UNIVERSITY INTERNAL AUDIT DIVISION
FISCAL YEAR 2018 AUDIT PLAN AND ENGAGEMENT STATUS
AS OF JUNE 30, 2018**

<u>Engagement</u>	<u>On Original Fiscal Year 2018 Audit Plan?</u>	<u>Coverage of Top 10 University Strategic Risks</u>	<u>Fiscal Year 2018 University Strategic Plan Goals</u>	<u>Status</u>	<u>Comments</u>
User Controls Over Ultra-Sensitive Data Follow-up	Yes	3 - Data or Cyber Security Breach Other - Internal Audit Universe Risk - Regulatory Non-Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process	4. Pursue organizational excellence	Complete - In Follow-up	The objective of this audit was to assess processes followed by users accessing ultra-sensitive University data for effectiveness and compliance to Federal, State, and University security requirements. 23 issues were noted related to guidance, training, storage, retention, verification processes, access, and approval processes. Report issued 3/26/18. Number of Audit Issues Remaining Open: 23 (corrective actions in progress) Number of Audit Issues Closed: 0
College of Agriculture and Life Sciences Poultry Sciences - Feed Mill Education Unit Investigation - Follow-up [Phase 1]	No - Added	Other - Prior Year Strategic Risk - Employee Misconduct Other - Internal Audit Universe Risk - Fraud Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Processes		Complete - In Follow-up	The objective of this audit was to investigate allegations from an internal source regarding potential non-compliance with State and University procurement, including PCard, policies. 1 issue was noted related to inadequate transaction review. Report issued 4/16/18. Number of Audit Issues Remaining Open: 1 (corrective action in progress) Number of Audit Issues Closed: 0
College of Sciences - Marine, Earth and Atmospheric Sciences Investigation - Follow-up	No - Added	Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process	4. Pursue organizational excellence	Complete - In Follow-up	The objective of this audit was to investigate allegations from an internal source regarding potential non-compliance with University policies on compensation. 1 issue was noted related to inadequate guidance. Report issued 5/17/18. Number of Audit Issues Remaining Open: 1 (corrective action in progress) Number of Audit Issues Closed: 0
PRIOR YEARS' AUDIT FOLLOW-UP					
University Employee Time and Leave Management - Follow-up	Yes	Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process	4. Pursue organizational excellence	FollowUp - In Process	The objective of this audit was to test compliance to Federal Fair Labor Standards Act, State, and University requirements relating to employee compensatory leave and overtime hours. 8 issues were noted related to incorrect payroll payments to employees, timesheet standardization and guidance, aged out compensatory time reporting process, hiring processes, holiday pay, compensatory leave, and incorrect full time equivalency status. Original report issued 9/15/16. Number of Audit Issues Remaining Open: 6 (corrective actions in progress) Number of Audit Issues Closed: 2

Key:	Closed	In Process	Returned to Continuous Risk Assessment
	Complete In Follow-up	Canceled	

**NC STATE UNIVERSITY INTERNAL AUDIT DIVISION
FISCAL YEAR 2018 AUDIT PLAN AND ENGAGEMENT STATUS
AS OF JUNE 30, 2018**

<u>Engagement</u>	<u>On Original Fiscal Year 2018 Audit Plan?</u>	<u>Coverage of Top 10 University Strategic Risks</u>	<u>Fiscal Year 2018 University Strategic Plan Goals</u>	<u>Status</u>	<u>Comments</u>
College of Agriculture and Life Sciences Business Processes - Follow-up	Yes	Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process	4. Pursue organizational excellence	FollowUp - In Process	The objective of this audit was to review internal controls and effectiveness of the College of Agriculture and Life Sciences business processes as related to previous investigations and determine other areas with opportunities for improvements. 5 issues were noted related to procedures for: financial oversight, monitoring and oversight of personnel charges, additional compensation payments, salary redistributions, and administration of faculty departures. Original report issued 4/19/17. Number of Audit Issues Remaining Open: 5 (corrective actions in progress) Number of Audit Issues Closed: 0
CONSULTING ENGAGEMENTS					
PeopleSoft Module Implementation - Timekeeping and Absence Management Module	Yes	Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process	4. Pursue organizational excellence	Closed	Internal Audit provided advisory and consulting services to Human Resources on their implementation of the PeopleSoft Timekeeping and Absence Management module that was implemented in July 2017. The changes automated 90% of the business processes that were previously completed manually for timekeeping for non-exempt personnel. Consultation closed: 8/24/17.
2017 National Science Foundation Audit	No - Added	Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process		Closed	Internal Audit consulted with the Office of Contracts and Grants and various Colleges to manage and facilitate the National Science Foundation's (NSF) review of NSF grants awarded to NCSU researchers. Consultation closed: 6/11/18.
Minor Consulting and Advisory Services	Yes	Various		Closed	Internal Audit receives requests every week from colleges, business units, centers, institutes, and remotely located sites seeking consultative audit input on their projects, new initiatives, or for proper handling of problems encountered. These activities deal with security, financial, research, and personnel matters and result in recommendations relating to compliance, efficiency, security and privacy, or provide general audit related information to campus. Time is allowed on the Plan for these advisory services. Staff members spent an average of 156 hours on these activities in FY2018.
Research Administration Systems Replacement - ERA (Enterprise Research Administration)	Yes - Carried Forward From Prior Year	3 - Data or Cyber Security Breach Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process Other - Internal Audit Universe Risk - Identification and Risk Management	3. Support interdisciplinary scholarship 4. Pursue organizational excellence	In Process	Internal Audit is providing advisory and consulting services to the Office of Research, Innovation and Economic Development and the Office of Finance and Administration on their replacement of multiple legacy systems used for enterprise research administration activities.

Key:	Closed	In Process	Returned to Continuous Risk Assessment
	Complete In Follow-up	Canceled	

**NC STATE UNIVERSITY INTERNAL AUDIT DIVISION
FISCAL YEAR 2018 AUDIT PLAN AND ENGAGEMENT STATUS
AS OF JUNE 30, 2018**

<u>Engagement</u>	<u>On Original Fiscal Year 2018 Audit Plan?</u>	<u>Coverage of Top 10 University Strategic Risks</u>	<u>Fiscal Year 2018 University Strategic Plan Goals</u>	<u>Status</u>	<u>Comments</u>
Office of the State Auditor Information Technology (IT) General Controls Audit	No - Added	3 - Data or Cyber Security Breach Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process		In Process	Internal Audit is consulting with the Office of Information Technology Security and Compliance to facilitate the Office of State Auditor's (OSA's) IT General Controls audit. OSA's audit scope included review and consideration of Internal Audit IT audit reports and documented issues to avoid duplication of effort as appropriate.
College of Agriculture and Life Sciences Integrated Pest Management Research	No - Added	Other - Internal Audit Universe Risk - Internal Controls		In Process	Internal Audit is consulting with Integrated Pest Management - Research management regarding an issue of non-compliance with University policy on compensation.
Implementation of Accounts Payable Vendor Management System	Yes	Other - Internal Audit Universe Risk - Fraud Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process	4. Pursue organizational excellence	In Process	Internal Audit Division is consulting with the University Controller's Office on their implementation of a vendor management system application.
College of Agriculture and Life Sciences Warren County Cooperative Extension Service	No - Added	Other - Prior Year Strategic Risk - Employee Misconduct Other - Internal Audit Universe Risk - Fraud Other - Internal Audit Universe Risk - Internal Controls		In Process	Internal Audit Division is consulting with the College of Agriculture and Life Sciences Human Resources, Cooperative Extension Services and Warren County Cooperative Extension Service regarding a potential mishandling of funds.
SPECIAL ASSIGNMENTS					
University Information Technology Strategic Advisory Committee (ITSAC) and Various Subcommittees	Yes	Other - Internal Audit Universe Risk - Governance		Closed	Chief Audit Officer and Director is a member of the ITSAC, the University-wide, top-level committee of non-Information Technology personnel whose focus is to ensure that changes, new directions, and planning is done in a coordinated and collaborative fashion. Additional consulting activities were performed by the Assistant Director who provides objective, independent advice to ITSAC subcommittees such as Security, Enterprise Application Systems Management, and the College Information Technology Directors. Engagement closed 6/30/18.

Key:	Closed	In Process	Returned to Continuous Risk Assessment
	Complete In Follow-up	Canceled	

**NC STATE UNIVERSITY INTERNAL AUDIT DIVISION
FISCAL YEAR 2018 AUDIT PLAN AND ENGAGEMENT STATUS
AS OF JUNE 30, 2018**

<u>Engagement</u>	<u>On Original Fiscal Year 2018 Audit Plan?</u>	<u>Coverage of Top 10 University Strategic Risks</u>	<u>Fiscal Year 2018 University Strategic Plan Goals</u>	<u>Status</u>	<u>Comments</u>
University Compliance and Integrity Initiative	Yes	Other - Internal Audit Universe Risk - Governance Other - Prior Year Strategic Risk - Employee Misconduct Other - Internal Audit Universe Risk - Fraud Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process		Closed	Internal Audit collaborated with Compliance Manager Services to enhance University-wide compliance activities by increasing collaboration and expanding reporting opportunities for student, faculty, and staff for ethical or compliance related concerns. Engagement closed 6/30/18.
Financial Reporting Director Selection Committee	No - Added	N/A		Closed	Chief Audit Officer and Director was on the search committee for Financial Reporting Director position. Engagement closed 6/1/18.
Office of Finance and Administration – University-wide Research Management Business Processes	Yes	Other - Prior Year Strategic Risk - Faculty Loss (infrastructure) Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non-Compliance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process		Closed	Internal Audit reviewed existing research management and research support structures across campus. This included identifying: 1) gaps in compliance; 2) best practices; 3) improvements to general business and central processes; 4) gaps in current available guidance documents; 5) efficiency and effectiveness of customer support structure; and, 6) ability to adapt to the growing and changing University research environment. Review spanned all applicable University entities involved in the area of research management. Internal Audit reported on and presented the results of this review to the Colleges, Central Offices, and other stakeholders. Engagement closed 9/20/17.
Information Technology Governance Redesign Steering Team	No - Carried Forward From Prior Year	Other - Internal Audit Universe Risk - Governance Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process		Closed	Chief Audit Officer and Director was on the steering team tasked by the Vice Chancellor for Information Technology & CIO with recommending improvements to the Office of Information Technology University-wide Information Technology governance structure, process and high-level implementation plan, and oversight for the implementation. NC State's Information Technology governance process is a strategic initiative that is part of the implementation of NC State's Information Technology Strategic Plan. Engagement closed 1/2/18.
IAD Data Analytics Tool Development	No - Added	N/A		Closed	IAD staff used data analytics software to build technical competency and begin planning use of analytics tools within future engagements. Engagement closed 2/26/18.
Director of College of Agriculture and Life Sciences Business Services Search Committee	No - Added	N/A		Closed	Chief Audit Officer and Director was on the search committee for the Director of College of Agriculture and Life Sciences Business Services. Engagement closed 6/15/18.

Key:	Closed	In Process	Returned to Continuous Risk Assessment
	Complete In Follow-up	Canceled	

**NC STATE UNIVERSITY INTERNAL AUDIT DIVISION
FISCAL YEAR 2018 AUDIT PLAN AND ENGAGEMENT STATUS
AS OF JUNE 30, 2018**

<u>Engagement</u>	<u>On Original Fiscal Year 2018 Audit Plan?</u>	<u>Coverage of Top 10 University Strategic Risks</u>	<u>Fiscal Year 2018 University Strategic Plan Goals</u>	<u>Status</u>	<u>Comments</u>
College of Sciences - Pilot Poland Study Abroad Program Financial Review	No - Added	Other - Internal Audit Universe Risk - Regulatory Non- Compliance	5. Engage locally and globally	Closed	The objective of this special assignment was to identify how funds were used in the STEM Semester Study Abroad Pilot Program at Adam Mickiewicz University in Poland. Engagement closed 6/14/18.
Power America Information Technology Security Assessment	No - Carried Forward From Prior Year	3 - Data or Cyber Security Breach Other - Internal Audit Universe Risk - Effectiveness and Efficiency of Process		In Process	Chief Audit Officer and Director and Assistant Director are collaborating with Office of Information Technology Security and Compliance to assess the effectiveness of the Power America Information Technology Security and Compliance Program implementation.
National Institute of Standards and Technology (NIST) 800-171 Compliance Steering Team	Yes	3 - Data or Cyber Security Breach Other - Prior Year Strategic Risk - Faculty Loss (infrastructure) Other - Internal Audit Universe Risk - Internal Controls Other - Internal Audit Universe Risk - Regulatory Non- Compliance	3. Support interdisciplinary scholarship 4. Pursue organizational excellence	In Process	Internal Audit Division provided advisory and consulting services to the Office of Research, Innovation and Economic Development, Office of Finance and Administration, Office of General Counsel, and Office of Information Technology as they developed a collaborative compliance process. This process aims to ensure the University achieves its research goals while maintaining compliance with National Institute of Standards and Technology (NIST) 800-171 "Protecting Controlled Unclassified Information in Nonfederal Information Systems and Organizations" and NIST 800-53 "Security and Privacy Controls for Federal Information Systems and Organizations." This collaboration raised awareness of research compliance requirements, provided compliance educational opportunities, and created new processes that will optimize compliance activities.
HIPAA Security Assessment	No - Added	3 - Data or Cyber Security Breach Other - Internal Audit Universe Risk - Regulatory Non- Compliance Other - Internal Audit Universe Risk - Internal Controls		In Process	Chief Audit Officer and Director and Assistant Director are collaborating with Office of Information Technology Security and Compliance and the HIPAA Compliance Sub-working Group to facilitate a complete HIPAA security assessment and privacy review for the HIPAA covered health care components at NC State.
Quality Assurance Review (QAR) - Self- Assessment	Yes	N/A	4. Pursue organizational excellence	In Process	A QAR is mandated by the Institute of Internal Auditors Professional Standards and by the State of NC for all internal audit units every five years. The objective of a QAR is to determine whether an internal audit function/program is in general compliance with the Institute of Internal Auditor's International Standards of the Professional Practice of Internal Auditing Self Assessment.
Quality Assurance Review (QAR) - Independent Validation	Yes	N/A	4. Pursue organizational excellence	In Process	A QAR is mandated by the Institute of Internal Auditors Professional Standards and by the State of NC for all internal audit units every five years. The objective of a QAR is to determine whether an internal audit function/program is in general compliance with the IIA's International Standards of the Professional Practice of Internal Independent Validation.
CONTINUOUS RISK ASSESSMENT AND AUDIT PLANNING					
Continuous Risk Assessment and Audit Planning	Yes	N/A		Closed	All team members visit faculty and staff across the University throughout the year to discuss their unit's strategic plans, goals, and risk posture in relation to the University's Mission. This includes new and on-going activities related to their academic, research, and outreach missions and potential concerns or emerging risks to both strategic and tactical goals at the unit and University level. This process supports the identification of potential audit and consulting engagements and is used as an objective tool in the development of our Annual Audit Plan. 69 Risk Assessments completed as of 6/30/18.

Key:	Closed	In Process	Returned to Continuous Risk Assessment
	Complete In Follow- up	Canceled	



STATE OF NORTH CAROLINA
OFFICE OF STATE BUDGET AND MANAGEMENT

ROY COOPER
GOVERNOR

CHARLES PERUSSE
STATE BUDGET DIRECTOR

July 30, 2018

Dr. Randy Woodson
Chancellor
North Carolina State University
Raleigh, North Carolina 27695

Mr. Thomas E. Cabaniss
Chair, NCSU Audit, Risk Management and Finance Committee
North Carolina State University
Raleigh, North Carolina 27695

Dear Dr. Woodson and Mr. Cabaniss:

I was engaged to conduct an independent validation of the North Carolina State University's Internal Audit Division's (IAD) self-assessment. The primary objective of the validation was to verify the assertions made in the attached self-assessment report concerning adequate fulfillment of the organization's basic expectations of the internal audit function and its conformity to The Institute of Internal Auditors' (IIA's) *International Standards for the Professional Practice of Internal Auditing (Standards)*. Other matters that might have been covered in a full external assessment, such as an in-depth analysis of successful practices, governance, consulting services, and use of advanced technology, were excluded from the scope of this independent validation by agreement with Ms. Hinson, Chief Audit Officer and Director - IAD. In acting as a validator, I am fully independent of the university and have the necessary knowledge and skills to undertake this engagement. I am a seasoned audit professional with 25 years of audit experience and hold the following credentials: Certified Internal Auditor (CIA); Certified Public Accountant (CPA); and Certified Internal Controls Auditor (CICA). Additionally, I administer a statewide peer review program for the North Carolina Council of Internal Auditing and have participated in over 20 reviews including reviews at several University of North Carolina campuses. The validation, conducted during the period July 12 – July 30, 2018, consisted primarily of a review and test of IAD's procedures and the results of their self-assessment. In addition to both of you, interviews were conducted with other senior members of management at North Carolina State University, and most members of the IAD team.

Under the leadership of Ms. Hinson, IAD implemented agile auditing, which is a leading trend within the internal

audit profession. This best-practice emphasis has facilitated IAD's maturation into providing forward-focused, risk-based services which significantly increases the unit's positive impact on the University. Agile auditing allows IAD to direct time and effort toward the issues, challenges, and risks that most affect the University's ability to implement strategy and achieve goals. This has been accomplished through leveraging technology and data analytics across the audit life cycle to: provide broader-based, more dynamic audit scopes; streamline IAD audit processes and procedures; increase IAD's services despite limited staffing resources; and, deliver more relevant, higher impact services. In addition, Ms. Hinson's efforts to promote closer, more collaborative relationships with stakeholders through continuous communication ensures IAD keeps abreast of emerging risk to the university.

One set back within IAD is staffing challenges and limitations; IAD has only six audit staff including one information systems auditor position for which recruitment and retention of a qualified candidate has recently proven to be very challenging. The local market competition for this high demand, specialized position requires higher salaries to address this issue. Ms. Hinson pointed out that University leadership has been supportive in addressing this issue and recruitment is in progress for this critical position. In addition, IAD is understaffed based on the most recent Office of State Budget and Management (OSBM) internal audit staffing analysis which concluded a need for a minimum of eight auditor positions. The OSBM staffing analysis was a high-level review that identified the minimal number of internal audit positions needed to cover the size of the institution, not the optimal number of positions. A more in-depth analysis would help determine the optimal number of positions to effectively address risk within the university. As mentioned above, IAD has taken counter steps to address the staffing issues through agile auditing; however, even with this counter measure, additional resources will improve IAD ability to meet the needs of their stakeholders and ensure proper controls are in place to mitigate risk within the University.

I concur fully with Ms. Hinson's conclusions in the self-assessment report attached. Implementation of the recommendations contained in the self-assessment report will improve the effectiveness and enhance the value of the internal audit function and support conformity to the *Standards*.



Barbara Baldwin, CIA, CPA, CICA

Assistant State Budget Officer / Internal Audit Director

North Carolina Office of State Budget and Management

Independent External Validator

NCSU Internal Audit Division – Self-Assessment with Independent Validation**May 8, 2018****BACKGROUND**

The *International Standards for the Professional Practice of Internal Auditing* (Standards) require that a Quality Assessment Review (QAR) of an internal audit activity be conducted at least once every five years. This QAR was performed in accordance with the Standards' "Internal Self-Assessment with Independent Validation" model through the State of North Carolina Council of Internal Auditing Office, Internal Audit Peer Review Program. This model requires an in-depth self-assessment and a review of that assessment by a qualified assessor. The assessor for this QAR of the NCSU Internal Audit Division (IAD) was the Assistant State Budget Officer and Internal Audit Director, Office of State Budget and Management, Office of Internal Audit.

OBJECTIVE AND SCOPE

The principal objectives of the quality assessment were to:

- Assess the internal audit activity's conformance to The Institute of Internal Auditors' (IIA's) Standards
- Evaluate the internal audit activity's effectiveness in carrying out its mission as set forth in its charter and expressed in the expectations of the University's Board of Trustees and University executive leaders
- Identify opportunities to enhance its management and work processes
- Provide suggestions to enhance the audit function's value to the University

The scope of our internal assessment was from Fiscal Year (FY) 2012 through FY 2017 and included, but was not limited to IAD's:

- Internal policies and procedures
- Risk assessment and audit planning processes
- Audit tools and methodologies
- Engagement and staff management processes

EXECUTIVE SUMMARY OF RESULTS and OVERALL OPINION

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The IIA's *Quality Assessment Manual* suggests rating the results of an assessment using one of three ratings: "Generally Conforms," "Partially Conforms," or "Does Not Conform." **It is our overall opinion that the NCSU Internal Audit Division generally conforms to the IIA Standards and Code of Ethics.** "Generally conforms" means that an internal audit activity has a charter, policies, and processes that are judged to be in conformance with the Standards. For a detailed list of conformance with individual *Standards*, please see Table 1 attached.

IAD believes that the IAD environment and culture are well established, sustainably structured, mature, and progressive. The Standards are understood, the Code of Ethics is inclusive, and both are embraced and applied by all IAD employees. IAD management provides useful audit tools, efficient standard operating procedures (SOPs), and implements innovative and appropriate practices.

Highlights of Successful Practices

Support of University Leadership

NCSU IAD consistently has strong support from the Audit, Risk Management, and Finance (ARMF) Committee of the NCSU Board of Trustees, the Chancellor, and other University administrative and academic management. Leadership ensures fiscal and organizational support for the IAD team's efforts to recruit, train, and retain highly qualified, committed individuals. The Chancellor and the ARMF ensure IAD's ability to work independently and objectively and promote management's prioritizing IAD's recommendations and timely implementation of corrective actions to identified concerns. Management has increasingly sought advice from IAD on management initiatives, major projects, new services, and process improvements.

Continuous Risk Assessment

IAD developed and implemented a Continuous Risk Assessment (CRA) program in 2008, well before it became a nationwide best practice. IAD considers all risks that affect the University "enterprise" - not just the "auditable risks" - and its ability to achieve its strategic and tactical goals and objectives. This broader concept of the audit universe begins with the core elements of the NC State Mission: academics, research, and engagement. All team members visit faculty and staff across the University each week throughout the year to discuss their unit's strategic plans, goals, and risk posture in relation to the Mission. The CRA process is at the core of our audit and consulting engagements and is used as an objective tool in the development of our risk-based Audit Plans. As a result, in FY 2017, 49% of engagements directly related to the Top Ten Risks identified by the University's Strategic Risk Management program and the remaining 51% related to risks identified during CRA.

Continuous Improvement

Continuous improvement is embedded within the culture and is incorporated within every activity. All staff participate and take ownership in improving internal processes. Quality Assurance Improvement activities are consistently discussed during weekly management meetings, staff meetings, and performance appraisals. Internally, continuous improvement supports the performance of a relatively large number of impactful engagements (64 in FY2017) with a lean staff (5) and facilitates 80% of staff time being dedicated directly to engagements.

Data Analytics

IAD has been using data analytics increasingly over the last five years. Data analysis software is used regularly for analyzing risk and performing audit fieldwork; several significant audit engagements included testing of 100% populations due to the capabilities provided by the software.

Currently, IAD is using both data analytics and visualization tools to explore the creation of continuous audit programs which may ultimately be shared with units across campus to incorporate into their operations and enable rapid identification of areas of concern. Data visualization is important as it allows anyone from within the University to quickly grasp difficult concepts and identify new patterns within the data without the need for complex, manual analysis.

Quality of Staff

All members of the IAD team are cross-trained so that no one is limited in the types of audits they can competently perform: operational, information technology (IT), compliance, fraud investigation, performance, or others. For example, all auditors receive periodic IT audit training such that the majority can perform IT General Controls (ITGC) focused audits. Recently, this allowed for the completion of a University-wide Audit of User Controls Over Ultra-Sensitive Data this fiscal year despite the IT Auditor position being vacant at the time. All auditors have also earned the Certified Fraud Examiner certification which ensures they can perform competent fraud risk assessment on each engagement and provides adequate coverage for investigative engagements.

Team members have been in place for over two years and the Director and Assistant Director have been at the University for over 15 and 20 years, respectively. This consistent time on campus has allowed the team to develop deeper knowledge of the organization structurally, culturally, and operationally in addition to ensuring a well-based understanding of the risks in a higher education environment.

Opportunities for Continuous Improvement

The IIA defines opportunities for continuous improvement as observations that can enhance alignment with the criteria of the Standards or increase the audit function's efficiency and effectiveness as opposed to indicating a lack of conformance with the Standards.

Throughout this self-assessment, IAD identified opportunities to document or improve documentation of processes that were already in practice. For example, the following areas are part of IAD's processes and practices but were not specifically documented in IAD's standard operating procedures or templates:-

- Engagement Planning Program template should include steps which indicate:
 - o The use of computer aided audit tools and other data analysis techniques
 - o An assessment for the risk of fraud
- Audit and Consulting Engagement process SOP should note:
 - o Use of the Risk, Scope, and Objective template in all engagements, regardless of type of engagement, to document IAD's assessment of governance, risk management, and control processes during planning
 - o How to document management's acceptance of risk, if needed
 - o Process for communicating an error or omission in a report, if it should occur

These documentation updates and other similar updates are in process as of the writing of this report and will be completed by June 30, 2018.

Additionally, the self-assessment process reaffirmed the benefits to be achieved through completing the mission and values reassessment, SWOT analysis, and risk assessment process improvement begun by the team in FY 2017. A team retreat is being planned for summer 2018 to complete that activity.

Table 1 - Evaluation Summary: Quality Assessment

(GC = Generally Conforms, PC = Partially Conforms, DNC = Does not Conform)

	GC	PC	DNC
Overall Evaluation	GC		

Attribute Standards (1000 through 1300)		GC	PC	DNC
1000	Purpose, Authority, and Responsibility	GC		
1010	Recognizing Mandatory Guidance in the Internal Audit Charter	GC		
1100	Independence and Objectivity	GC		
1110	Organizational Independence	GC		
1111	Direct Interaction with the Board	GC		
1112	Chief Audit Executive Roles Beyond Internal Auditing	GC		
1120	Individual Objectivity	GC		
1130	Impairment to Independence or Objectivity	GC		
1200	Proficiency and Due Professional Care	GC		
1210	Proficiency	GC		
1220	Due Professional Care	GC		
1230	Continuing Professional Development	GC		

1300	Quality Assurance and Improvement Program	GC		
1310	Requirements of the Quality Assurance and Improvement Program	GC		
1311	Internal Assessments	GC		
1312	External Assessments	GC		
1320	Reporting on the Quality Assurance and Improvement Program	GC		
1321	Use of "Conforms with the <i>International Standards for the Professional Practice of Internal Auditing</i> "	GC		
1322	Disclosure of Nonconformance	GC		

Performance Standards (2000 through 2600)		GC	PC	DNC
2000	Managing the Internal Audit Activity	GC		
2010	Planning	GC		
2020	Communication and Approval	GC		
2030	Resource Management	GC		
2040	Policies and Procedures	GC		
2050	Coordination and Reliance	GC		
2060	Reporting to Senior Management and the Board	GC		
2070	External Service Provider and Organizational	GC		

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	Responsibility for Internal Auditing			
2100	Nature of Work	GC		
2110	Governance	GC		
2120	Risk Management	GC		
2130	Control	GC		
2200	Engagement Planning	GC		
2201	Planning Considerations	GC		
2210	Engagement Objectives	GC		
2220	Engagement Scope	GC		
2230	Engagement Resource Allocation	GC		
2240	Engagement Work Program	GC		
2300	Performing the Engagement	GC		
2310	Identifying Information	GC		
2320	Analysis and Evaluation	GC		
2330	Documenting Information	GC		
2340	Engagement Supervision	GC		
2400	Communicating Results	GC		
2410	Criteria for Communicating	GC		
2420	Quality of Communications	GC		

2421	Errors and Omissions	GC		
2430	Use of "Conducted in Conformance with the <i>International Standards for the Professional Practice of Internal Auditing</i> "	GC		
2431	Engagement Disclosure of Nonconformance	GC		
2440	Disseminating Results	GC		
2450	Overall Opinions	GC		
2500	Monitoring Progress	GC		
2600	Communicating the Acceptance of Risks	GC		

Code of Ethics		GC	PC	DNC
	Code of Ethics	GC		

NC State Investment Fund, Inc.

NC State University, Campus Box 7207, Raleigh, NC 27695-7207

Inception Date: April 1, 1999

March 31, 2018

MARKET COMMENTARY

Volatility returned to the markets in the first quarter of 2018 as uncertainty around aggressive US trade policy, inflation, and geopolitical risks rose to the forefront of investors' minds. The Federal Open Market Committee, under the leadership of its new chairman Jerome Powell continued towards rate normalization, increasing the Fed Funds target rate by another 0.25% in its January meeting. Inflation fears began to surface during the quarter, with investors fearing that a spike may lead the Fed to deviate from its plan and increase rates preemptively. This concern had a significant impact on investment markets, as Treasury yields increased materially during the quarter. Within international markets, fundamentals still appear strong, but concerns of US protectionism in the form of tariffs, and the future direction of global bond markets led to equities posting modest losses for the period. Emerging markets equities provided one of the few bright spots, producing positive returns for the quarter.

Domestic equities, as measured by the S&P 500 Index, were down modestly (.76%) during the first quarter. Small cap stocks, as measured by the Russell 2000 Index, were the most resilient performers for the period, down just .08%. US stocks bolstered by tax reform, started strong in calendar 2018. Other factors were strong corporate earnings, and a general sense of economic strength. Fears of a trade war with China, a potential spike in inflation, and concerns that the current economic expansion cycle is reaching its later innings stifled investor sentiment later in the period.

International equities, as measured by the MSCI EAFE GR Index, also posted negative returns for the quarter, down 1.41%. The trajectory of international returns followed that of the US, with 2018 starting on a positive note only to see volatility return later in the period over concerns about the direction of US rates and trade policy.

Emerging markets (EM), as measured by the MSCI Emerging Markets GR Index, shrugged off broader global market concerns and returned 1.47% for the first quarter. Over the last year, emerging markets have produced a return of more than 25%, leading major asset classes globally.

The beginning of the year saw treasury yields rise across all maturities. The 10-year treasury yield opened the quarter at 2.46%, and hit an intra-period peak of 2.94% before settling at 2.74% at the end of March. In general, fixed income did not perform well during the quarter with the Bloomberg Barclays US AGG bond losing -1.46% during the period. Long-dated high yield corporates, as measured by the Bloomberg Barclays Long Corporate Index, lost -4.05% during the period, bringing its one-year return down to 6.11%.

Going forward, geopolitical uncertainty and "America-first" trade rhetoric continue to dominate headlines. While fundamentals on a global scale still appear strong and corporate earnings have been robust, investors are beginning to wrestle with the idea that the economic expansion that has boosted equity markets in recent periods is beginning to slow down. It is too early to determine whether the recent volatility is reflective of a more significant economic issue or simply a much needed correction, but it does appear that the momentum injected into the markets following Trump's election is starting to wane, if only temporarily.

PERFORMANCE

March 31, 2018						
Market Value	\$1,003,101,710	Participants		9		
Performance	QTD	FYTD	1 Year	3 Year	5 Year	10 Year
NCSIF	2.3%	9.3%	12.2%	6.8%	9.0%	5.6%
Policy Index (1)	-0.2%	6.2%	8.9%	5.9%	7.1%	6.0%
Global Index (2)	-1.0%	7.0%	10.7%	6.1%	7.1%	5.3%
BNY E&F Univ (3)	0.1%	7.2%	10.3%	6.4%	7.6%	6.0%
UNCIF	2.8%	9.7%	12.5%	6.8%	9.0%	5.8%
NCSIF Private	-0.7%	8.4%	12.4%	9.3%	12.5%	8.1%
BlackRock LPP	-0.8%	7.1%	10.3%	6.7%	7.9%	

Note 1: Policy Index= NCSIF's Strategic Investment Policy Portfolio Index (SIPP).

Note 2: Global Index= 70% ACWI; 30% Barclay's Aggregate

Note 3: BNY Mellon Endowment & Foundation Universe Median Return—167 portfolios are represented for the one-year period ended March 31, 2018

FUND PERFORMANCE

The NCSIF (Fund) is a large, diversified investment pool with a long-term perspective. At March 31, 2018 the Fund had 1 Billion invested with several managers in a wide variety of asset classes. The largest manager for the Fund, UNCMC, managed 87.3% of the Fund's assets. The UNC Investment Fund (UNCIF) produced a three month return of 2.8%, and a 12 month return of 12.5% return for the period ended March 31, 2018. The NCSIF employs seven additional private equity managers, who oversee 2% of the portfolio. This portion of the Fund produced a three-month and 12-month return of -7% and 12.4%, respectively, for the period ended March 31, 2018. The Fund's Liquid Policy Portfolio (LPP), managed by Blackrock, was another 9.7% of the portfolio. This investment returned -8% for the three months and 10.3% for the 12 months ended March 31, 2018. The remaining 1% of the portfolio is invested in cash with the State Treasurer's Short-Term Investment Fund (STIF).

RISK METRICS

3 Year Period	Fund	UNCIF	Policy Index	MSCI ACWI
Annualized Return	6.8%	6.8%	5.9%	8.1%
Annualized Volatility	4.5%	4.6%	4.3%	10.9%
Annual Sharpe Ratio (1)	1.50	1.46	1.40	0.75
Correlation to Global Index	0.88	0.86	0.95	0.99
Max Drawdown	-6.3%	-6.8%	-5.0%	-13.4%

Note 1: Sharpe Ratio: Excess return per unit of risk

This report is based on information available at the time of distribution. The information comprising this report has not been audited and is subject to change.

Third Quarter Fiscal Year 2018

NC State Investment Fund, Inc.

NC State University, Campus Box 7207, Raleigh, NC 27695-7207

Inception Date: April 1, 1999

March 31, 2018

INVESTMENT STRATEGY

The Fund is managed as a broadly diversified portfolio with exposure to seven primary asset classes and many sub-strategies within each asset class. The Fund seeks to diversify exposure to the sub-strategies through the use of multiple investment managers that utilize a variety of investment approaches. The purpose of diversification is to provide reasonable assurance that no single security, class of securities, or investment manager has a disproportionate impact on the Fund's aggregate results. At times, the Fund invests in passive strategies. In working toward the Fund's investment strategy, through UNCMC, the Fund invests in a number of niche managers that can employ different types of hedging strategies such as short-selling and derivative investing to help reduce the volatility of the Fund. The focus on controlling volatility preserves capital and benefits Fund participants through the power of compounding.

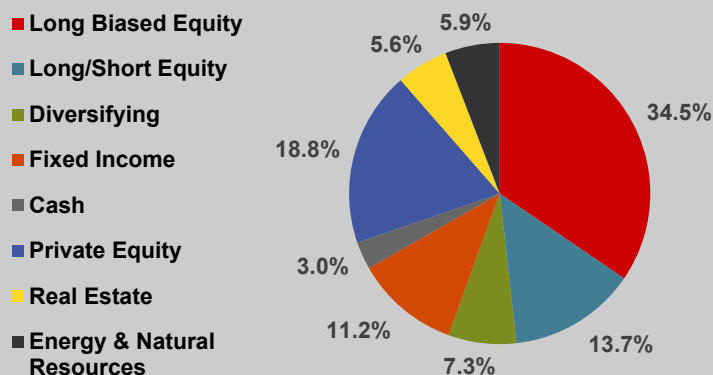


UNC MANAGEMENT CO.

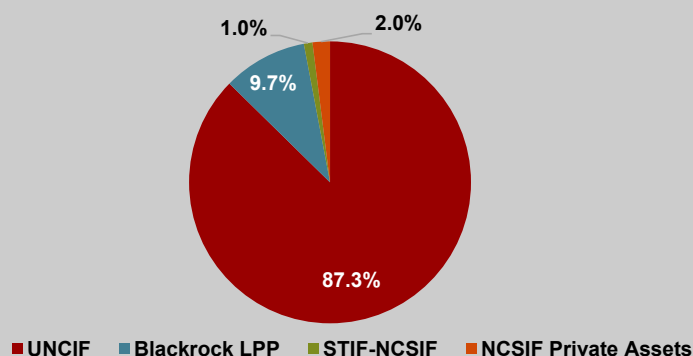
The UNCMC was established on January 1, 2003 as an exempt 501 (c)(3) organization. It is a professionally-staffed asset management company created to provide investment services to the University of North Carolina at Chapel Hill and its affiliated entities, to the constituent institutions of the UNC system and system affiliated foundations, associations, trusts, and endowments. With nearly 40 employees, UNCMC has two teams, Investment Management and Operations. The Investment Management team manages all public and private investments of the UNCIF. Their responsibilities include evaluating and monitoring investment managers, recommending changes to investment objectives and asset allocation, monitoring risk, and implementing investment decisions approved by Chapel Hill Investment Fund's (CHIF) Executive Committee. The Operations Team performs all administrative, legal, compliance, accounting, and performance reporting duties.

This report is based on information available at the time of distribution. The information comprising this report has not been audited and is subject to change.

ASSET ALLOCATION



ALLOCATION BY MANAGER



HISTORY OF THE FUND

The NC State Investment Fund, Inc., (Fund) was established in April 1999 to combine NC State University's and its affiliated entities' endowments in an external pooled investment vehicle. The goal of the investment program for the Fund is to provide a real total return from assets invested that will preserve the purchasing power of Fund capital, while generating an income stream to support the spending needs of the University. Effective July 2008, the Fund partnered with UNC Management Company (UNCMC) to invest in the UNC Investment Fund (UNCIF), with the remaining investments committed to a Liquid Policy Portfolio (LPP) of Exchange Traded Funds (ETF's), and to 3 private equity managers which includes an allocation for cash to fund capital calls. The transition of assets to UNCMC was completed December 2009.

NC State Intermediate Term Fund

NC State University, Campus Box 7207, Raleigh, NC 27695-7207

Inception Date: July 3, 2014

March 31, 2018

FUND HISTORY AND PHILOSOPHY

As a pooled fund for the collective investment of operating funds, the NC State Intermediate Term Fund (ITF) consists of Participants' excess cash balances, which are defined as funds not needed for normal operating purposes. Generally, the ITF will not include operating funds needed within the next year, endowed funds or those funds that are specifically excluded by law or contractual agreement.

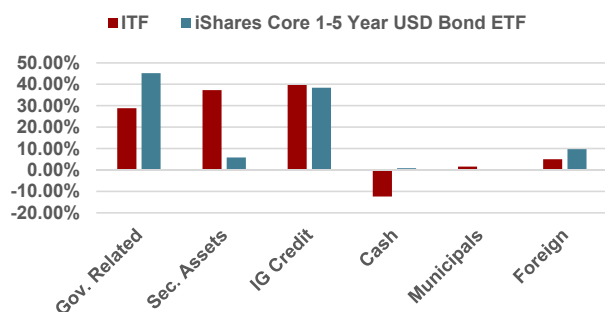
The decision to invest funds takes into account various factors including duration, credit, concentration, and manager risk, along with total return, suitability, and the experiences, quality and capability of external managers.

The primary investment objectives of the ITF are: 1) Preservation and safety of principal; 2) Liquidity; and 3) Maximization of returns within acceptable levels of risk. Because of current concerns about potential changes in monetary policy and rising interest rates, duration is limited. The investment policy calls for an average weighted maturity between one and five years, with an overall credit rating in general of A+/A as rated by a nationally-recognized rating agency. However, for any mutual funds selected by the ITF, their respective approved investment policy guidelines supersede those of the ITF.

The ITF was established on July 3, 2014 with an initial investment of \$122 million. Additional investments were made during FY 2015 & FY 2017, bringing the total invested to \$193.83 million. The ITF can be compared with the State Treasurer's Short-Term Investment Fund (STIF) on both a total return and on an SEC yield basis. In order to provide a buffer for changes in the NAV of the different investments, some of the excess earnings are being used to create a loss reserve. FMV fluctuates on a day-to-day basis.

BlackRock's SIO was liquidated from the fund on June 30, 2016. Proceeds were invested in Vanguard's Short Term Fund and DoubleLine's Total Return Fund on July 1, 2016. Additionally, a small position with PIMCO Income was initiated on November 2, 2016. The ITF's position in JP Morgan was liquidated on September 27, 2017 and PIMCO Low Duration was liquidated on October 2, 2017. The proceeds from these liquidations were reinvested into Vanguard's Short Term Fund and PIMCO Income, bringing the total cost basis to \$190.4 million.

SECTOR ALLOCATION



This report is based on information available at the time of distribution. The information comprising this report has not been audited and is subject to change.

PERFORMANCE

Market Value	\$186,179,388			
Performance	QTD	FYTD	1 Year	3 Year
ITF Fund	-0.4%	0.6%	1.3%	1.2%
Barclays 1-3 yr Treasury	-0.2%	-0.2%	0.0%	0.4%
Barclays Universal 1-5 yr	-0.5%	-0.1%	0.6%	1.3%
DoubleLine	-0.5%	0.8%	2.2%	
PIMCO Income	-0.3%	2.9%	5.3%	
Vanguard Short Term	-0.5%	0.1%	0.8%	1.5%

STATISTICS	Fund	Index (1)
Volatility	1.1%	1.3%
Sharpe Ratio	1.2	1.1
SEC Yield	3.4%	2.8%
Effective Duration	2.8	2.8
FYTD Net Interest & Dividends**	\$3,919,316	N/A
Net Interest & Dividends Since Inception**	\$15,998,165	N/A

**Net of Fund expenses

Note 1: The iShares Core 1-5 Year Bond ETF is used as a proxy for the benchmark for Statistics information

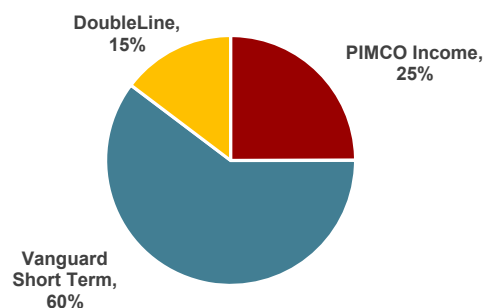
MANAGERS

Vanguard's Short Term Fund has a low tracking error and is a low cost portfolio option consisting primarily of investment grade corporates.

PIMCO's Income Fund is a portfolio of a broad range of intermediate-duration bonds that is actively managed to maximize current income while maintaining a relatively low risk profile.

DoubleLine's Total Return Fund seeks to maximize total return by exploiting inefficiencies within the subsectors of the mortgage market while maintaining active risk management constraints.

MANAGER ALLOCATION



**BUILDINGS AND PROPERTY COMMITTEE
NORTH CAROLINA STATE UNIVERSITY
September 20, 2018**

**BOARD OF TRUSTEES
NORTH CAROLINA STATE UNIVERSITY**

**Buildings and Property Committee
Time: 10:15 – 11:30 p.m., September 20, 2018
Winslow Hall Conference Room
Robert “Chip” Andrews, Chair
Members: Kelly, Murphy, Washington, Weisiger**

AGENDA

CALL TO ORDER

Chip Andrews, Chair, Buildings and Property Committee

- Roll Call
- Reading of the State Government Ethics Act

1. 2018-2019 COMMITTEE PLAN OF WORK

TAB 1

Doug Morton, Associate Vice Chancellor, Facilities

- Review of 2018-2019 Committee Plan of Work

5.1.A

2. COMMITTEE RESPONSIBILITIES AND PROCEDURES

TAB 2

Doug Morton, Associate Vice Chancellor, Facilities

- Review of Committee Responsibilities

5.2.A

3. MINUTES

TAB 3

Chip Andrews, Chair, Buildings and Property Committee

- Approval of April 19, 2018 meeting minutes

5.3.A

4. PROPERTY MATTERS

TAB 4

Harlan Stafford, Director, Real Estate & Development

- Disposition by Utility Easement: Duke Energy Progress proposes to install $\pm$ 427 feet of electrical service to the Wake County Emergency Management Service Station Number 8, located at 1351 Varsity Drive in Raleigh, NC. The proposed line will begin at the northwestern corner of the intersection of Marcom Street and Varsity Drive and run northerly $\pm$ 345 feet, then in an easterly direction for $\pm$ 82 feet to its point of terminus.

5.4.A.1

✓ **Requires full board approval**

¹ Materials will be distributed to committee members at the meeting

Buildings and Property Committee

Page 1

**BUILDINGS AND PROPERTY COMMITTEE
NORTH CAROLINA STATE UNIVERSITY
September 20, 2018**

- The underground utility easement will be 10 feet wide. Total easement area will comprise $\pm 4,270$ square feet ~ 0.0980 acres.
- Disposition by Utility Easement: Duke Energy Progress proposes to install $\pm 1,240$ feet of electrical service to be located on the southern side of Varsity Drive. The proposed line will begin at the southeastern corner of the intersection of Varsity Drive and Avent Ferry Road, thence run in a southeasterly direction for $\pm 1,240$ feet to its point of terminus near Main Campus Drive. The underground utility easement will be 10 feet wide. Total easement area will comprise $\pm 12,400$ square feet ~ 0.2846 acres. 5.4.A.2
 - Disposition by Utility Easement: PSNC Energy has requested an easement across State-owned land allocated to North Carolina State University in order to provide underground gas service to the Horticulture Field Lab Greenhouses, located at 4301 Beryl Road, Raleigh, North Carolina. PSNC Energy proposes to install ± 500 feet of underground gas service within the existing boundary limits of the property. The underground utility easement will be 10 feet wide. Total easement area will comprise of $\pm 5,000$ square feet ~ 0.1148 acres. 5.4.A.3
 - Disposition by Access Easement: The owners (SRI GUKRUDEV, LLC) Of the Ramada Inn, have plans to develop a five-story improvement to the front of their existing hotel. This proposed improvement will require its current ingress and egress point to be relocated to the northern side of the building, which is located at 1520 Blue Ridge Road in Raleigh, North Carolina. They have requested an access easement from the State of North Carolina to address this issue. The proposed easement will be $\pm 8,500$ square feet. (.20 acres). The subject tract is located at 1520 Blue Ridge Road in Raleigh, NC. The easement area will have dimensions of ± 40 feet x 211 feet ($\pm 8,500$ square feet). 5.4.A.4
 - Disposition by Utility Easement: The City of Raleigh has requested an easement for the installation of an underground waterline and two (2) water meter vaults to provide and monitor the distribution of a public water service as part of the renovation of the Gregg Museum, located at 1903 Hillsborough Street in Raleigh, North Carolina. The proposed easement area will be located at the northwestern corner of the property. The underground utility easement will be ± 18 feet x 12 feet wide. Total easement area will comprise of ± 209 square feet ~ 0.0048 acres. 5.4.A.5
 - Disposition by Access Easement: This substitution of an existing easement, allows the continuing development of the university. The proposed easement will be ± 24 feet by ± 113 feet, containing $\pm 2,730$ 5.4.A.6

✓ **Requires full board approval**

¹ **Materials will be distributed to committee members at the meeting**

Buildings and Property Committee

Page 2

**BUILDINGS AND PROPERTY COMMITTEE
NORTH CAROLINA STATE UNIVERSITY
September 20, 2018**

square feet (~ .0627 acres) running northeasterly from the Tammy Lynn Center to its point of terminus with the Capability Drive Parking Lot on Capability Drive.

- Disposition by Demolition: The College of Agriculture and Life Sciences located at the Upper Piedmont Tobacco Research Station at 2022 Wentworth Street, Reidsville, North Carolina requests the demolition of one of their structures located at the research station. The structure to be demolished is a two-story log-constructed blacksmith shop and horse stables containing $\pm$ 9,114 square feet. 5.4.A.7
- Disposition by Easement: An adjoining property owner (172 Asheland Avenue, LLC) has requested the conveyance of an easement for the purpose of increasing the width of the Federal Aly way, due to a permitting requirement by the City of Asheville. The proposed easement will affect the northwestern corner of the North Carolina State University Mineral Laboratory parcel, located at 167 Coxe Avenue in Asheville, North Carolina. This requirement is due to the proposed development of an adjacent property. The proposed easement area will be $\pm$ 1,000 square feet ~ .0230 acres. *[NOTE: The specific type of conveyance for this item is undetermined at this time. It will be either an easement or a sale.]* 5.4.A.8
- ✓ Disposition by Cross Easement: This is a proposed easement between the State of North Carolina and The Board of Trustees of the Endowment Fund of North Carolina State University to facilitate the development and management of all Centennial Campus, including Centennial Bio-Medical Campus and Spring Hill Campus for the benefit of North Carolina State University and The Board of Trustees of the Endowment Fund of North Carolina State University. The Cross Easement Agreement will include all properties located on Centennial Campus, Spring Hill Campus, and Centennial Bio-Medical Campus. 5.4.A.9

5. DESIGNER AND DESIGN-BUILD SELECTIONS

TAB 5

Doug Morton, Associate Vice Chancellor, Facilities

- Creamery Cafe and Dairy Education Center, Design-Build 5.5.A.1
- Memorial Belltower Renovation, Design-Build 5.5.A.2
- Student Housing Master Plan, Design 5.5.A.3
- Approval of Designer Selections \$1 million or Less 5.5.A.4

✓ Requires full board approval

¹ Materials will be distributed to committee members at the meeting

Buildings and Property Committee

**BUILDINGS AND PROPERTY COMMITTEE
NORTH CAROLINA STATE UNIVERSITY
September 20, 2018**

6. ACCEPTANCE OF COMPLETED BUILDINGS AND PROJECTS

TAB 6

Doug Morton, Associate Vice Chancellor, Facilities

- The University and Office of State Construction have accepted the attached list of completed buildings and projects with dollar values greater than \$2,000,000. The University has accepted the attached list of completed buildings and projects with dollar values less than \$2,000,000. All are recommended to the Buildings and Property Committee for formal acceptance. This listing represents buildings and projects received since the April 19, 2018 meeting.

5.6.A

7. PROPERTY MATTERS (Received after Full Board Mailing)

TAB 7

8. SITE AND PLAN REVIEW / APPROVAL

TAB 8

Lisa Johnson, University Architect

Site Review and Approval

- Sigma Kappa House, South Campus Precinct
- Zeta Tau Alpha House, South Campus Precinct

5.8.A.1

5.8.A.2

Plan Approval

- Sigma Kappa House, South Campus Precinct
- Zeta Tau Alpha House, South Campus Precinct
- Approval of Plans and Specifications of Formal Projects less than \$2 million

5.8.A.3

5.8.A.4

5.8.A.5

9. INFORMATIONAL REPORTS

TAB 9

- Capital Projects Update (*Doug Morton*)
- Status of Projects in Planning (*Lisa Johnson*)

5.9.A.1

5.9.A.2

ADJOURN

✓ Requires full board approval

¹ Materials will be distributed to committee members at the meeting

Buildings and Property Committee

**NC STATE BOARD OF TRUSTEES
BUILDINGS AND PROPERTY COMMITTEE
2018-2019 PLAN OF WORK**

5.1.A

September

- Accept Completed Buildings and Projects (NC State POL 01.05.01, Appendix 1, II, a.v.) (Acceptance)
- Acquisition and Disposition of Interests in Real Property (UNC POL Ch. 100.1, Appendix 1 (VI)), (NC State POL 01.05.01, App 1, II, c.i.ii) (Consider and approve property matters in a timely fashion to avoid adverse impact to the business of the University.)
- Architect Selection (NC State POL 01.05.01, Appendix 1, II, i.) and Construction Managers at Risk Selection (NC State POL 01.05.01, Appendix 1, II, ii.) (Participate in designer, developer, and CMR selection interviews and approve selections in a timely manner to avoid impacts to project schedules.)
- Building Site, Plan and Specification Approval (NC State POL 01.05.01, App 1, III.iv.v) (Review of project design plans for responsiveness to the vision of the physical master plan. Review and approve design projects in a timely manner to avoid impact to project design and construction schedule.)
- Capital Projects Update (UNC POL Ch. 100.1, App.1 (VI)) (Receive periodic updates and comment as warranted.)
- Projects in Planning Status (Receive periodic updates and comment as warranted.)
- Review Committee Responsibilities (Annually)

November

- Accept Completed Buildings and Projects (NC State POL 01.05.01, App 1.II.vi) (Acceptance)
- Acquisition and Disposition of Interests in Real Property (UNC Pol. Ch. 100.1, App.1 (VI)), (NC State POL 01.05.01, App 1.II.vi) (Consider and approve property matters in a timely fashion to avoid adverse impact to the business of the University.)
- Architect Selection (NC State POL 01.05.01, App 1, II.ii) and Construction Managers at Risk Selection (NC State POL 01.05.01, App 1, II.iii) (Participate in designer, developer, and CMR selection interviews and approve selections in a timely manner to avoid impacts to project schedules.)
- Building Site, Plan and Specification Approval (NC State POL 01.05.01, App 1, III.iv.v) (Review of project design plans for responsiveness to the vision of the physical master plan. Review and approve design projects in a timely manner to avoid impact to project design and construction schedule.)
- Capital Projects (UNC Pol., Ch. 100.1, App.1 (VI) and Centennial Campus Update) (Receive periodic updates and comment as warranted.)
- Projects in Planning Status (Receive periodic updates and comment as warranted.)

February

- Accept Completed Buildings and Projects (NC State POL 01.05.01, App 1.II.vi) (Acceptance)
- Acquisition and Disposition of Interests in Real Property (UNC Pol. Ch. 100.1, App.1 (VI)), (NC State POL 01.05.01, App 1.II.vi) (Consider and approve property matters in a timely fashion to avoid adverse impact to the business of the University.)

Desired outcomes and measures of success are highlighted

**NC STATE BOARD OF TRUSTEES
BUILDINGS AND PROPERTY COMMITTEE
2018-2019 PLAN OF WORK**

5.1.A

- Architect Selection (NC State POL 01.05.01, App 1, II.ii) and Construction Managers at Risk Selection (NC State POL 01.05.01, App 1, II.iii) (Participate in designer, developer, and CMR selection interviews and approve selections in a timely manner to avoid impacts to project schedules.)
- Building Site, Plan and Specification Approval (NC State POL 01.05.01, App 1, III.iv.v) (Review of project design plans for responsiveness to the vision of the physical master plan. Review and approve design projects in a timely manner to avoid impact to project design and construction schedule.)
- Capital Projects Update (UNC Pol., Ch. 100.1, App.1 (VI)) (Receive periodic updates and comment as warranted.)
- Projects in Planning Status (Receive periodic updates and comment as warranted.)

April

- Accept Completed Buildings and Projects (NC State POL 01.05.01, App 1.II.vi) (Acceptance)
- Acquisition and Disposition of Interests in Real Property (UNC Pol., Ch. 100.1, App.1 (VI)), (NC State POL 01.05.01, App 1.II.vi) (Consider and approve property matters in a timely fashion to avoid adverse impact to the business of the University.)
- Architect Selection (NC State POL 01.05.01, App 1, II.ii) and Construction Managers at Risk Selection (NC State POL 01.05.01, App 1, II.iii) (Participate in designer, developer and CMR selection interviews and approve selections in a timely manner to avoid impacts to project schedules.)
- Building Site, Plan and Specification Approval (NC State POL 01.05.01, App 1, III.iv.v) (Review of project design plans for responsiveness to the vision of the physical master plan. Review and approve design projects in a timely manner to avoid impact to project design and construction schedule.)
- Capital Projects Update (UNC Pol., Ch. 100.1, App.1 (VI) and Centennial Campus Update) (Receive periodic updates and comment as warranted.)
- Parking and Transportation Ordinances (NC State POL 07.60.01), (NCGS §116-44.4, §20-137.7) (Approval)
- Physical Master Plan Update (UNC Pol. Ch. 100.1, App 1 (VI)), (NC State POL. 01.05.01, App 1, II.a.i) (Receive annual update and comment as warranted.)
- Projects in Planning Status (Receive periodic updates and comment as warranted.)

Desired outcomes and measures of success are highlighted

**NORTH CAROLINA STATE UNIVERSITY
BOARD OF TRUSTEES
BUILDINGS AND PROPERTY COMMITTEE**

REVIEW OF COMMITTEE RESPONSIBILITIES

The By-Laws Subject to policies of the Board of Governors and all legal requirements relative to the construction of state-owned buildings, the Buildings and Property Committee is responsible for the following matters concerning campus capital construction projects, which have been approved by the Board of Governors and authorized by the State of North Carolina.

MASTER PLAN

Required

Annual review by Buildings and Property Committee

DESIGNER SELECTION

Required

All major new buildings, major additions, and comprehensive renovation projects (cost greater than \$1,000,000) require one current or former Trustee on the selection committee. For large complex projects that involve several campus units the Secretary to the Trustees' Buildings and Property Committee in consultation with the Chair of the Trustees' Buildings and Property Committee will decide if additional user and Trustee representation is warranted. Bi-annual approval of Open-Ended Service Agreement Design selections. Selections are for a one-year term with an option for a one-year extension.

Procedure

Committee Chair approval of short list
Selection committee interview
Buildings and Property Committee selection or rejection
For open-ended service agreement design selections, interview may be waived and there will be no rank ordering.

CONSTRUCTION MANAGER-AT-RISK SELECTION

Required

All projects require that the same Selection Committee, which interviewed and evaluated the designers for a particular capital project, also serve as Selection Committee members for the Construction Manager-at-Risk for that project. For large complex projects that involve several campus units the Secretary to the Trustees' Buildings and Property Committee in consultation with the Chair of the Trustees' Buildings and Property Committee will decide if additional user and Trustee representation is warranted.

Procedure

Committee Chair approval of short list
Selection committee interview
Buildings and Property Committee selection or rejection

DESIGN-BUILD SELECTIONRequired

The Design-Build delivery method may be utilized for less complex new buildings and renovation projects. Projects over \$1,000,000 require one current or former Trustee on the selection committee.

Procedure

Committee Chair approval of short list
Selection committee interview
Buildings and Property Committee selection or rejection

SITE SELECTIONProcedure

Project building committee recommendation
University Administration recommendation
Buildings and Property Committee selection (Space Committee approves temporary structures in research annexes)

PLANS AND SPECIFICATIONSRequired

Approval of projects less than \$2,000,000 – based on recommendations presented in quarterly Status Reports from Facilities Division
Approval of projects greater than \$2,000,000 – review site plan, floor plans, elevations, perspective models, and budget between design development and construction document stages

Procedure

Facilities Division staff recommendation
Ad-hoc building committee recommendation
Campus Design Review Panel recommendation

ACCEPT COMPLETED BUILDINGS AND PROJECTSRequired

Acceptance following University and State Construction Office certification

PROPERTY MATTERSRequired

Approval/recommendation for:
Property purchase and sale
Property leases
Utility easements
Demolitions

Procedure

University Administration recommendation
Buildings and Property Committee approval/recommendation
Full Board decision if required by scope

BUILDINGS AND PROPERTY POLICIES

Procedure

University Administration recommendation
Buildings and Property recommendation
Full Board decision

TRAFFIC AND PARKING POLICIES

Procedure

University Administration recommendation
Buildings and Property recommendation
Full Board decision

**BOARD OF TRUSTEES
NORTH CAROLINA STATE UNIVERSITY**

Buildings and Property Committee

Meeting Date: April 19, 2018

Minutes

Meeting No. 17-18: 4

Location: Primrose Conference Room

Time: 1:10 – 2:46 p.m.

Committee Members Present:

Mr. Chip Andrews, Chair
Miss Jackie Gonzalez
Mrs. Ann Goodnight
Mr. Wendell Murphy
Dr. Ron Prestage
Mr. Ed Weisiger, Jr.

Present from the University:

Mr. Scott Douglass, Vice Chancellor, Finance and Administration
Ms. P. J. Teal, Secretary of the University and Assistant to the Chancellor
Mr. David Rainer, Associate Vice Chancellor, Environmental Health and Public Safety
Mr. Douglas Morton, Associate Vice Chancellor, Facilities Division
Mr. Michael Fausnight, Associate General Counsel, Office of General Counsel
Ms. Lisa Johnson, University Architect
Mr. Harlan Stafford, Director, University Real Estate & Development
Mr. Mike Kennon, Assistant Transportation Director, Planning and Operations
Ms. Catherine Phillips, OFA Director of Operations, Analysis and Planning
Ms. Cathi Dunnagan, DELTA, Lead Instructional Designer
Ms. Melissa Young, Administrative Assistant, Office of the University Architect

CALL TO ORDER

Chair Andrews called the meeting to order at 1:10 p.m.

ROLL CALL

Chair Andrews called the roll. All were present.

STATE GOVERNMENT ETHICS ACT

The chair reminded all members of their duty to avoid conflicts of interest and appearances of conflicts of interest under the State Government Ethics Act. He inquired as to whether there were any known conflicts of interest with respect to any matters coming before the Buildings and Property Committee at this meeting. The committee members indicated that they had no conflicts of interest or appearances thereof.

MINUTES

Chair Andrews asked whether there were any corrections to the February 15, 2018 meeting minutes. There being none, Chair Andrews declared the minutes approved as drafted.

DESIGNER SELECTIONS

Chair Andrews asked Mr. Morton to discuss the designer selections. Morton recommended approval of the 2018-2019 Open Ended Service Agreement designer selections and ten designer selections less than \$1 million dollars.

Chair Andrews called for a motion and a second to recommend approval of the designer selections as outlined by Morton. Mr. Weisiger made the motion, which Mr. Prestage seconded. Chair Andrews asked if there was any further discussion on the motion. There being none, he called for a vote. He announced the motion passed.

ACCEPTANCE OF COMPLETED BUILDINGS AND PROJECTS

Chair Andrews asked Mr. Morton to present the completed buildings and projects for acceptance. Morton requested acceptance of seven completed projects listed with a combined value of \$866,630, which included the Wolf Ridge Student Health Renovation and the Dorothy and Roy Park Alumni Center Roof Replacement.

Chair Andrews called for a motion and a second to recommend acceptance as outlined by Mr. Morton. Mrs. Goodnight made the motion, which Mr. Murphy seconded. Chair Andrews asked if there was any further discussion on the motion. There being none, he called for a vote. He announced the motion passed.

PARKING AND TRANSPORTATION

Chair Andrews asked Mr. Rainer to present the Proposed Revision to Policy 7.60.1 Parking and Transportation Ordinances for 2018-2019. Rainer said the most significant change is that license plate recognition will replace parking permits. If you prefer to back into parking spaces, you will need to purchase a special license plate for \$5.00 from Transportation to display on the front of your vehicle. There will be an increase in parking charges in the fall. The additional money will cover the cost of making a down payment on the Coliseum Deck replacement and pay back debt service for the West Parking Deck.

Miss Gonzalez had questions about the student leader permits. Currently only three permits are allotted and they are specific to the student leader title. Mr. Rainer suggested he meet with DASA and the new student body president for further discussion, and that additional student leader permits could be made available. Mr. Kennon said he was happy to meet with anyone personally about his or her parking needs.

Chair Andrews thanked Mr. Rainer for the report. Chair Andrews called for a motion and a second to accept the report as outlined by Rainer. Mrs. Goodnight made the motion, which Mr. Weisiger seconded. Chair Andrews asked if there was further discussion on the motion. There being none, he called for a vote. He announced the motion passed.

PHYSICAL MASTER PLAN

Chair Andrews asked Ms. Johnson to present the Physical Master Plan update. Johnson distributed materials for this presentation. Johnson gave an overview of the overarching concepts of the 2014 Physical Master Plan, *A Campus of Neighborhoods and Paths*. She noted

the university updates the physical master plan every 5 to 7 years.

In 2017, the university engaged Ayers Saint Gross to develop a Campus Capacity and Assessment Study, which provided a comprehensive assessment of the Raleigh Campus. This study complements the 2014 Physical Master Plan as a high-level overlay and guiding document. With large campus, stakeholder involvement five guiding principles were established that serve as a mechanism to guide prioritization and decision-making as it relates to the physical campus.

Ms. Johnson noted that the university is moving forward with planning efforts for two of the key strategies identified in the Campus Capacity and Assessment Study. Both planning efforts include collaboration with many university and community stakeholders.

1. Engage Hillsborough Street with active uses and streetscape while creating a more porous edge to campus. The initial phase of the planning will focus on providing clear branding and consistent streetscaping along the south side of Hillsborough Street as well as a plan for better pedestrian connections to and through DH Hill Library. A graduate level College of Design studio has been involved with the visioning.
2. Re-envision Cates Avenue and reduce or redirect vehicular congestion in this active pedestrian area. This effort will be informed by a student housing master plan that will include a market analysis and interrelationship needs with Dining, Academics, Retail and Transportation. The housing study is scheduled to start this summer.

SITE AND PLAN APPROVAL

Chair Andrews asked Ms. Johnson to present the site approval for the Kappa Alpha Theta House located on South Campus. Ms. Johnson asked Chair Andrews if she could present the site and plan approval at the same time. Chair Andrews approved her request. Ms. Johnson said the Kappa Alpha Theta sorority house would be a three-story structure with at-grade entrances on the lowest two levels. The house includes 42 beds, a facilities director's suite, residents den, study lounge, parlor, living room, executive office/conference room, commercial kitchen, and multi-purpose dining/meeting room. The gross square footage of the house is 18,724.

Chair Andrews called for a motion and a second to recommend the site approval for Kappa Alpha Theta House as outlined by Ms. Johnson. Dr. Prestage made the motion, which Miss Gonzalez seconded. Chair Andrews asked if there was any further discussion on the motion. There being none, he called for a vote. The motion passed.

Chair Andrews called for a motion and a second to recommend the plan approval for Kappa Alpha Theta House as outlined by Ms. Johnson. Dr. Prestage made the motion, which Mrs. Goodnight seconded. Chair Andrews asked if there was any further discussion on the motion. There being none, he called for a vote. The motion passed.

Chair Andrews asked Ms. Johnson to present the plan approval for Plant Sciences at Centennial Campus. Johnson said the \$160.2 million Plant Sciences Building will build a new interdisciplinary plant sciences research building on Centennial Campus where researchers from the College of Agriculture and Life Sciences (CALS) and from the university can build multidisciplinary partnerships with scientists from government, industry, and regulatory agencies. The five-level building will be approximately 184,000 gross square feet (GSF) comprised of flexible research

labs, office space, partner lab/office suites, support lab space, and flexible conferencing space. The top floor will house Biosafety (BSL) Levels BSL-2 and BSL-3 rooftop greenhouses. The exterior building materials include red brick at the base of the building and site walls, terracotta tiles and metal panels on the upper levels. Ms. Johnson noted that the terracotta tiles and red brick combination was also used on the Talley Student Union. A video fly-through of the interior of the building was viewed by the committee.

Chair Andrews called for a motion and a second to recommend plan approval for Plant Sciences Building as outlined by Ms. Johnson. Mr. Weisiger made the motion, which Mr. Murphy seconded. Chair Andrews asked if there was any further discussion on the motion. There being none, he called for a vote. The motion passed.

PLAN APPROVAL

Chair Andrews asked Ms. Johnson to present the Plans and Specifications of Formal Projects less than \$2 million. Johnson requested acceptance of ten projects listed with a combined value of \$5.6 million, which included Exterior Lighting LED Conversion, Steam Tunnel Repairs, and the Daniels Hall Roof replacement.

Chair Andrews called for a motion and a second to recommend approval of the Plans and Specifications of Formal Projects less than \$2 million as outlined by Ms. Johnson. Dr. Prestage made the motion, and Mr. Murphy seconded.

INFORMATIONAL REPORTS

Chair Andrews recognized Mr. Morton to present the update for Capital Projects. Morton noted that the update is to provide committee members information from design to completion. The project updates included the DH Hill Academic Success Center, the Memorial Belltower Restoration, and the Engineering Building Oval.

Andrews recognized Ms. Johnson to provide an update on projects in planning. Johnson presented the update and noted that the committee would more than likely review two more Greek Village houses, Zeta Tau Alpha and Sigma Kappa at the September 2018 meeting.

There being no additional business, the meeting adjourned at 2:46 p.m.

Respectfully submitted,

D. G. Morton
Secretary to the Committee

cc: Scott Douglass, Vice Chancellor, Finance & Administration
P.J. Teal, Assistant Secretary of the Trustees

Approved: _____
Committee Chair Date

**DISPOSITION
OF REAL PROPERTY**

EASEMENT

GRANTOR The State of North Carolina

GRANTEE Duke Energy Progress

LOCATION Wake County EMS Station, 1351 Varsity Dr., Raleigh, NC

SIZE +/- 4,270 sf. (427' x 10') of real property.

RATE Benefit

TERM Perpetual Utility Easement

USE Duke Energy Progress proposes to install +/- 427 feet of electrical service within the existing boundary limits of the property. The proposed line will begin at the northwestern corner of the intersection of Marcom St. and Varsity Dr. and run in a northerly direction for +/- 345', then in an easterly direction 82' to its point of terminus. The underground utility easement will be 10 feet wide. Total easement area will comprise +/- 4,270 square feet ~ 0.0980 acres.

Form-PO 2

Original and one copy to
to State Property Office

STATE OF NORTH CAROLINA
Department of Administration
***DISPOSITION OF REAL PROPERTY**

Institution or Agency: State of North Carolina**Date:** August 1, 2018

The Department of Administration is requested, as provided by GS 146-28 to dispose of the real property herein described by (sale), (lease), (rental), or (other specify): Utility Easement

The disposition is recommended for the following reasons:

Duke Energy Progress has requested an easement across State-owned land allocated to NC State University in order to provide electrical service to the Wake County EMS Station #8 located on Varsity Dr.

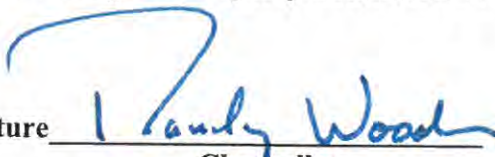
Description of Property:

Duke Energy Progress proposes to install +/- 427 feet of electrical service within the existing boundary limits of the property. The proposed line will begin at the northwestern corner of the intersection of Marcom St. and Varsity Dr. and run in a northerly direction for +/- 345', then in an easterly direction 82' to its point of terminus. The underground utility easement will be 10 feet wide. Total easement area will comprise +/- 4,270 square feet ~ 0.0980 acres.

Term: Perpetual**Estimated value:** \$44,823.24 (Benefit)**Where deed is filed, if known:** Wake County Register of Deeds.**If deed is in the name of agency other than applicant, state the name.** N/A**Rental income, if applicable, and suggested terms:** N/A**Funds from the disposal of this property are recommended for the following use.** N/A

Action recommending this transaction was taken by the Building and Property Committee of the Board of Trustees at its meeting held on _____, 2018.

Signature


Chancellor

*The term "real property" includes timber rights, mineral rights, etc. (GS 146-64)

REFERENCES

BM 1911, PG 121
BM 1924, PG 2
DB 422, PG 404
DB 4503, PG 514
BM 1988, PG 1980
BM 1997, PG 318

THIS MAP MAY NOT BE A CERTIFIED SURVEY AND HAS NOT BEEN REVIEWED BY A LOCAL GOVERNMENT AGENCY FOR COMPLIANCE WITH APPLICABLE LAND DEVELOPMENT REGULATIONS AND HAS NOT BEEN REVIEWED FOR COMPLIANCE WITH RECORDING REQUIREMENTS FOR PLATS.

LEGEND

□ ECM EXISTING CONCRETE MONUMENT
▲ COMPUTED POINT
● IRON PIPE SET

LINE TABLE

LINE	BEARING	DISTANCE
L1	N87°49'34"W	10.12'
L2	N09°28'21"W	29.62'
L3	N81°18'59"E	10.00'
L4	S08°41'01"E	10.00'
L5	S81°18'59"W	10.00'
L6	S09°28'21"E	29.85'

GENERAL NOTES

- THIS SURVEY MAP IS INTENDED TO REPRESENT AN EASEMENT EXHIBIT ON A PORTION OF THE PROPERTY OF STATE OF NORTH CAROLINA, PIN 0794507674, AND IS NOT A BOUNDARY SURVEY. THIS SURVEY WAS PERFORMED WITHOUT THE BENEFIT OF A TITLE REPORT AND THEREFORE ALL ENCUMBRANCES UPON THE PROPERTY MAY NOT BE SHOWN.

- HORIZONTAL DATUM IS NAD 83 (2001).

I, C. RYAN DAVENPORT, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION (BM 1924, PG 2); THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION FOUND IN SOURCES SHOWN HERE ON; THAT THE RATIO OF PRECISION AS CALCULATED IS 1:20000+; THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G. S. 47-30 AS AMENDED. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER AND SEAL THIS 30th DAY OF MAY, A.D., 2018.

FURTHERMORE, I CERTIFY THAT THE SURVEY IS OF ANOTHER CATEGORY, SUCH AS THE RECOMBINATION OF EXISTING PARCELS, A COURT ORDERED SURVEY, OR OTHER EXCEPTION TO THE DEFINITION OF SUBDIVISION.

DocuSigned by: *C. Ryan Davenport* 5/30/2018
C. RYAN DAVENPORT, PLS, L-4707

BA950243039041B

STEWART

421 FAIRVIEW AVE. STE. 400
WILSON, NC 27891
1-813-360-0000

PLAT LICENSE # C-1001
www.ncsurvey.com
PROFESSIONAL

EASEMENT EXHIBIT FOR:
DUKE ENERGY

NC STATE UNIVERSITY
CAMPUS

GRAPHIC SCALE



(IN FEET)
1 inch = 80ft.



Project No: C17004	Ref No: --
Scale: 1"=60'	Date: 12/15/17
Drawn By: CRD	Drawing No: V-1
Checked By: CRD	

DocuSign Envelope ID: 1440DC9C-C09F-4C84-A522-0914A39980C3

Wake County EMS Station #8
1351 Varsity Dr.

Varsity Dr
Gorman St
Marcom St
Greenleaf St
Carlton Ave
Western Blvd
Foushee Dr
Dean Allen Dr
Fraternity Ct
Sewardship Park
Greek Village Dr
Avant Ferry Rd

North Carolina State University

Maps

Overview

▼ Maps

Overview

**DISPOSITION
OF REAL PROPERTY**

EASEMENT

GRANTOR The State of North Carolina

GRANTEE Duke Energy Progress

LOCATION NCSU Centennial Campus Varsity Dr., Raleigh, NC

SIZE +/- 12,400 sf. (1,240' x 10') of real property.

RATE Benefit

TERM Perpetual Utility Easement

USE Duke Energy Progress proposes to install +/- 1,240 feet of electrical service to be located on the southern side of Varsity Dr. The proposed line will begin at the southeastern corner of the intersection of Varsity Dr. and Avent Ferry Rd., thence run in a southeasterly direction for +/- 1,240 feet to its point of terminus near main campus drive. The underground utility easement will be 10 feet wide. Total easement area will comprise +/- 12,400 square feet ~ 0.2846 acres.

Form-PO 2

Original and one copy to
to State Property Office

STATE OF NORTH CAROLINA
Department of Administration
***DISPOSITION OF REAL PROPERTY**

Institution or Agency: State of North Carolina**Date:** August 1, 2018

The Department of Administration is requested, as provided by GS 146-28 to dispose of the real property herein described by (sale), (lease), (~~rental~~), or (other specify): Utility Easement

The disposition is recommended for the following reasons:

This is a disposition by easement. Duke Energy Progress has requested an easement for the installation of underground electrical service, located on Varsity Dr. The proposed easement area will be relocated on the southern side of Varsity Dr. The easement area will be +/- 12,400 sf ~ .2846 ac.

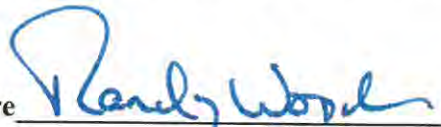
Description of Property:

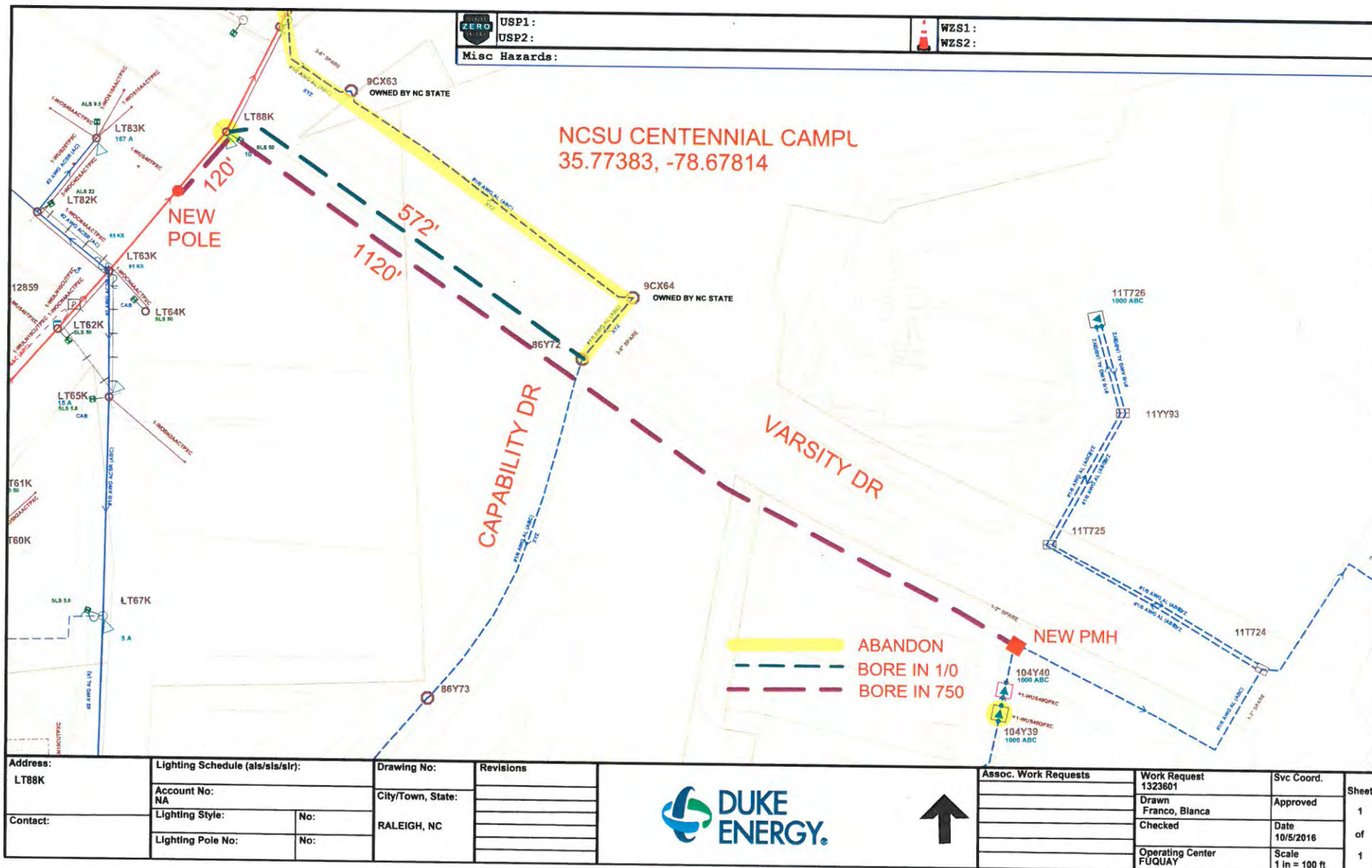
Duke Energy Progress proposes to install +/- 1,240 feet of electrical service to be located on the southern side of Varsity Dr. The proposed line will begin at the southeastern corner of the intersection of Varsity Dr. and Avent Ferry Rd., thence run in a southeasterly direction for +/- 1,240 feet to its point of terminus near main campus drive. The underground utility easement will be 10 feet wide. Total easement area will comprise +/- 12,400 square feet ~ 0.2846 acres.

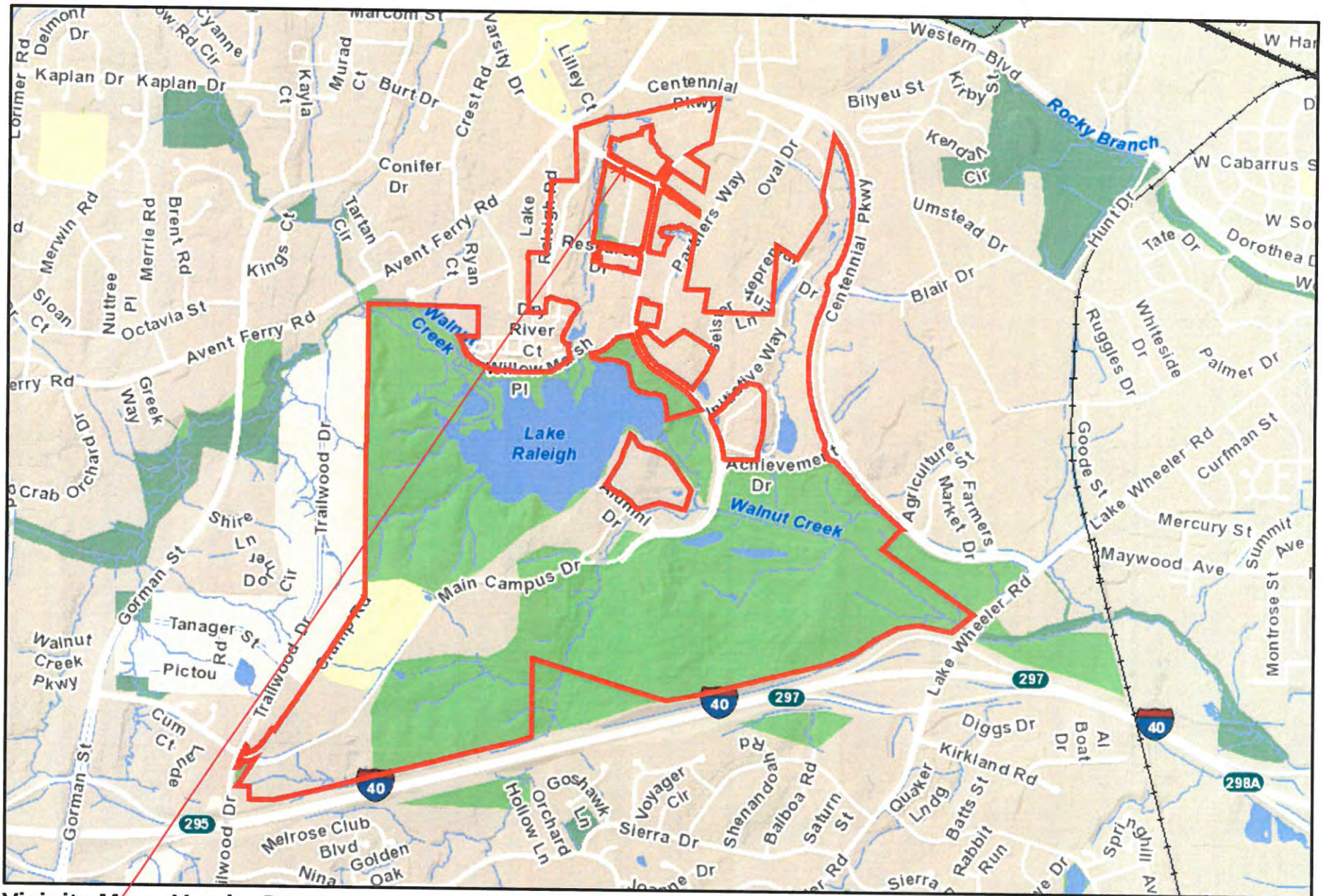
Term: Perpetual**Estimated value:** \$50,864.64 (Benefit)**Where deed is filed, if known:** Wake County Register of Deeds.**If deed is in the name of agency other than applicant, state the name.** N/A**Rental income, if applicable, and suggested terms:** N/A**Funds from the disposal of this property are recommended for the following use.** N/A

Action recommending this transaction was taken by the Building and Property Committee of the Board of Trustees at its meeting held on _____, 2018.

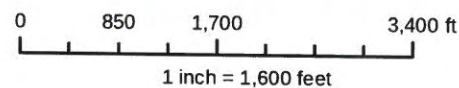
Signature


Chancellor





Vicinity Map - Varsity Dr.



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 iMaps makes every effort to produce and publish the most current and accurate information possible. However, the maps are produced for information purposes, and are NOT surveys. No warranties, expressed or implied, are provided for the data therein, its use, or its interpretation.

**DISPOSITION
OF REAL PROPERTY**

EASEMENT

GRANTOR The State of North Carolina

GRANTEE PSNC Energy

LOCATION NCSU Horticulture Field Greenhouses 4301 Beryl Rd, Raleigh, NC

SIZE +/- 5,000 sf. (500' x 10') of real property.

RATE Benefit

TERM Perpetual Utility Easement

USE PSNC Energy proposes to install +/- 500 feet of underground gas service within the existing boundary limits of the property. The underground utility easement will be 10 feet wide. Total easement area will comprise of +/- 5,000 square feet ~ 0.1148 acres.

Form-PO 2

Original and one copy to
to State Property Office

STATE OF NORTH CAROLINA
Department of Administration
***DISPOSITION OF REAL PROPERTY**

Institution or Agency: North Carolina State University**Date:** August 1, 2018

The Department of Administration is requested, as provided by GS 146-28 to dispose of the real property herein described by (sale), (lease), (rental), or (other specify): Permanent Utility Easement

The disposition is recommended for the following reasons:

PSNC Energy has requested an easement across State-owned land allocated to NC State University in order to provide underground gas service to the Horticulture Field Greenhouses, located at 4301 Beryl Rd., Raleigh, NC.

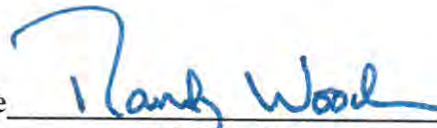
Description of Property:

PSNC Energy proposes to install +/- 500 feet of underground gas service within the existing boundary limits of the property. The underground utility easement will be 10 feet wide. Total easement area will comprise of +/- 5,000 square feet ~ 0.1148 acres.

Term: Perpetual**Estimated value:** Benefit**Where deed is filed, if known:** Wake County Register of Deeds.**If deed is in the name of agency other than applicant, state the name.** N/A**Rental income, if applicable, and suggested terms:** N/A**Funds from the disposal of this property are recommended for the following use.** N/A

Action recommending this transaction was taken by the Building and Property Committee of the Board of Trustees at its meeting held on _____, 2018

Signature



Chancellor

*The term "real property" includes timber rights, mineral rights, etc. (GS 146-64)

General Notes

This map is not a certified survey and has not been reviewed by a local government agency for compliance with any applicable land development regulations.

A minimum of 48 hours prior to construction call NC ONE-CALL At 1-800-632-4949 for other utility locations.

For questions concerning this project, please contact Nakima Bogan at 919-367-2720.

Exhibit "A"

Legend

- Main Distribution Steel Route
- - - Main Distribution Proposed Plastic Route
- - - Main Service Plastic Route
- - - Foreign Pipeline Route
- Alt Def Building Annotation
- Alt Def Building Extent
- Lot Line Back Side Lot Route
- Lot Line Right of Way Route
- Alt Def Parcel Annotation
- Parcel Centroid
- Political Boundary City Town Area
- Political Boundary County Area
- == Rail Road Centerline
- Unnamed Span Route

Scale



800a Gaston Rd., Gastonia, NC 28056

PIPE TO BE INSTALLED

2" Polyethylene PE-2406 SDR 11	500 Feet
4" Polyethylene PE-2406 SDR 11.5	
8" Polyethylene PE-2406 SDR 13.5	

Proposed 2" Gas Main
NCSU - Hort Field Greenhouses
Raleigh, North Carolina

Author:

Nakima Bogan

Checked By:

Approved By:

Page:

1 of 1

Project Number

CP Number:

N/A

Date: 06/07/2018

0065331



Know what's below.
Call before you dig.



1060

GARAGE



**DISPOSITION
OF REAL PROPERTY**

EASEMENT

GRANTOR The State of North Carolina

GRANTEE SRI Gurudev Datta, LLC (Ramada Inn)

LOCATION 1520 Blue Ridge Rd., Raleigh, NC

SIZE +/- 8,500 sf. (211' x 40') of real property.

RATE \$61,000.00 Pending Appraisal

TERM Perpetual Access Easement

USE The owners (SRI GUKRUDEV, LLC) of the Ramada Inn have plans to develop a five-story improvement to the front of their existing hotel. This proposed improvement will require its current ingress and egress point to be relocated to the northern side of the building, which is located at 1520 Blue Ridge Rd. in Raleigh, NC. They have requested an access easement from the State of NC to address this issue. The proposed easement will be +/- 8,500 sf. (.20 ac.) acres.

Form-PO 2Original and one copy to
to State Property Office

STATE OF NORTH CAROLINA
Department of Administration
***DISPOSITION OF REAL PROPERTY**

Institution or Agency: State of North Carolina**Date:** August 1, 2018

The Department of Administration is requested, as provided by GS 146-28 to dispose of the real property herein described by (sale), (lease), (rental), or (other specify): Access Easement

The disposition is recommended for the following reasons:

The owners (SRI GUKRUDEV, LLC) of the Ramada Inn have plans to develop a five-story improvement to the front of their existing hotel. This proposed improvement will require its current ingress and egress point to be relocated to the northern side of the building, which is located at 1520 Blue Ridge Rd. in Raleigh, NC. They have requested an access easement from the State of NC to address this issue. The proposed easement will be +/- 8,500 sf. (.20 ac.)

Description of Property:

The subject tract is located at 1520 Blue Ridge Rd. in Raleigh, NC. The easement area will have dimensions of +/- 40' x 211' (+/- 8,500 sq. ft.).

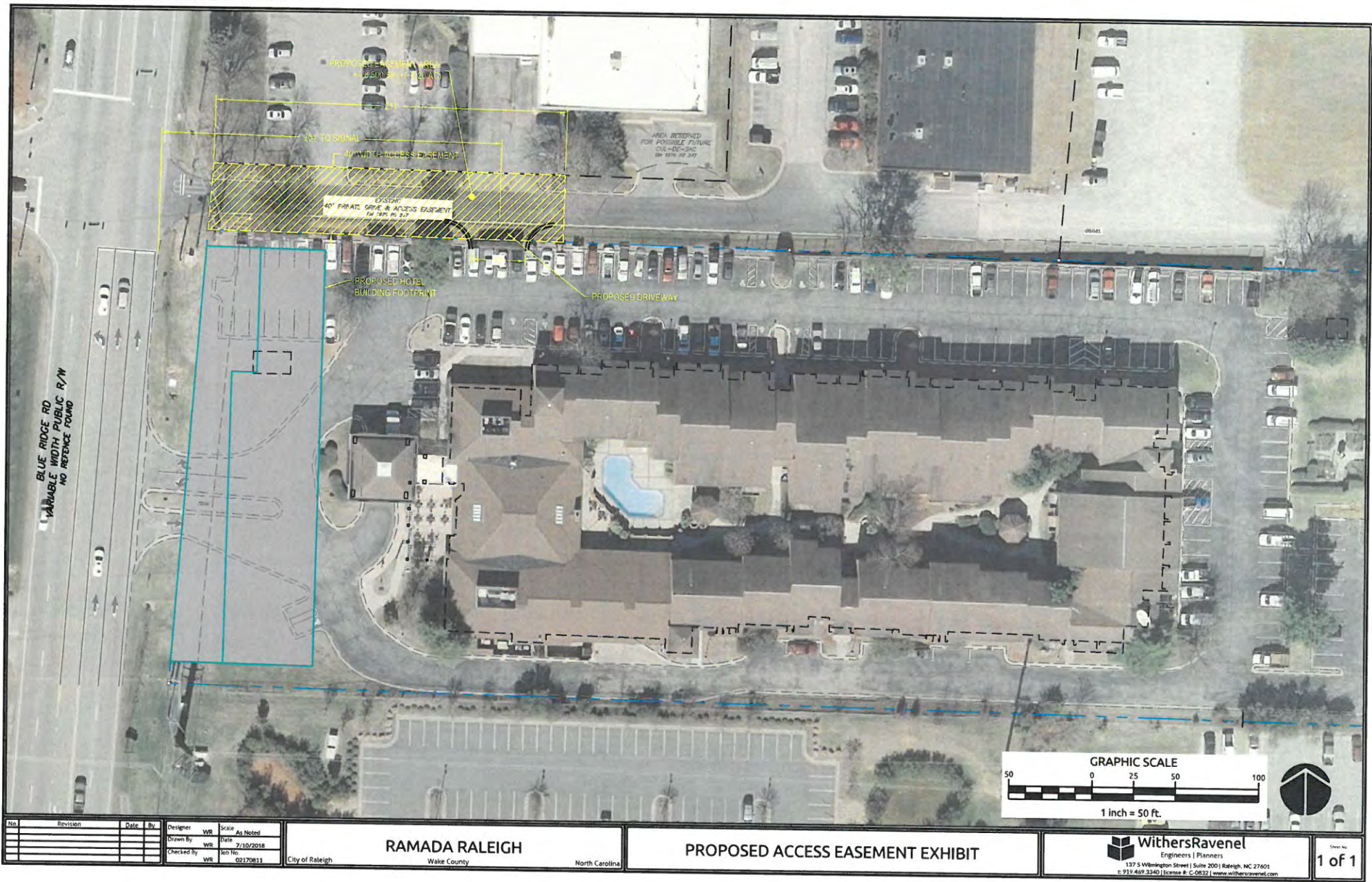
Term: Permanent**Estimated value:** To be determined by the State Property Office.**Where deed is filed, if known:** Wake County Register of Deeds.**If deed is in the name of agency other than applicant, state the name.** SRI GUKRUDEV, LLC**Rental income, if applicable, and suggested terms:** N/A**Funds from the disposal of this property are recommended for the following use.**

To be determined by the State Property Office

Action recommending this transaction was taken by the Building and Property Committee of the Board of Trustees at its meeting held on _____, 2018.

Signature


Chancellor

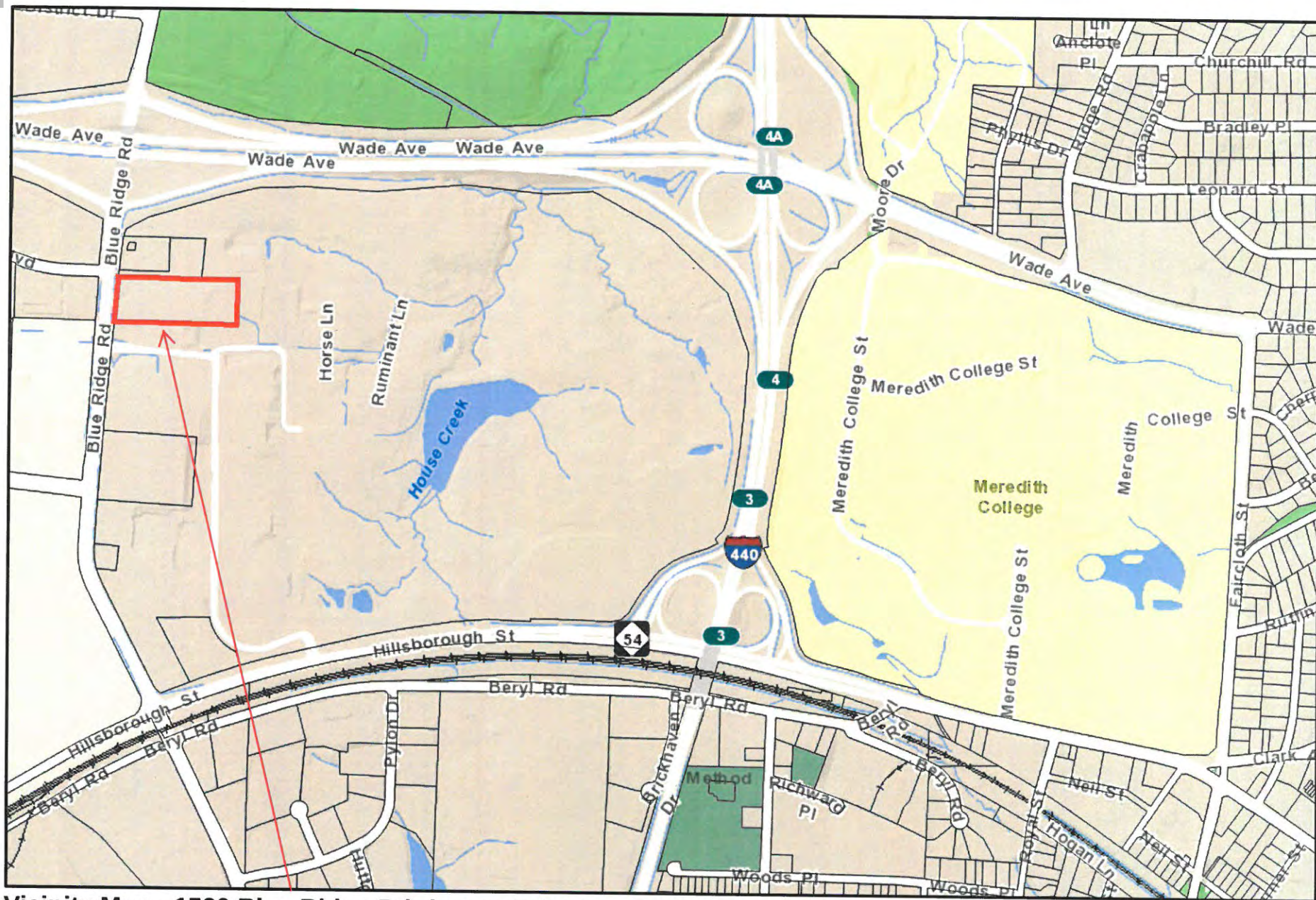


No.	Revision	Date	By	Designer	Scale
				WR	As Noted
				WR	2/18/2018
				WR	02/17/2018

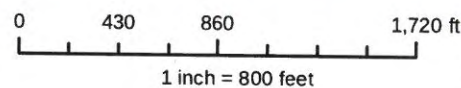
RAMADA RALEIGH
City of Raleigh
Wake County
North Carolina

PROPOSED ACCESS EASEMENT EXHIBIT

WithersRavenel
Engineers | Planners
137 S Wilmington Street | Suite 200 | Raleigh, NC 27601
© 919.469.3340 | License # C-0832 | www.withersravenel.com



Vicinity Map - 1520 Blue Ridge Rd. (Ramada Inn)



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**DISPOSITION
OF REAL PROPERTY**

EASEMENT

GRANTOR The State of North Carolina

GRANTEE City of Raleigh

LOCATION Gregg Museum 1903 Hillsborough St., Raleigh, NC

SIZE +/- 209 sf. (18' x 12') of real property.

RATE Benefit

TERM Perpetual

USE This is a disposition by easement. The City of Raleigh has requested an easement for the installation and use of an underground waterline and two (2) water meter vaults to provide and monitor the distribution of a public water service as part of the renovation of the Gregg Museum, located at 1903 Hillsborough St. in Raleigh, NC. The proposed easement area will be located at the northwestern corner of the property. The underground utility easement will be +/- 18' x 12' wide. Total easement area will comprise of +/- 209 square feet ~ 0.0048 acres.

Form-PO 2

Original and one copy to
to State Property Office

STATE OF NORTH CAROLINA
Department of Administration
***DISPOSITION OF REAL PROPERTY**

Institution or Agency: State of North Carolina**Date:** August 1, 2018

The Department of Administration is requested, as provided by GS 146-28 to dispose of the real property herein described by (sale), (lease), (~~rental~~), or (other specify): Utility Easement

The disposition is recommended for the following reasons:

The City of Raleigh has requested an easement for the installation of a waterline to provide public water service to the Gregg Museum, located on 1903 Hillsborough St.

Description of Property:

This is a disposition by easement. The City of Raleigh has requested an easement for the installation and use of an underground waterline and two (2) water meter vaults to provide and monitor the distribution of a public water service as part of the renovation of the Gregg Museum, located at 1903 Hillsborough St. in Raleigh, NC. The proposed easement area will be located at the northwestern corner of the property. The underground utility easement will be +/- 18' x 12' wide. Total easement area will comprise of +/- 209 square feet ~ 0.0048 acres.

Term: Perpetual**Estimated value:** \$6,481.06 (Benefit)**Where deed is filed, if known:** Wake County Register of Deeds.**If deed is in the name of agency other than applicant, state the name.** N/A**Rental income, if applicable, and suggested terms:** N/A**Funds from the disposal of this property are recommended for the following use.** N/A

Action recommending this transaction was taken by the Building and Property Committee of the Board of Trustees at its meeting held on _____, 2018.

Signature

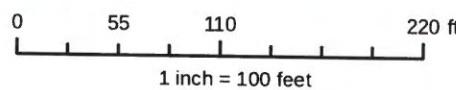

Chancellor

*The term "real property" includes timber rights, mineral rights, etc. (GS 146-64)





Vicinity Map - Gregg Museum



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**DISPOSITION
OF REAL PROPERTY**

EASEMENT

GRANTOR The State of North Carolina

GRANTEE Tammy Lynn Center

LOCATION Tammy Lynn Center 739 Chappell Dr., Raleigh, NC

SIZE +/- 2,730 square feet (24' x 113')

RATE Benefit

TERM Perpetual

USE This is a disposition by access easement. The Tammy Lynn Center has requested an easement from the State of North Carolina for the proposed construction of an emergency access. The proposed easement will be +/- 24' x 113' running northeasterly from the Tammy Lynn Center to its point of terminus with the Capability Drive

Form-PO 2

Original and one copy to
to State Property Office

STATE OF NORTH CAROLINA
Department of Administration
***DISPOSITION OF REAL PROPERTY**

Institution or Agency: State of North Carolina**Date:** August 1, 2018

The Department of Administration is requested, as provided by GS 146-28 to dispose of the real property herein described by (sale), (lease), (rental), or (other specify): Access Easement

The disposition is recommended for the following reasons:

This is a disposition by easement. The Tammy Lynn Center has requested an easement for the purpose of providing emergency access. The easement area will be +/- 24' x 113' containing +/- 2,730 square feet ~ .0627 ac.

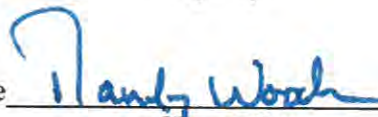
Description of Property:

This is a disposition by access easement. The Tammy Lynn Center has requested an easement from the State of North Carolina for the proposed construction of an emergency access. The proposed easement will be +/- 24' x 113' running northeasterly from the Tammy Lynn Center to its point of terminus with the Capability Drive Parking Lot.

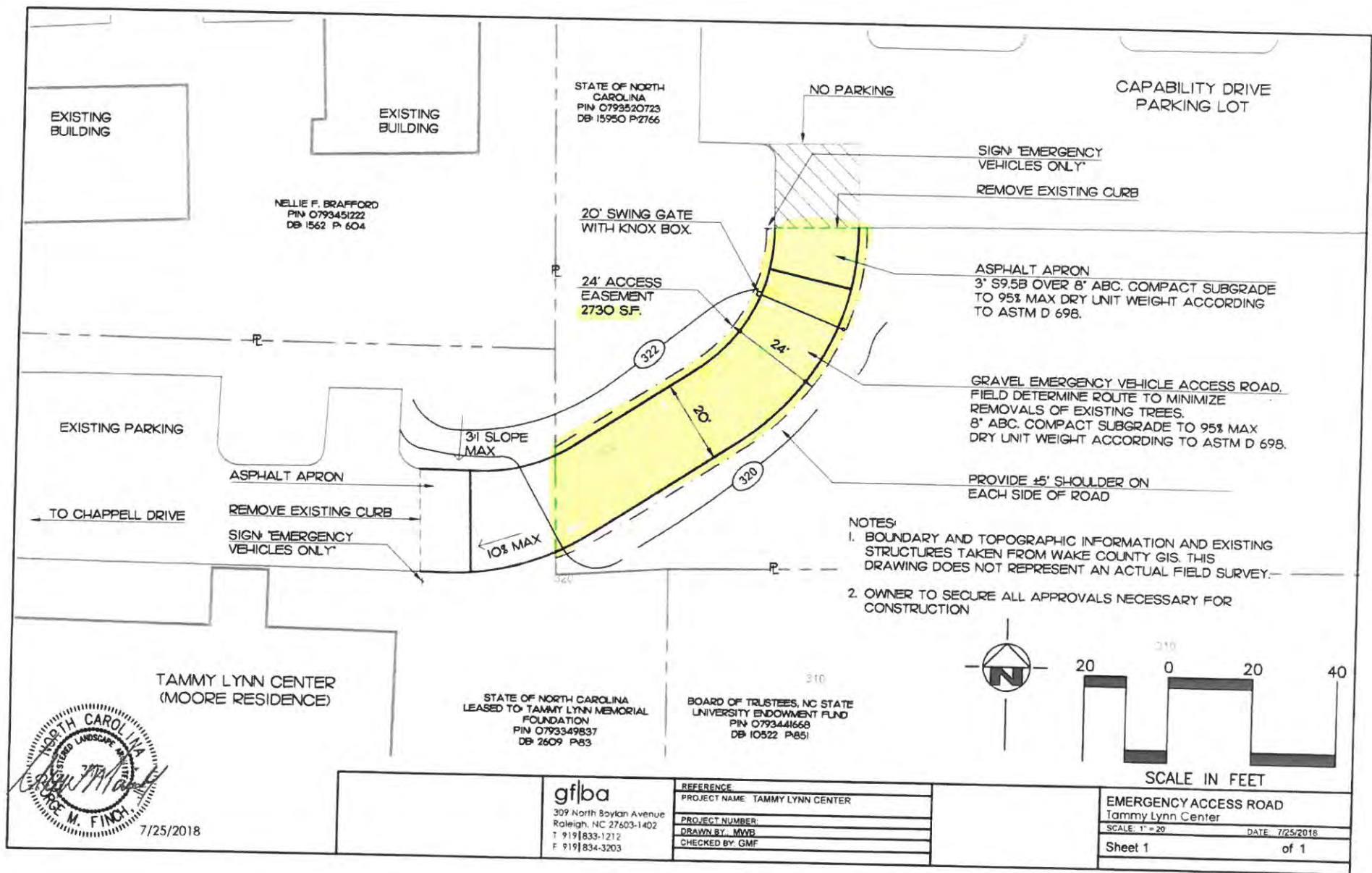
Term: Perpetual**Estimated value:** \$11,198.42 (Benefit)**Where deed is filed, if known:** Wake County Register of Deeds.**If deed is in the name of agency other than applicant, state the name.** N/A**Rental income, if applicable, and suggested terms:** N/A**Funds from the disposal of this property are recommended for the following use.** N/A

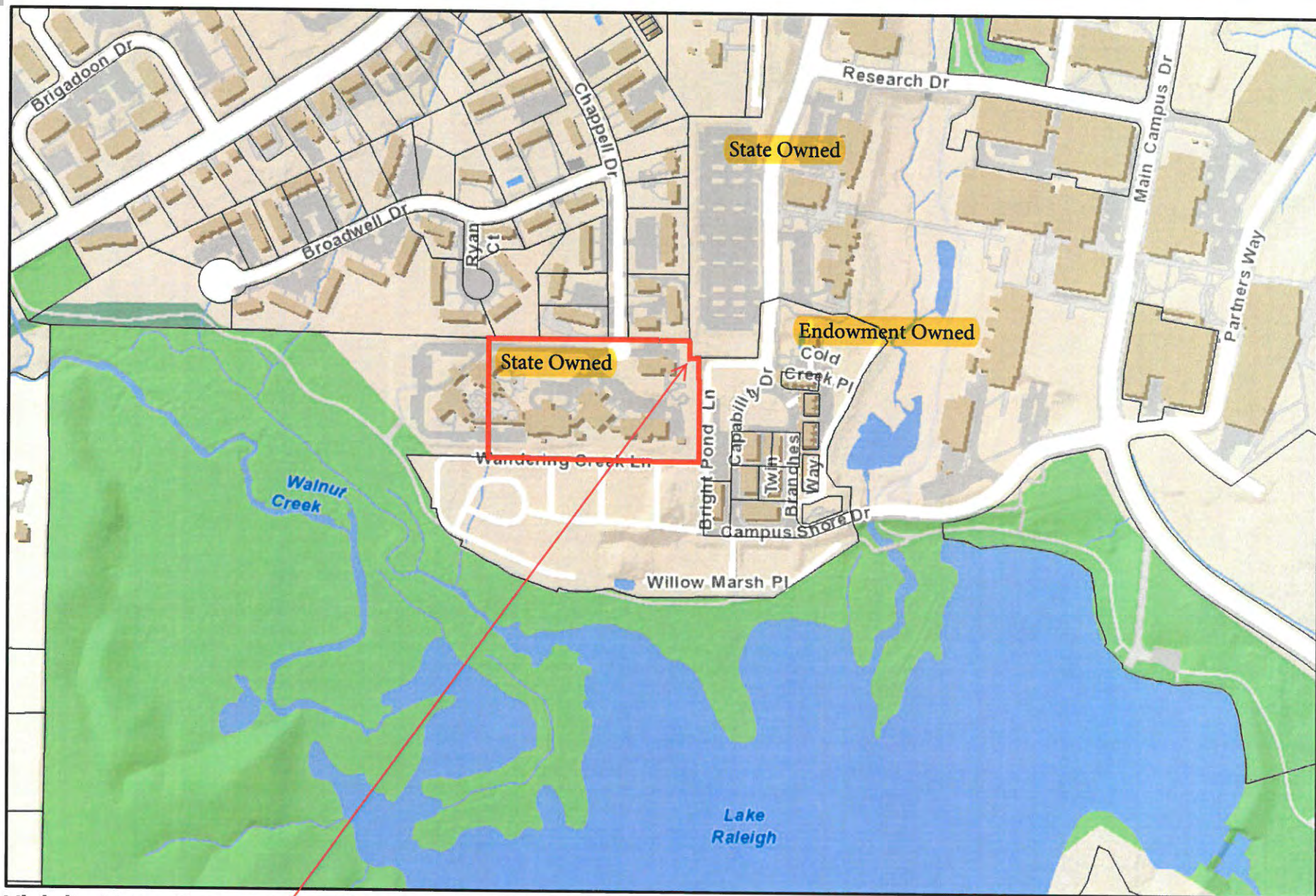
Action recommending this transaction was taken by the Building and Property Committee of the Board of Trustees at its meeting held on _____, 2018.

Signature

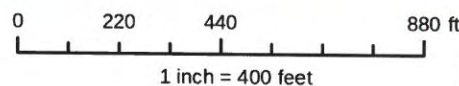

Chancellor

*The term "real property" includes timber rights, mineral rights, etc. (GS 146-64)





Vicinity Map - Tammy Lynn Memorial Foundation, Inc.
Emergency Access Easement



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**DISPOSITION
OF REAL PROPERTY**

DEMOLITION

GRANTOR The State of North Carolina

GRANTEE Not Applicable

LOCATION Upper Piedmont Tobacco Research Station, 2022 Wentworth St., Reidsville, NC

SIZE +/- 9,114 square feet

RATE Benefit

TERM Not Applicable

USE This is a disposition by demolition. The College of Agriculture and Life Sciences has requested the demolition of a structure located at the Upper Piedmont Tobacco Research Station, due to structural damaged. The structure is a two-story log-constructed blacksmith shop and horse stables.

Form-PO 2

Original and one copy to
to State Property Office

STATE OF NORTH CAROLINA
Department of Administration
***DISPOSITION OF REAL PROPERTY**

Institution or Agency: State of North Carolina**Date:** August 1, 2018

The Department of Administration is requested, as provided by GS 146-28 to dispose of the real property herein described by (sale), (lease), (~~rental~~), or (other specify): Demolition

The disposition is recommended for the following reasons:

This is a disposition by demolition. The College of Agriculture and Life Sciences has requested the demolition of a structure located at the Upper Piedmont Tobacco Research Station, due to structural damaged. The structure is a two-story log-constructed blacksmith shop and horse stables.

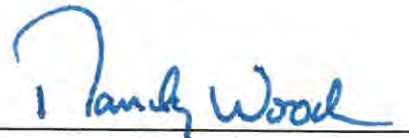
Description of Property:

This is a disposition by demolition of a two-story log-constructed blacksmith shop and horse stables containing +/- 9,114 square feet. The improvements are located at the Upper Piedmont Tobacco Research Station at 2022 Wentworth St. in Reidsville, NC

Term: Not Applicable**Estimated value:** (Benefit)**Where deed is filed, if known:** Rockingham County Register of Deeds.**If deed is in the name of agency other than applicant, state the name.** N/A**Rental income, if applicable, and suggested terms:** N/A**Funds from the disposal of this property are recommended for the following use.** N/A

Action recommending this transaction was taken by the Building and Property Committee of the Board of Trustees at its meeting held on _____, 2018.

Signature

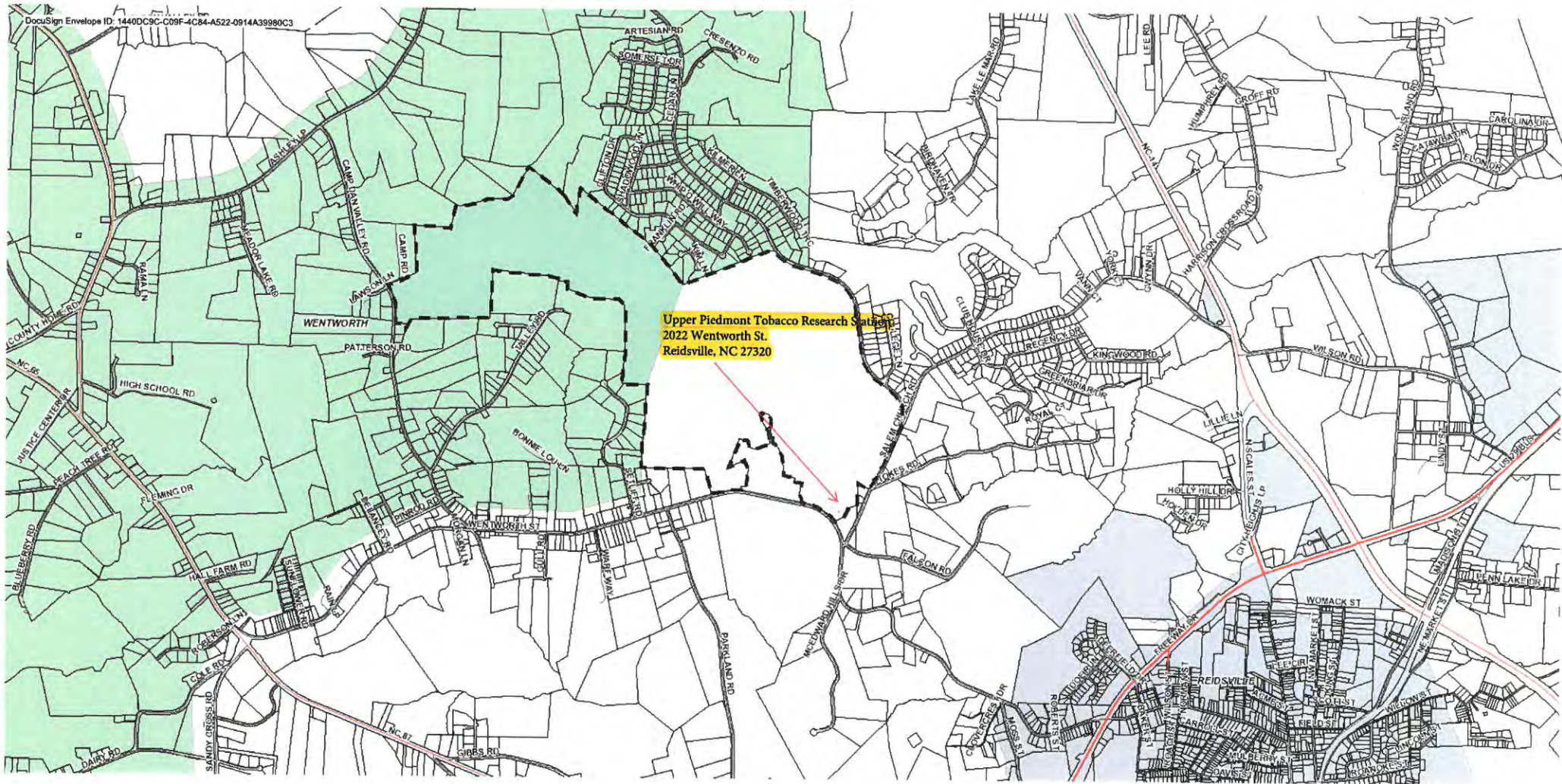


Chancellor

*The term "real property" includes timber rights, mineral rights, etc. (GS 146-64)







**DISPOSITION
OF REAL PROPERTY**

EASEMENT

GRANTOR The State of North Carolina

GRANTEE City of Asheville

LOCATION NCSU Minerals Laboratory 167 Coxe Ave., Asheville, NC

SIZE +/- 1000 square feet (.0230 ac.)

RATE To be determined by the State Property Office.

TERM Perpetual

USE This is a disposition by easement. The easement will increase the width of Federal Alley to a maximum of 30 feet. The easement area will be located at the northwest corner of the NCSU Minerals Research Laboratory, located at 167 Coxe Ave. in Asheville, NC. The proposed easement area will be +/- 1,000 square feet ~ .0230 ac.

Form-PO 2

Original and one copy to
to State Property Office

STATE OF NORTH CAROLINA
Department of Administration
***DISPOSITION OF REAL PROPERTY**

Institution or Agency: State of North Carolina**Date:** August 1, 2018

The Department of Administration is requested, as provided by GS 146-28 to dispose of the real property herein described by (sale), (lease), (rental), or (other specify): Easement

The disposition is recommended for the following reasons:

This is a disposition by easement. An adjoining property owner (172 Asheland Ave., LLC) has requested a conveyance for the purpose of increasing the width of the Federal Alley, due to permitting requirements from the City of Asheville. The requirement is in connection with a proposed development of property in the immediate vicinity. The easement contains +/- 1,000 square feet ~ .0230 ac.

Description of Property:

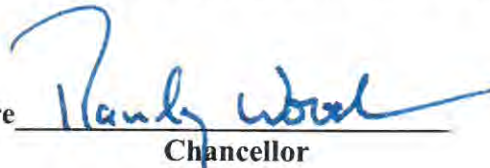
This is a disposition by easement. The easement will increase the width of Federal Alley to a maximum of 30 feet. The easement area will be located at the northwest corner of the NCSU Minerals Research Laboratory, located at 167 Coxe Ave. in Asheville, NC. The proposed easement area will be +/- 1,000 square feet ~ .0230 ac.

Term: Not Applicable**Estimated value:** To be determined by the State Property Office**Where deed is filed, if known:** Buncombe County Register of Deeds.**If deed is in the name of agency other than applicant, state the name.** N/A**Rental income, if applicable, and suggested terms:** N/A**Funds from the disposal of this property are recommended for the following use.** N/A

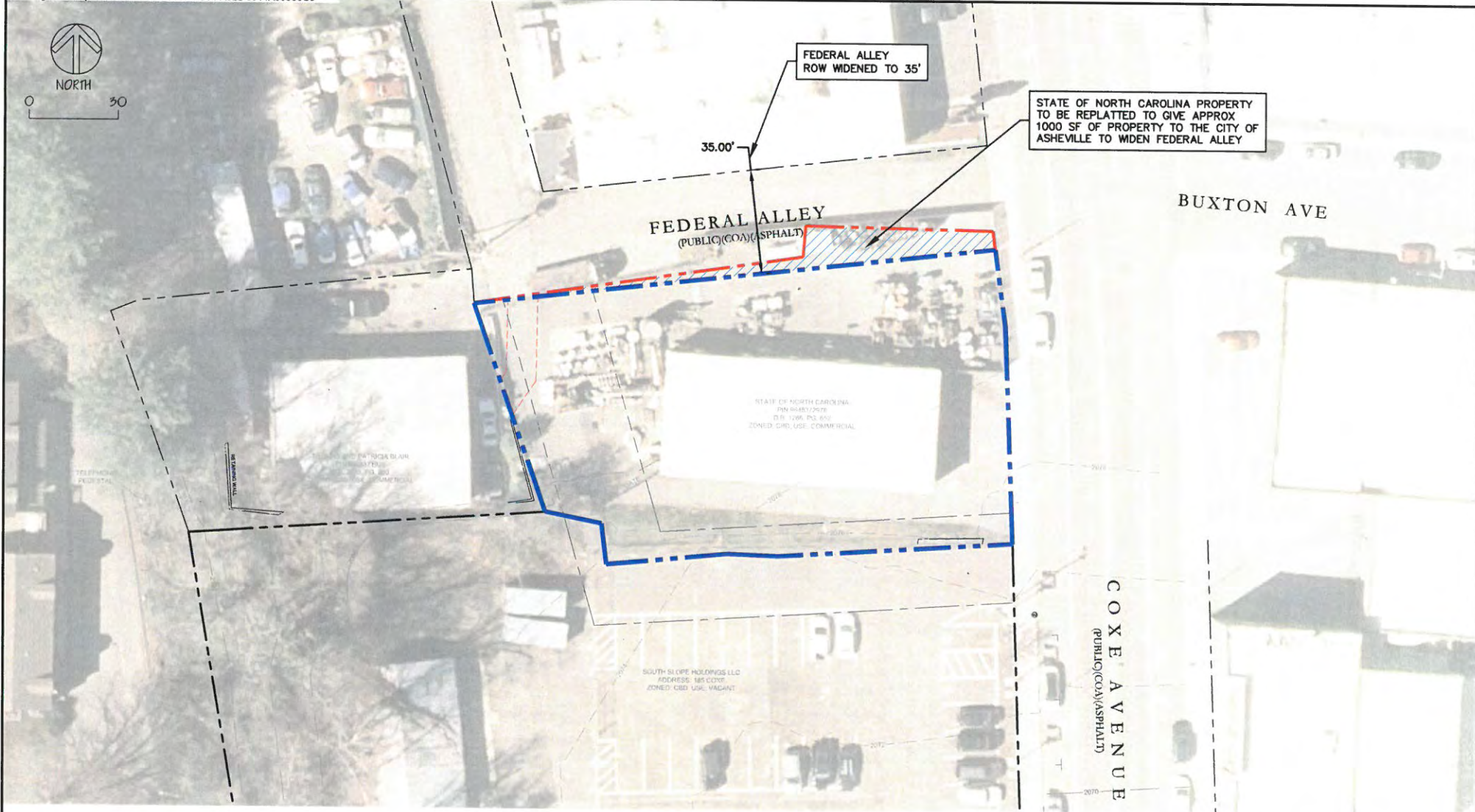
To be determined by the State Property Office

Action recommending this transaction was taken by the Building and Property Committee of the Board of Trustees at its meeting held on _____, 2018.

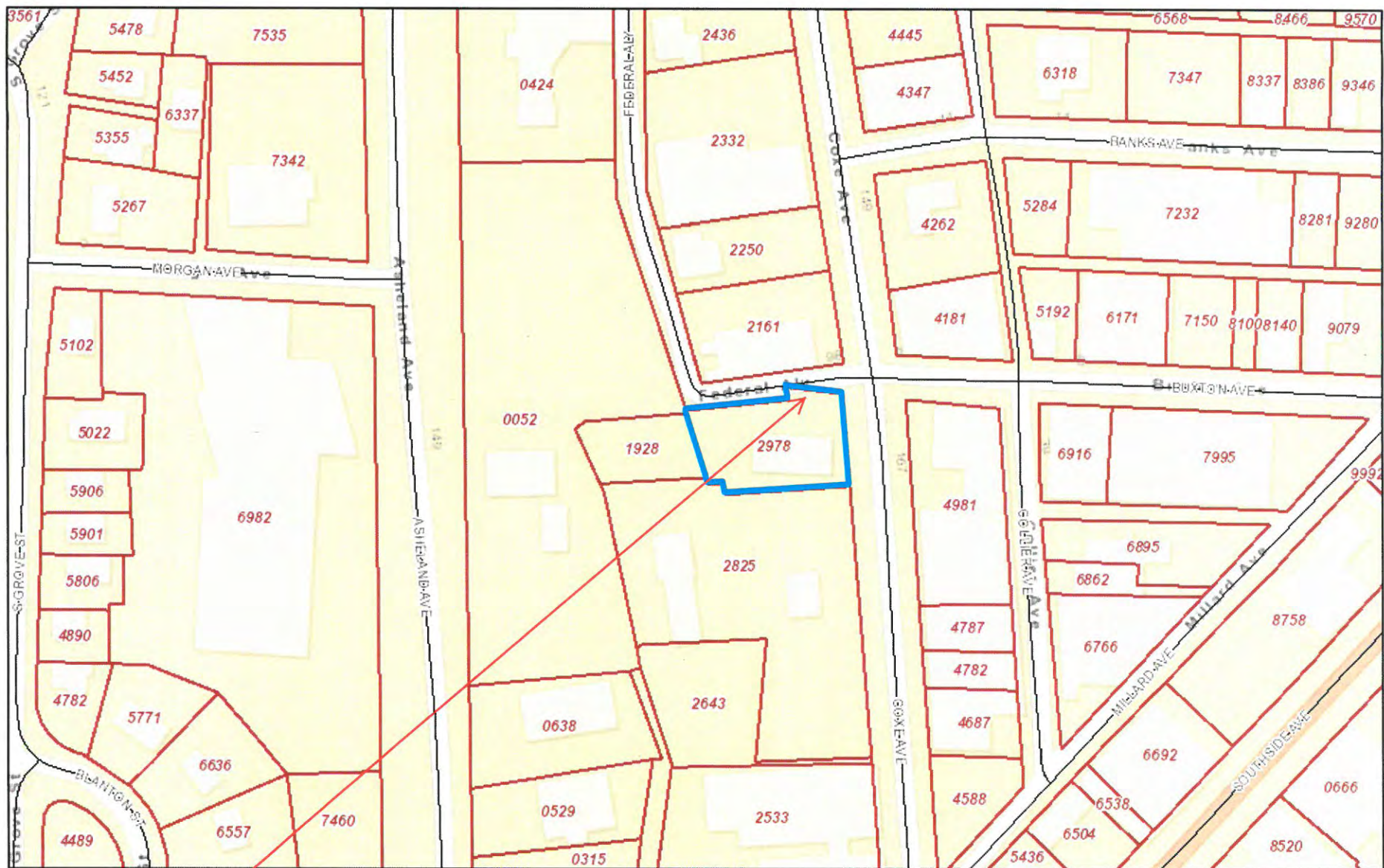
Signature


Chancellor

DocuSign Envelope ID: 1440DC9C-C09F-4C84-A522-0914A39980C3



Buncombe County



Vicinity Map - 167 Coxe Ave.

**DISPOSITION
OF REAL PROPERTY**

EASEMENT

GRANTOR The State of North Carolina

GRANTEE The Board of Trustees of the Endowment Fund of North Carolina State University

LOCATION Centennial Campus, Centennial Bio-medical Campus, and Spring Hill Campus

SIZE Not Applicable

RATE Benefit

TERM Perpetual

USE Disposition by easement between the State of North Carolina and The Board of Trustees of the Endowment Fund of North Carolina State University to facilitate the development and management of Centennial Campus, including Centennial Bio-medical Campus and Spring Hill Campus for the benefit of North Carolina State University and The Board of Trustees of the Endowment Fund of North Carolina State University.

Form-PO 2

Original and one copy to
to State Property Office

**STATE OF NORTH CAROLINA
Department of Administration
*DISPOSITION OF REAL PROPERTY**

Institution or Agency: State of North Carolina

Date: August 1, 2018

The Department of Administration is requested, as provided by GS 146-28 to dispose of the real property herein described by (sale), (lease), (rental), or (other specify): Cross Easement

The disposition is recommended for the following reasons:

Disposition by easement between the State of North Carolina and The Board of Trustees of the Endowment Fund of North Carolina State University to facilitate the development and management of Centennial Campus, including Centennial Bio-medical Campus and Spring Hill Campus for the benefit of North Carolina State University and The Board of Trustees of the Endowment Fund of North Carolina State University.

Description of Property:

The Cross Easement Agreement will include all properties located on Centennial Campus, Spring Hill Campus, and Centennial Bio-medical Campus.

See attached vicinity maps.

Term: Permanent

Estimated value: Benefit

Where deed is filed, if known: Wake County Register of Deeds.

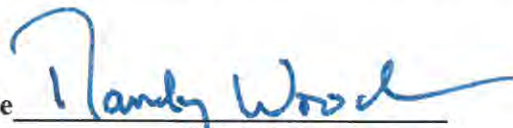
If deed is in the name of agency other than applicant, state the name. N/A

Rental income, if applicable, and suggested terms: N/A

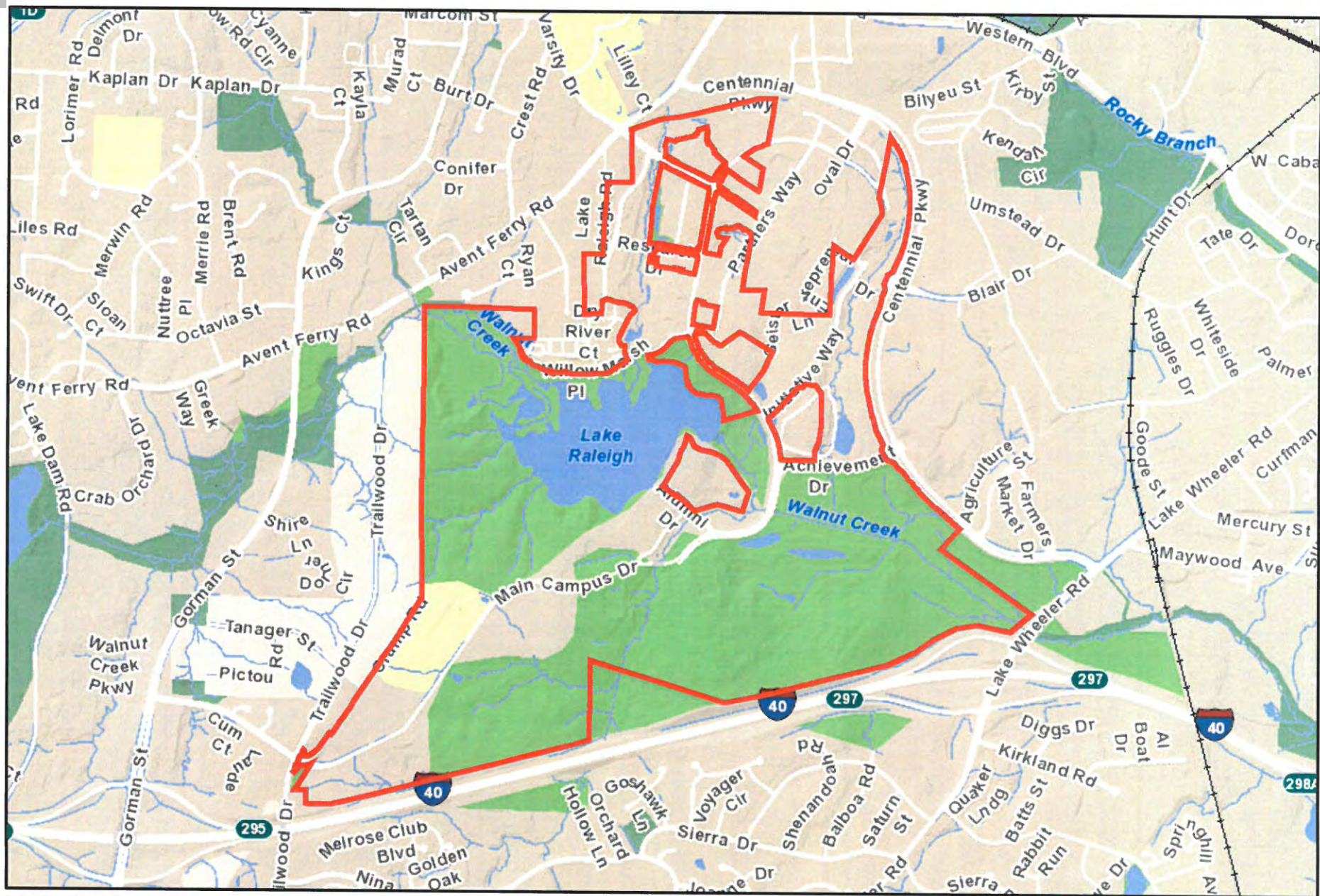
Funds from the disposal of this property are recommended for the following use. N/A

Action recommending this transaction was taken by the Board of Trustees at its meeting held on
_____, 2018

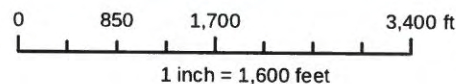
Signature



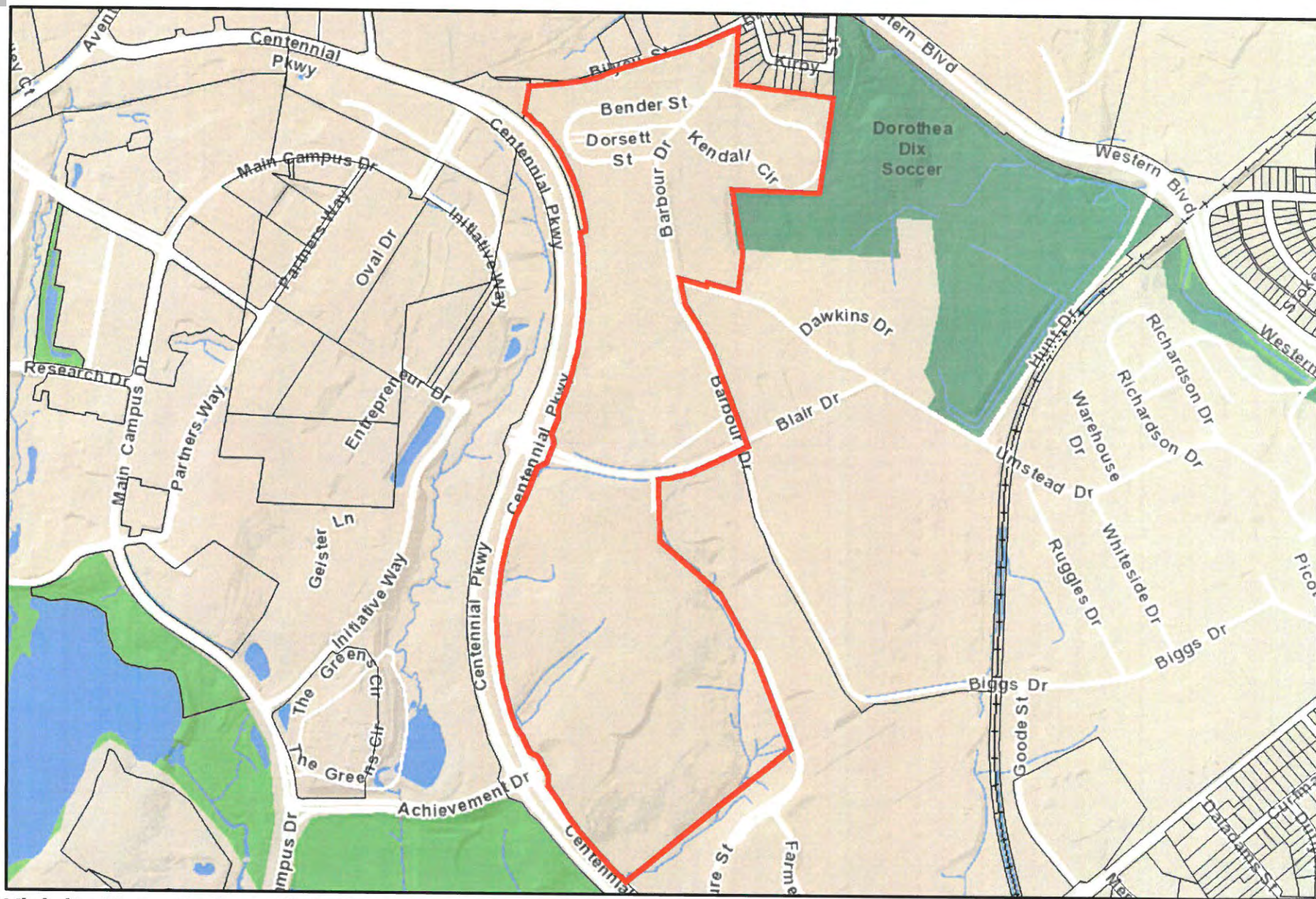
Chancellor



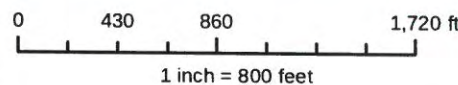
Vicinity Map - Centennial Campus



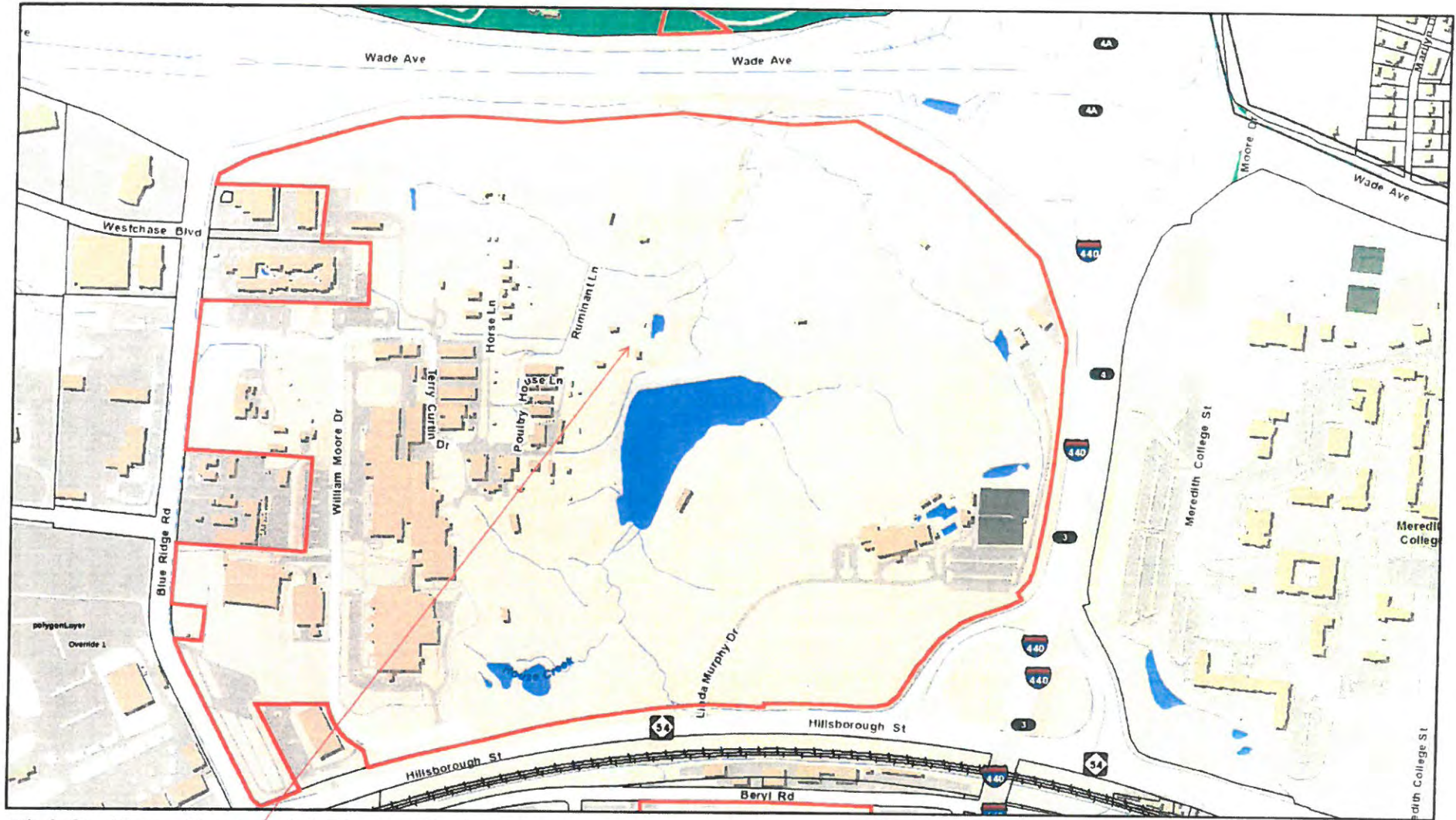
Disclaimer
iMaps makes every effort to produce and publish the most current and accurate information possible. However, the maps are produced for information purposes, and are **NOT** surveys. No warranties, expressed or implied, are provided for the data therein, its use, or its interpretation.



Vicinity Map - Spring Hill Campus



Disclaimer
iMaps makes every effort to produce and publish the most current and accurate information possible. However, the maps are produced for information purposes, and are **NOT** surveys. No warranties, expressed or implied, are provided for the data therein, its use, or its interpretation.



Vicinity Map - Centennial Bio-medical Campus

Creamery Cafe

Total Project Scope – \$1M (NC Dairy Foundation)

- 02/12/18 Advertised in NC Purchase Directory
- 03/05/18 Closing date for submittals
(6 proposals received)
- 03/05/18 Appointment of Selection Committee
By Doug Morton, Secretary – Buildings and Property Committee
- 03/05/18-
05/03/18 Selection Committee review:
Ron Prestage, Trustee
Lisa Johnson, University Architect
Cameron Smith, Senior Director, Capital Project Management
David Hammock, Project Manager, Capital Project Management
Gary Cartwright, Director, Dairy Enterprise System
Carl Hollifield, Associate Director, Food Science
Others who assisted in review and short listing process
Bill Davis, Associate Director, Design, Capital Project Management
Charlie Marshall, Associate Director, Construction Management
Jake Terrell, Engineer, Capital Project Management
Charles “Buddy” Gaither, Chairman, Dairy Campaign for Excellence
Robert Paxton, Mix Plant Manager, Krispy Kreme Doughnut Association
- 03/28/18 Short list recommendation by Selection Committee:
Barker Construction – Raleigh, NC (w/Andron & Associates)
Muter Construction – Zebulon, NC (w/Louis Cherry Architecture)
LeChase Construction Services – Durham, NC (w/New City Design)
- 03/28/18 Short list approved by Robert F. Andrews
- 04/04/18 Pre-interview briefing of Designers
- 05/03/18 Designers interviewed. Recommendation in priority order:
Muter Construction – Zebulon, NC (w/Louis Cherry Architecture)
LeChase Construction Services – Durham, NC (w/New City Design)
Barker Construction – Raleigh, NC (w/Andron & Associates)

Memorial Bell Tower Restoration

Total Project Scope – \$6.5M (Gifts)

- 03/18/18 Advertised in NC Purchase Directory

- 04/12/18 Closing date for submittals
 (6 proposals received)

- 04/12/18 Appointment of Selection Committee
 By Doug Morton, Secretary – Buildings and Property Committee

- 04/12/18- Selection Committee review:
 05/24/18 Wendell Murphy, Trustee
 Lisa Johnson, University Architect
 Cameron Smith, Senior Director, Capital Project Management
 Charlie Marshall, Associate Director, Construction Management
 Bill Davis, Associate Director, Design, Capital Project Management
 Shon Burch-Crispin, Program Manager, Capital Project Management
 Damian Lallathin, Project Manager, Capital Project Management
 Others who assisted in review and short listing process
 Alan Taylor, Executive Director, University Development
 Tom Stafford, Vice Chancellor, Academic Affairs, Emeritus

- 05/07/18 Short list recommendation by Selection Committee:
 Clancy & Theys Construction Company – Raleigh, NC (w/ Davis Kane Architects)
 LeChase Construction Services – Durham, NC (w/ EYP)
 New Atlantic Contracting – Winston Salem, NC (w/ Walter Robbs Architecture)

- 05/07/18 Short list approved by Robert F. Andrews

- 05/11/18 Pre-interview briefing of Designers

- 05/24/18 Designers interviewed. Recommendation in priority order:
 New Atlantic Contracting – Winston Salem, NC (w/ Walter Robbs Architecture)
 Clancy & Theys Construction Company – Raleigh, NC (w/ Davis Kane Architects)
 LeChase Construction Services – Durham, NC (w/ EYP)

Student Housing Master Plan

Total Project Scope – \$250,000 (Housing Receipts)

- 04/12/18 Advertised in NC Purchase Directory
- 05/04/18 Closing date for submittals
 (9 proposals received)
- 05/04/18 Appointment of Selection Committee
 By Doug Morton, Secretary – Buildings and Property Committee
- 05/04/18- Selection Committee review:
 06/14/18 Ann Goodnight, Trustee
 Lisa Johnson, University Architect
 Barry Olson, Associate Vice Chancellor, Business Administration
 Susan Grant, Director, University Housing
 Tom Skolnicki, Project Manager, University Landscape Architect
 Others who assisted in review and short listing process
 Pete Fraccaroli, Director of Facilities Planning and Management
 Sumayya Jones-Humienny, Associate University Architect
 Bill Davis, Associate Director, Design, Capital Project Management
- 05/13/18 Short list recommendation by Selection Committee:
 LS3P Associates Ltd. – Raleigh, NC
 Hanbury – Raleigh, NC
 KSQ Design – Charlotte, NC
- 05/13/18 Short list approved by Robert F. Andrews
- 05/30/18 Pre-interview briefing of Designers
- 06/14/18 Designers interviewed. Recommendation in priority order:
 LS3P Associates Ltd. – Raleigh, NC
 KSQ Design – Charlotte, NC
 Hanbury – Raleigh, NC

Approval of Designer Selections for Projects \$1,000,000 or Less

Note: The projects below are submitted to the Board of Trustees Buildings and Property Committee for formal approval of designer selections for projects \$1,000,000 or less that are not on the OESAD list. This listing represents designers selected since April 19, 2018.

<u>Project:</u>	<u>Fee:</u>
Roof Upgrades Phase III, ES King Village Designer: Swanson + Stewart Architects Funds Source: Housing Trust Fund	\$60,900
Toxicology Building Water Infiltration Assessment Designer: Raymond Engineering Funds Source: Facilities Funded	\$10,975
HVAC Renovations to Price Music Hall Designer: Sud Associates, P.A. Funds Source: DASA Trust	\$83,600
Third Floor Upgrades- Hunt Library Designer: Skinner Farlow Kirwan Architecture Funds Source: Library Appropriated Funds	\$ 14,860
Carmichael Addition and Renovation- CMT/SI Designer: Hanson Professional Services Funds Source: Student Fees	\$284,300
Bureau of Mines Renovation- Commissioning Designer: Commissioning WorCx Funds Source: Carry Forward	\$13,150
Academic Success Center at DH Hill Library- Commissioning Designer: System WorCx Funds Source: Carry Forward	\$10,200
Fuel Oil Tank Expansion- Centennial Campus Designer: RMF Engineering Funds Source: Engineering Trust	\$23,000
Murphy Sports Medicine Designer: Davis Kane Architects, PA Funds Source: Athletic Receipts	\$107,000
Plant Sciences Scale Model Designer: Flad Architects Funds Source: Bond, Golden Leaf, Gifts	\$12,500

**Buildings and Property Committee
Board of Trustees
Acceptance of Completed Buildings and Projects**

5.6.A

Code/Item	Project#	Location	Title	Project Cost	University Acceptance
	201720130	Eastern 4H	Boardwalk Structure	\$180,312	4/30/2018
	201720060	BTEC	BTEC 215 Lab Renovation	\$211,497	5/24/2018
	201720045	Eastern 4H	Pier and Dock Structure	\$194,465	4/30/2018
41324/353	201420008	MRC	Cleanroom Renovations	\$6,500,000	5/30/2018
	201720112	Polk Hall	METRIC Program Ground Floor Renovation	\$257,668	6/6/2018
	201720096	Central Crops Research Station	Vegetable Pathology Buildings	\$117,248	6/1/2018
41524/330	201720131	Talley	Upfit for PNC E-Branch	\$192,459	6/8/2018
	201720158	Case Academic Building	Chilled Water System Upgrade	\$152,527	5/31/2018
41724/303	201720088	Nelson Hall	Data Infrastructure Upgrades FY 2018	\$106,793	7/11/2018
41524/307	201520015	Varsity Research Building	Phase 1	\$2,786,460	7/18/2018
	201620025	Lake Wheeler Compost Site	Lake Wheeler Compost Site	\$293,478	6/14/2018
41624/309	201611084	Harris Hall	Harris Hall Renovation	\$1,180,000	8/17/2018
41624/313	201511114	Case Academic Building	Case Academic Dining Renovation	\$1,325,000	8/16/2018
41724/315	201720122	Avent Ferry Complex	Site Enhancement - E&F	\$364,228	8/20/2018
			TOTAL	\$13,862,134	

Polk Hall – METRIC Ground Floor



Before



After

Varsity Research Building – Phase I



Before



After

NC STATE UNIVERSITY



Greek Village Development Review

Trustees Buildings & Property Committee

September 20, 2018

NC STATE UNIVERSITY

Greek Court

Early 2000s

- Failing housing stock
- Lack of community focus
- Unsustainable model



NC STATE UNIVERSITY



Greek Court

- No sense of community
- No relationship between houses





Greek Village

2005 Vision

- Active, dynamic
- Connected
- Integrated, not isolated

2006 Master Plan

- Organized around shared open spaces
- Street character
- Amenities to encourage interaction

Greek Village Phased Implementation



REMAINING HOUSES			
HOUSE NUMBER	HOUSE NUMBER	HOUSE NUMBER	HOUSE NUMBER
PHASE 3: 1	PHASE 4: 4	PHASE 3: 11	PHASE 5: 14
PHASE 4: 2	PHASE 4: 7	PHASE 3: 12	15
PHASE 4: 3	PHASE 5: 8	PHASE 5: 13	
PROPOSED HOUSES			
HOUSE NUMBER	HOUSE NUMBER	HOUSE NUMBER	HOUSE NUMBER
PHASE 1: 1	PHASE 5: 6	PHASE 3: 11	PHASE 4: 16
2	7	12	17
3	8	13	18
4	9	14	PHASE 1: 19
PHASE 5: 5	PHASE 3: 10	15	20

SCHEDULE FOR DEMOLITION AND CONSTRUCTION			
PHASE	ACTION	TIME TABLE	PARKING
1	Demo Houses 9, 10 + Site Prep Build Houses 1 2 3 4		258
2	Demo Houses 5, 6 + site prep Build Houses 19 20	SUMMER 2015	120
3	Demo Houses 1, 11, 12 + Site Prep + Varsity Drive Widening Build Houses 9 9 10 11	SUMMER 2018	146
4	Demo Houses 2, 3, 4 + Site Prep + Varsity Drive Widening + MEAS Lab Build Houses 12 13 14 15 16 17 18	SUMMER 2021	239
5	Demo Houses 8, 13, 14 + Site Prep Build Houses 5 6 7	SUMMER 2024	90
MULTIUNIT	Demo Houses 7 + Site Prep TOWNHOUSES A B & C		125
			TOTAL - 978

Greek Village Design Guidelines



- Traditional residential style
- Durable materials
- Roof form
- Setbacks
- Height
- Signage
- Site standards

Greek Village Design Guidelines



- Traditional residential style
- Durable materials
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Greek Village Design Guidelines



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Greek Village Design Guidelines



- Traditional residential style
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- Site standards

NC STATE UNIVERSITY



**BOARD OF TRUSTEES
NORTH CAROLINA STATE UNIVERSITY**

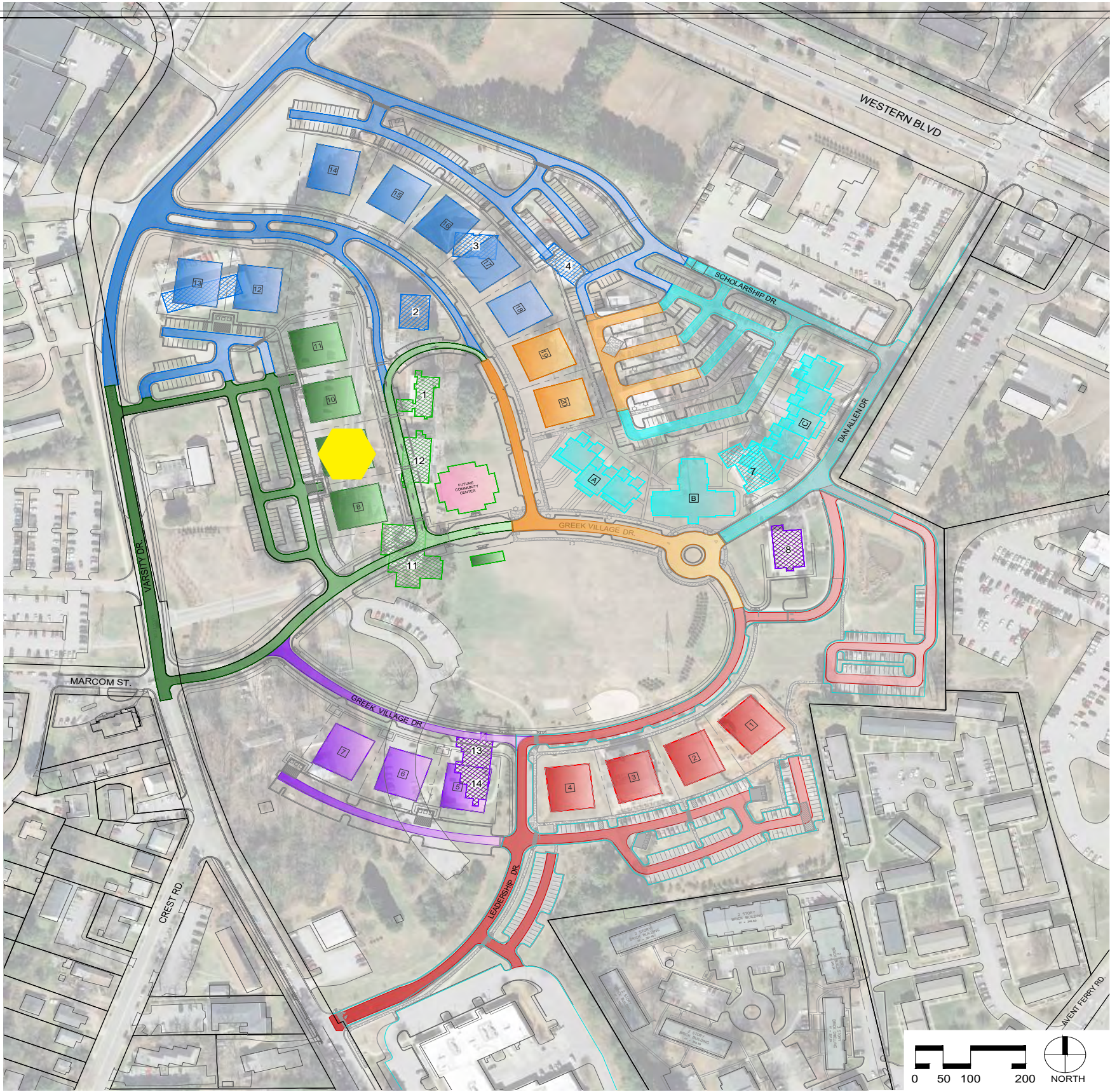
Committee: Buildings and Property

Meeting Date: September 20, 2018

Agenda Item / Issue:	5.8.A.1	Site Review & Approval/Sigma Kappa House – South Campus										
Requested / Required Action:	Approval											
Functions:	The Sigma Kappa Sorority House is planned for Lot #9 in the North Carolina State University's Greek Village Phase 3. The house will be three levels, with the lowest level being a walkout basement. The house design includes entrances on two levels with the front entrance/porch on the lowest level and the rear entrance/porch on the second floor. The house will have 40 beds plus a house director's suite.											
Project Scope:	<table><tr><td>\$610,000</td><td>Design/Consultant Costs</td></tr><tr><td>\$ 5,289,000</td><td>Construction</td></tr><tr><td>\$ 201,000</td><td>Contingency/Other Project Costs</td></tr><tr><td> </td><td></td></tr><tr><td>\$6,100,000</td><td>Total Project Budget</td></tr></table>		\$610,000	Design/Consultant Costs	\$ 5,289,000	Construction	\$ 201,000	Contingency/Other Project Costs			\$6,100,000	Total Project Budget
\$610,000	Design/Consultant Costs											
\$ 5,289,000	Construction											
\$ 201,000	Contingency/Other Project Costs											
\$6,100,000	Total Project Budget											
Design Team:	CJMW Architecture – (Lead Designer) Stewart Engineering – (MEP & FP)											
Master Plan Summary:	The Greek Village master plan envisions creating a sense of community with houses facing in towards a large campus green/community space. Each house will connect to the campus path system. There will be on-street parking but the majority of the parking for the residents will be behind the houses.											
Recommendation:	Reviewed by CDRP on May 30, 2018. Approval recommended.											
Suggested Motion:	Move approval of the site for the Sigma Kappa House.											
Funding Source:	Private Funding - \$6,100,000											
Responsible University unit University Presenter/Contact:	Office of Finance and Administration, Facilities Division Lisa Johnson, University Architect											



Trustees Buildings & Property Committee
September 20, 2018



REMAINING HOUSES			
HOUSE NUMBER	HOUSE NUMBER	HOUSE NUMBER	HOUSE NUMBER
PHASE 3 1	PHASE 4 4	PHASE 3 11	PHASE 5 14
PHASE 4 2	MULTIUNIT 7	12	15
3	PHASE 5 8	PHASE 5 13	
PROPOSED HOUSES			
HOUSE NUMBER	HOUSE NUMBER	HOUSE NUMBER	HOUSE NUMBER
PHASE 1 1	PHASE 5 6	PHASE 3 11	PHASE 4 16
2	7	12	17
3	8	13	18
4	9	14	19
PHASE 5 5	10	15	PHASE 2 20

SCHEDULE FOR DEMOLITION AND CONSTRUCTION			
PHASE	ACTION	TIME TABLE	PARKING
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2	Demo Houses 5, 6 + site prep Build Houses 19 20	SUMMER 2015	120
3	Demo Houses 1, 11, 12 + Site Prep + Varsity Drive Widening Build Houses 8 9 10 11	SUMMER 2018	146
4	Demo Houses 2, 3, 4 + Site Prep + Varsity Drive Widening + MEAS Lab Build Houses 12 13 14 15 16 17 18	SUMMER 2021	239
5	Demo Houses 8, 13, 14 + Site Prep Build Houses 5 6 7	SUMMER 2024	90
MULTIUNIT	Demo Houses 7 + Site Prep TOWNHOUSES A B & C		125
			TOTAL - 978

NCSU GREEK VILLAGE
UPDATED MASTER PLAN
MARCH 13, 2017



OVERALL MASTER PLAN



OVERALL MASTER PLAN

5.8.A.1

SIGMA KAPPA
2608 Stewardship Park
Raleigh, NC 27606
Monday, May 21, 2018



Flowering Cherry Tree



Gardenia



Bigleaf Hydrangea



Inkberry Holly

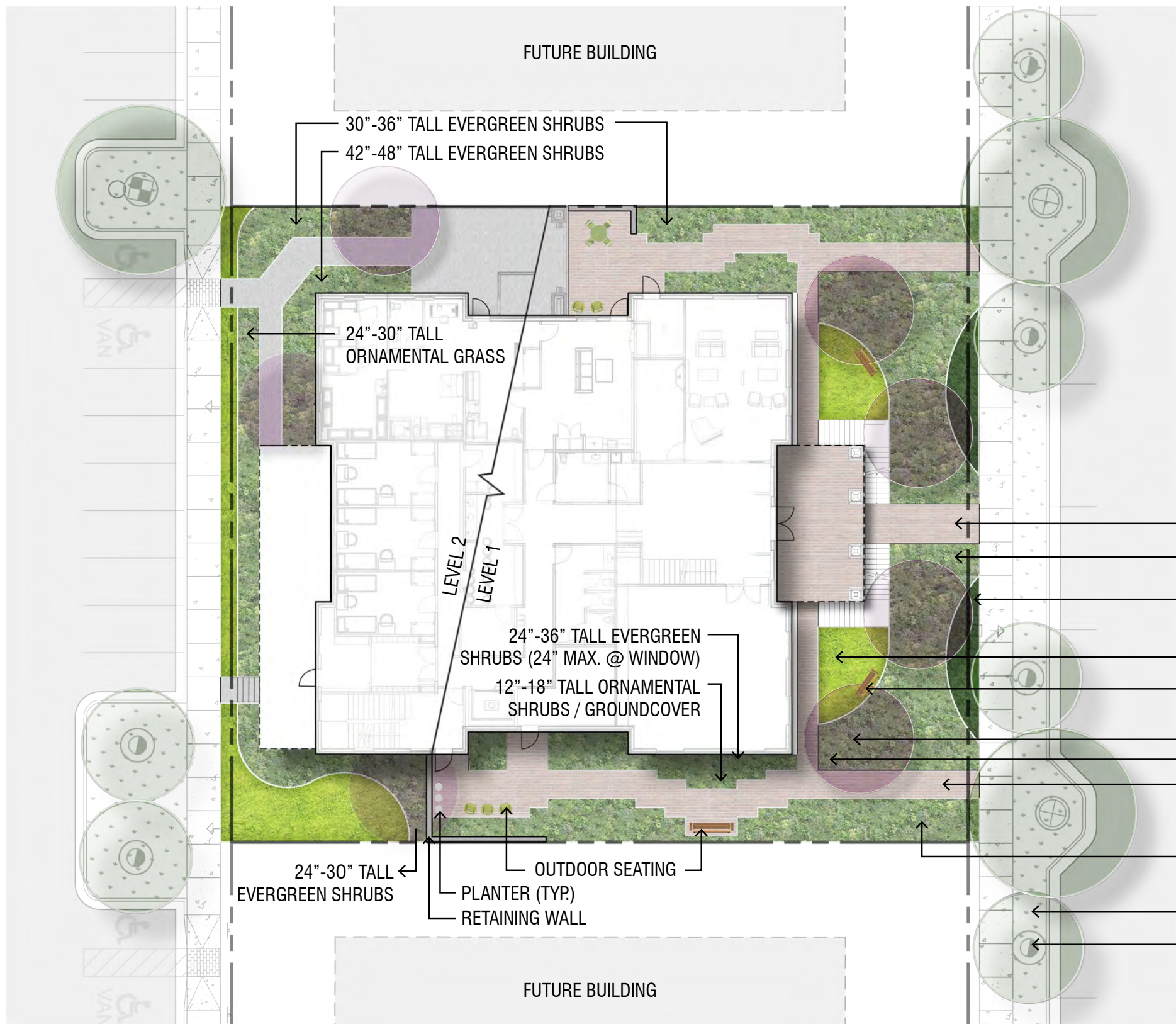


Petite Indian Hawthorn



STEWART

421 FAYETTEVILLE ST., STE 400 FIRM LICENSE #: C-1051
RALEIGH, NC 27601 www.stewartinc.com
T 919.380.8750 PROJ #: C17004



5.8.A.1

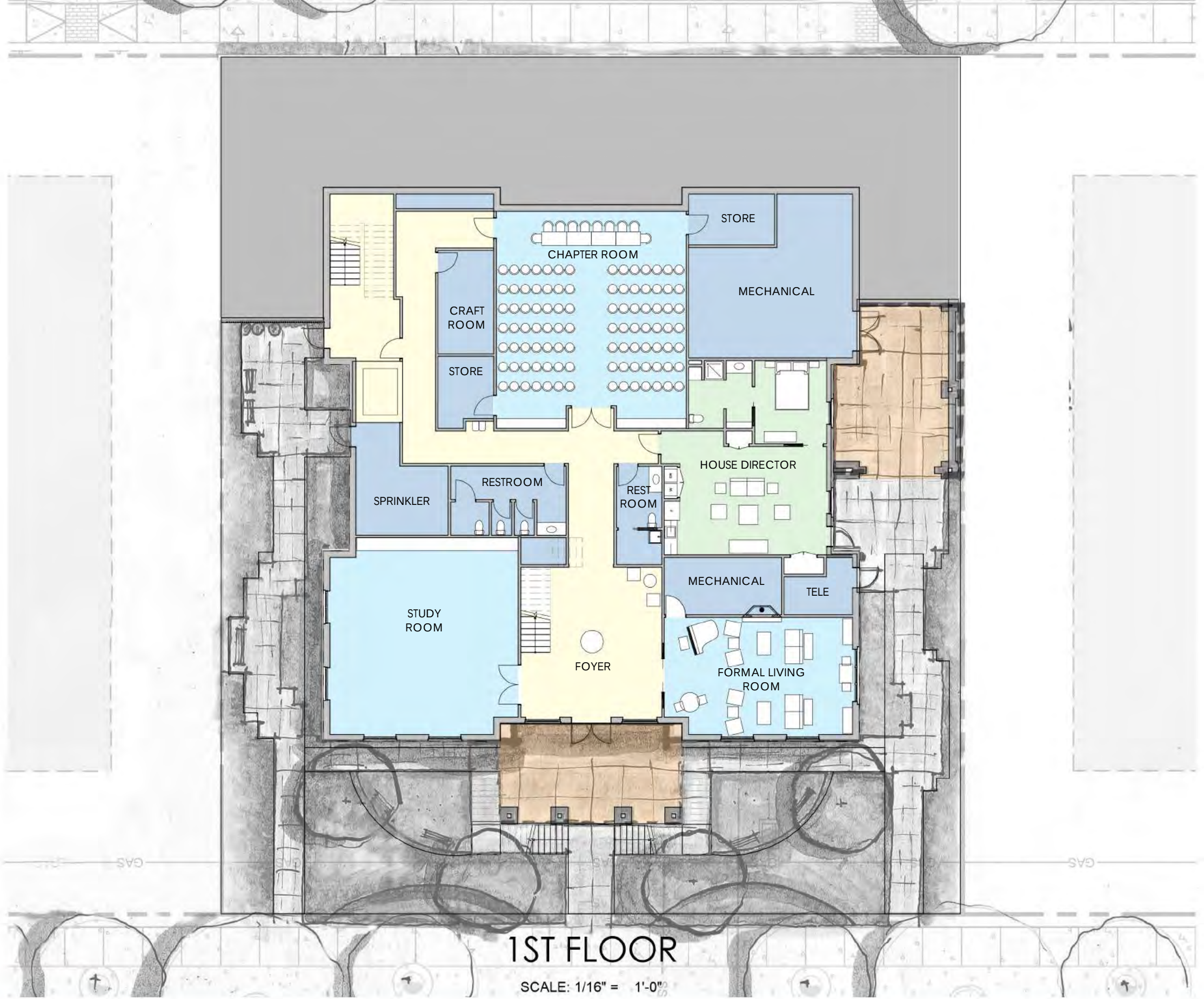


Fountain Grass

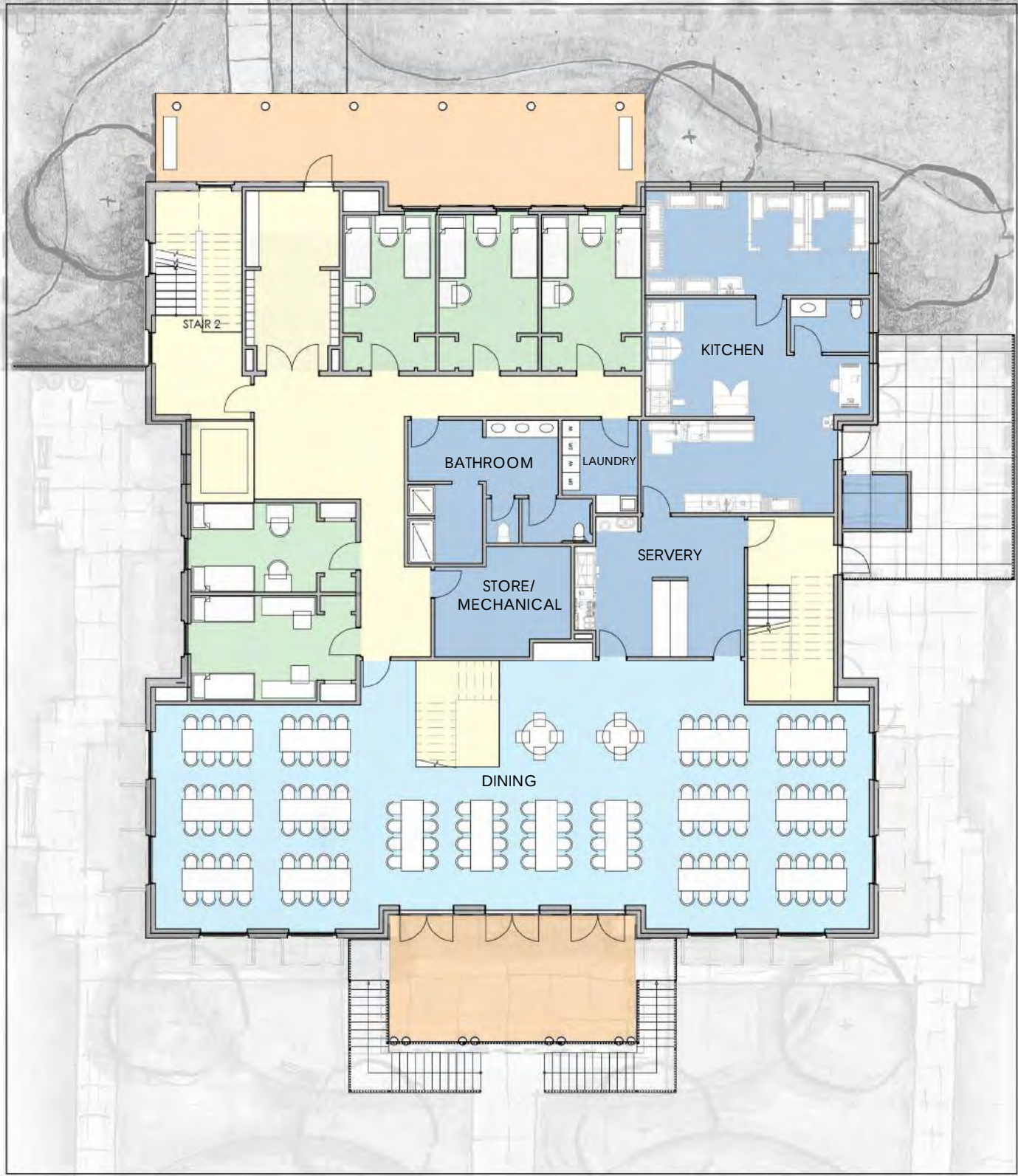


Liriope

- CONCRETE UNIT PAVERS (TYP.)
- 18" - 36" TALL EVERGREEN SHRUBS
- 12" TALL EVERGREEN GROUNDCOVER (TYP.)
- TURF / OPEN SPACE (TYP.)
- BENCH (TYP.)
- FLOWERING TREE (TYP.)
- 42" - 48" TALL EVERGREEN SHRUBS
- 5' WIDE SIDEWALK (TYP.)
- 30" - 36" TALL EVERGREEN SHRUBS
- EXISTING TURF (TYP.)
- EXISTING STREET TREE (TYP.)



- Circulation
- Accessory
- Assembly
- Bedrooms
- Covered Exterior



2ND FLOOR

SCALE: 1/16" = 1'-0"

- Circulation
- Accessory
- Assembly
- Bedrooms
- Covered Exterior



3RD FLOOR

SCALE: 1/16" = 1'-0"

- Circulation
- Accessory
- Assembly
- Bedrooms
- Covered Exterior



SOUTH ELEVATION

SCALE: 1/8" = 1'-0"



EAST ELEVATION

SCALE: 1/8" = 1'-0"



NORTH ELEVATION

SCALE: 1/8" = 1'-0"



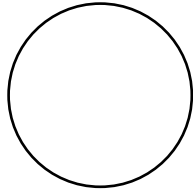
WEST ELEVATION

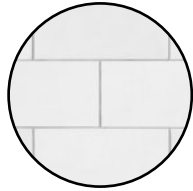
SCALE: 1/8" = 1'-0"

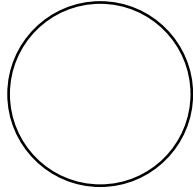




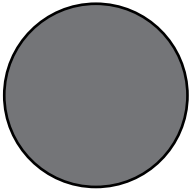

SHINGLES
OAKRIDGE: ESTATE GRAY

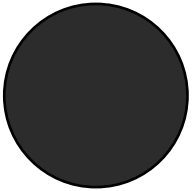

PAINT
BENJAMIN MOORE:
SIMPLY WHITE

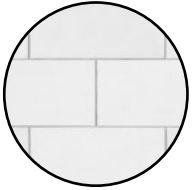

LIMESTONE
ARRISCRAFT: RENAISSAUCE


MORTAR
A.W. COOK: WHITE


BRICK
OLD TEXAS BRICK:
GREY ANTIQUE


METAL ROOFING
PAC CLAD: MUSKET GRAY


PAINT
BENJAMIN MOORE:
BLACK


LIMESTONE
ARRISCRAFT: RENAISSAUCE





**BOARD OF TRUSTEES
NORTH CAROLINA STATE UNIVERSITY**

Committee: Buildings and Property

Meeting Date: September 20, 2018

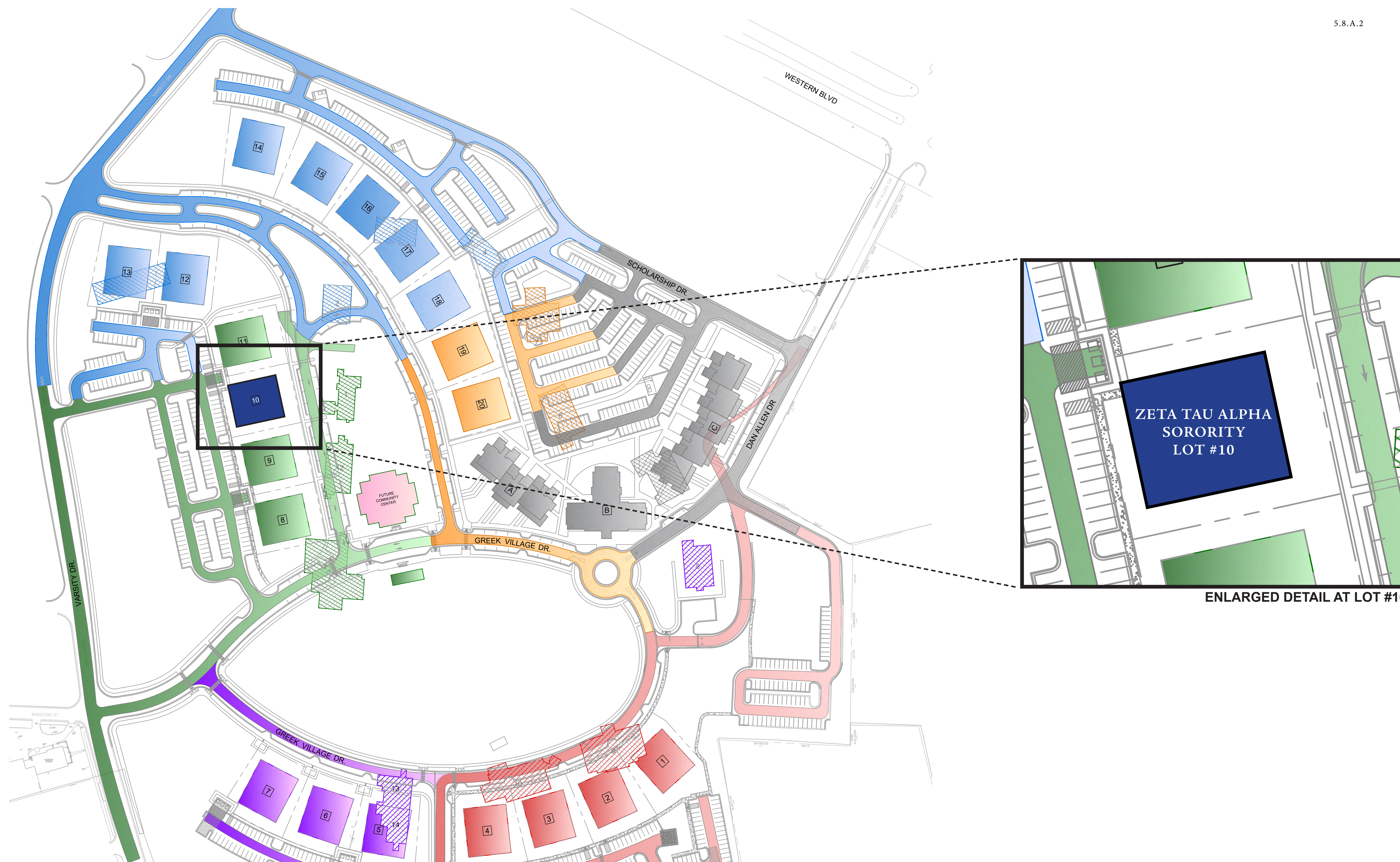
Agenda Item / Issue:	5.8.A.3	Plan Review & Approval/Sigma Kappa House – South Campus								
Requested / Required Action:	Approval									
Functions:	The Sigma Kappa Sorority House is planned for Lot #9 in the North Carolina State University's Greek Village Phase 3. The house will be three levels, with the lowest level being a walkout basement. The house design includes entrances on two levels with the front entrance/porch on the lowest level and the rear entrance/porch on the second floor. The house will have 40 beds plus a house director's suite.									
Project Scope:	<table><tr><td>\$ 610,000</td><td>Design/Consultant Costs</td></tr><tr><td>\$ 5,289,000</td><td>Construction</td></tr><tr><td>\$ 201,000</td><td>Contingency/Other Project Costs</td></tr><tr><td><u>\$ 6,100,000</u></td><td>Total Project Budget</td></tr></table>		\$ 610,000	Design/Consultant Costs	\$ 5,289,000	Construction	\$ 201,000	Contingency/Other Project Costs	<u>\$ 6,100,000</u>	Total Project Budget
\$ 610,000	Design/Consultant Costs									
\$ 5,289,000	Construction									
\$ 201,000	Contingency/Other Project Costs									
<u>\$ 6,100,000</u>	Total Project Budget									
Design Team:	CJMW Architecture – (Lead Designer) Stewart Engineering – (MEP & FP)									
Master Plan Summary:	The Greek Village master plan envisions creating a sense of community with houses facing in towards a large campus green/community space. Each house will connect to the campus path system. There will be on-street parking but the majority of the parking for the residents will be behind the houses.									
Recommendation:	Reviewed by CDRP on May 30, 2018. Approval recommended.									
Suggested Motion:	Move approval of the Plan for the Sigma Kappa House.									
Funding Source:	Private Funding - \$6,100,000									
Responsible University unit University Presenter/Contact:	Office of Finance and Administration, Facilities Division Lisa Johnson, University Architect									

**BOARD OF TRUSTEES
NORTH CAROLINA STATE UNIVERSITY**

Committee: Buildings and Property

Meeting Date: September 20, 2018

Agenda Item / Issue:	5.8.A.2	Site Review & Approval/Zeta Tau Alpha House – South Campus								
Requested / Required Action:	Approval									
Functions:	The Zeta Tau Alpha Sorority House is planned for Lot #10 in the North Carolina State University’s Greek Village Phase 3. The house will be three levels, with a walkout basement/terrace level and porches on both the first and second floors. The house will have 40 beds plus a house director’s suite. The first floor plan will include the following spaces: Sleeping rooms, accessible guest suite, TV lounge, meeting room, group study room, front entry hall, coffee lounge, mailroom, craft room, bathrooms, laundry, and utility/mechanical spaces. The second floor plan will include Dining room, living room, kitchen, house director’s suite, and restrooms. The third level will include sleeping rooms, community bathrooms, laundry, TV lounge, and electrical/mechanical spaces. The gross square footage of the house will be 18,747 SF, including unheated mechanical areas, and will have an estimated construction cost of \$6.1 million. The project is scheduled to break ground in June 2019, with an estimated construction schedule of 13 months, to be completed on July 2020.									
Project Scope:	<table><tr><td>\$ 610,000</td><td>Design/Consultant Costs</td></tr><tr><td>\$ 5,289,000</td><td>Construction</td></tr><tr><td>\$201,000</td><td>Contingency/Other Project Costs</td></tr><tr><td><u>\$ 6,100,000</u></td><td>Total Project Budget</td></tr></table>		\$ 610,000	Design/Consultant Costs	\$ 5,289,000	Construction	\$201,000	Contingency/Other Project Costs	<u>\$ 6,100,000</u>	Total Project Budget
\$ 610,000	Design/Consultant Costs									
\$ 5,289,000	Construction									
\$201,000	Contingency/Other Project Costs									
<u>\$ 6,100,000</u>	Total Project Budget									
Design Team:	Hug Architects – (Lead Designer) Core Landscape – (Landscape Architect)									
Master Plan Summary:	The Greek Village master plan envisions creating a sense of community with houses facing in towards a large campus green/community space. Each house will connect to the campus path system. There will be on-street parking but the majority of the parking for the residents will be behind the houses.									
Recommendation:	Reviewed by CDRP on May 30, 2018. Approval recommended.									
Suggested Motion:	Move approval of the Site for the Zeta Tau Alpha House									
Funding Source:	Private Funding - \$6,100,000									
Responsible University unit University Presenter/Contact:	Office of Finance and Administration, Facilities Division Lisa Johnson, University Architect									



ENLARGED DETAIL AT LOT #10

PARTIAL CAMPUS PLAN



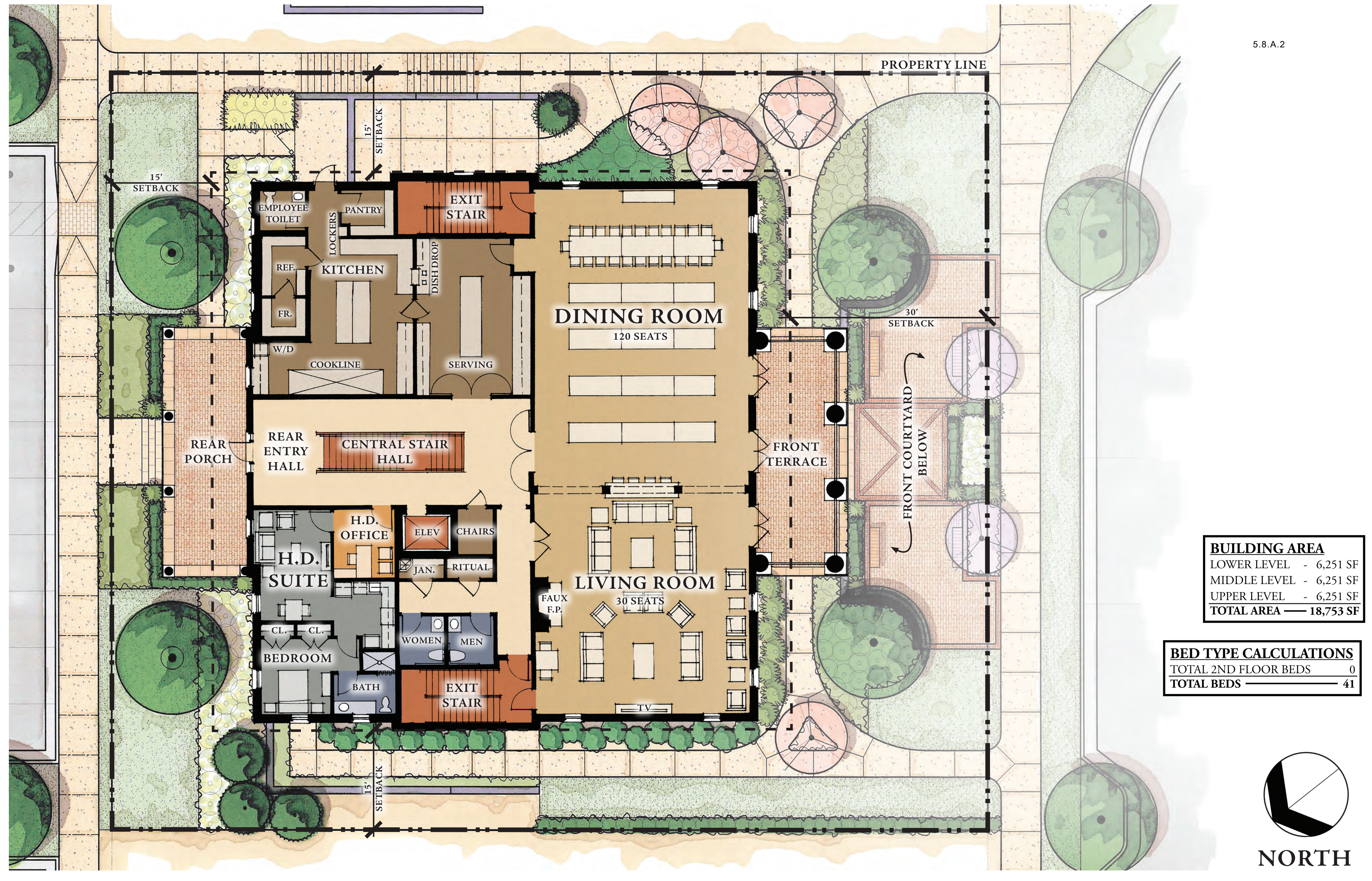
A NEW SORORITY HOUSE FOR
▪ ZETA TAU ALPHA ▪
 NORTH CAROLINA STATE UNIVERSITY - RALEIGH, NORTH CAROLINA



FIRST FLOOR PLAN

A NEW SORORITY HOUSE FOR
▪ ZETA TAU ALPHA ▪

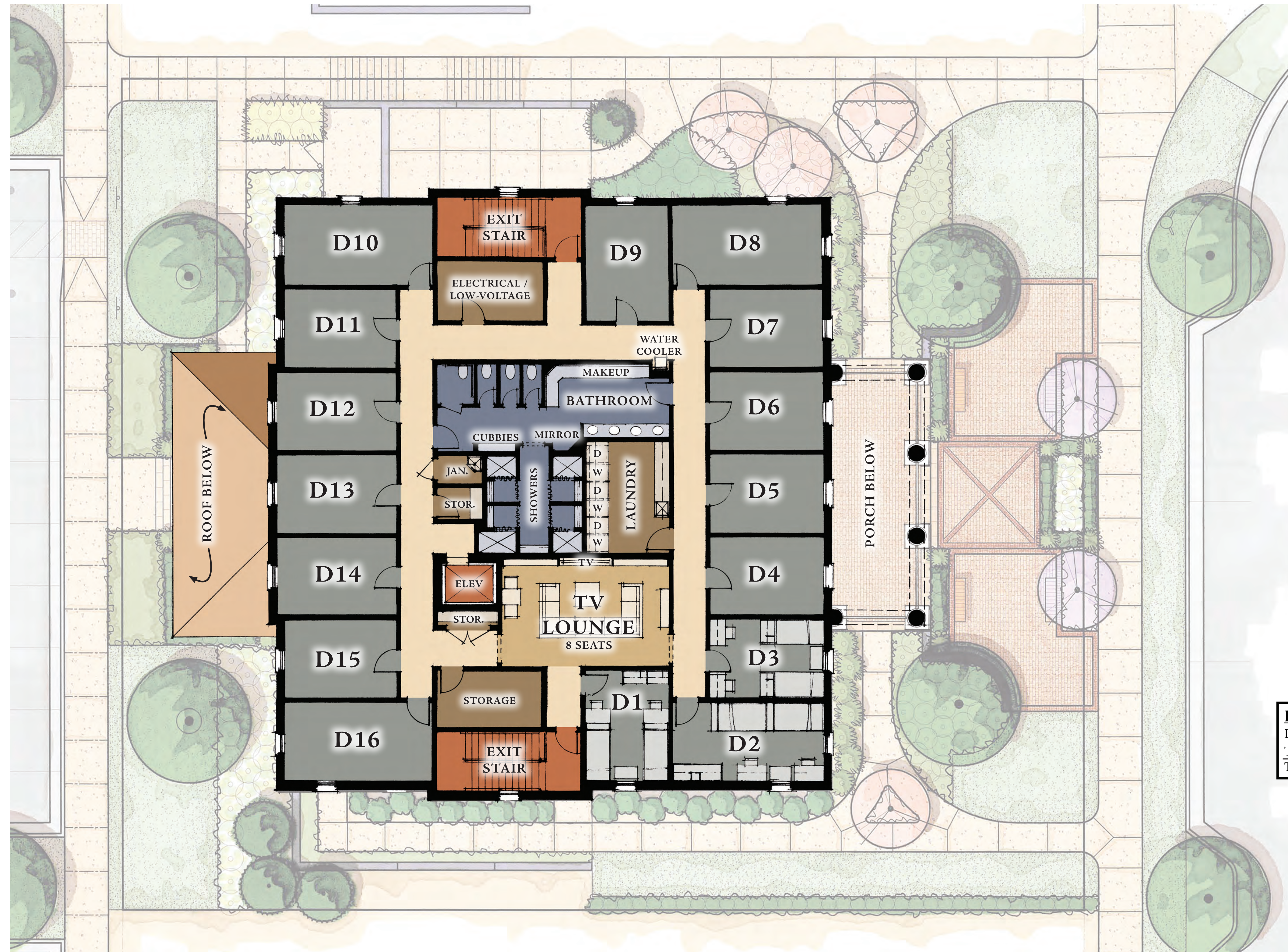
NORTH CAROLINA STATE UNIVERSITY - RALEIGH, NORTH CAROLINA



SECOND FLOOR PLAN

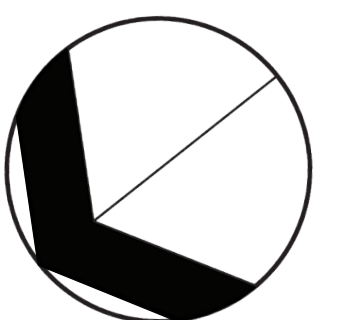


A NEW SORORITY HOUSE FOR
▪ ZETA TAU ALPHA ▪
 NORTH CAROLINA STATE UNIVERSITY - RALEIGH, NORTH CAROLINA



BUILDING AREA	
LOWER LEVEL	- 6,251 SF
MIDDLE LEVEL	- 6,251 SF
UPPER LEVEL	- 6,251 SF
TOTAL AREA	18,753 SF

BED TYPE CALCULATIONS	
DOUBLES	16 x 2 = 32
TOTAL 3RD FLOOR BEDS	= 32
TOTAL BEDS	41

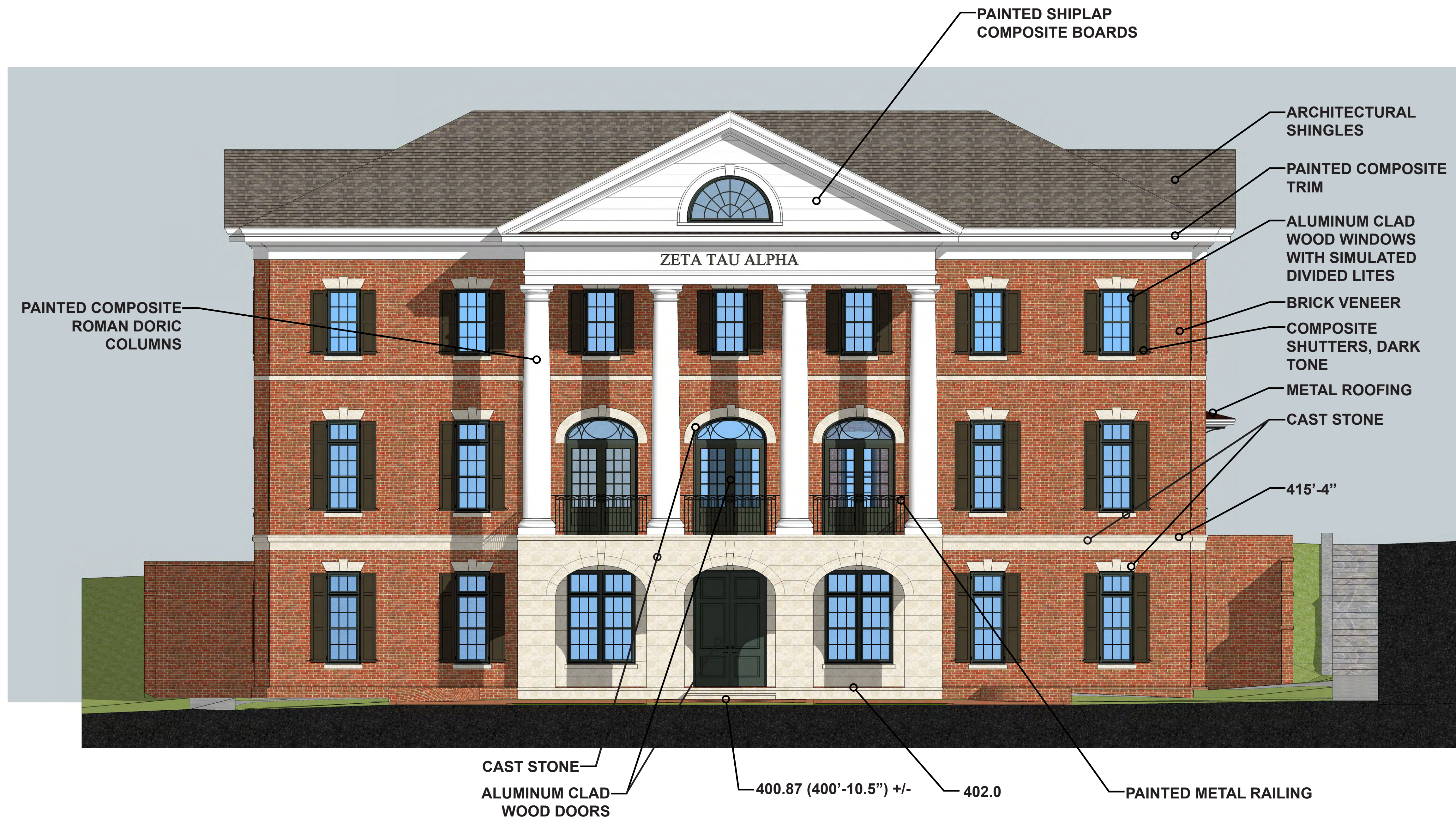


NORTH

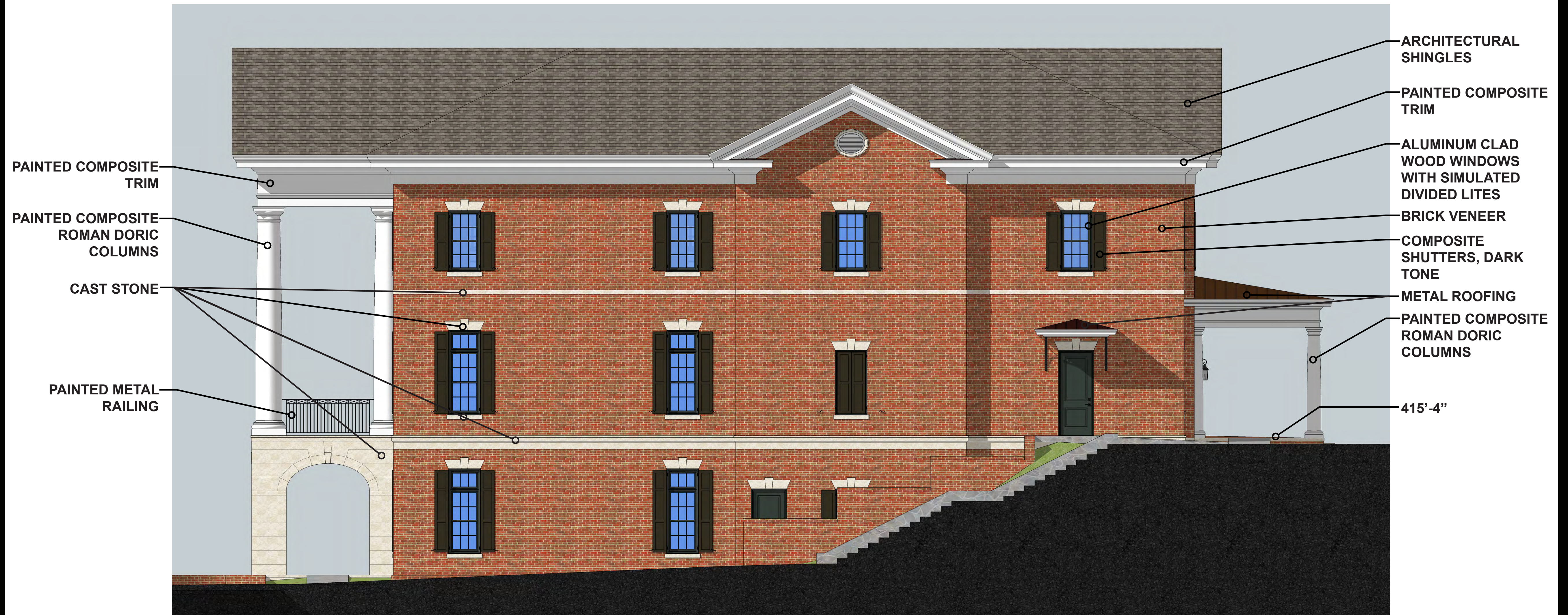
THIRD FLOOR PLAN



A NEW SORORITY HOUSE FOR
▪ ZETA TAU ALPHA ▪
 NORTH CAROLINA STATE UNIVERSITY - RALEIGH, NORTH CAROLINA



FRONT ELEVATION



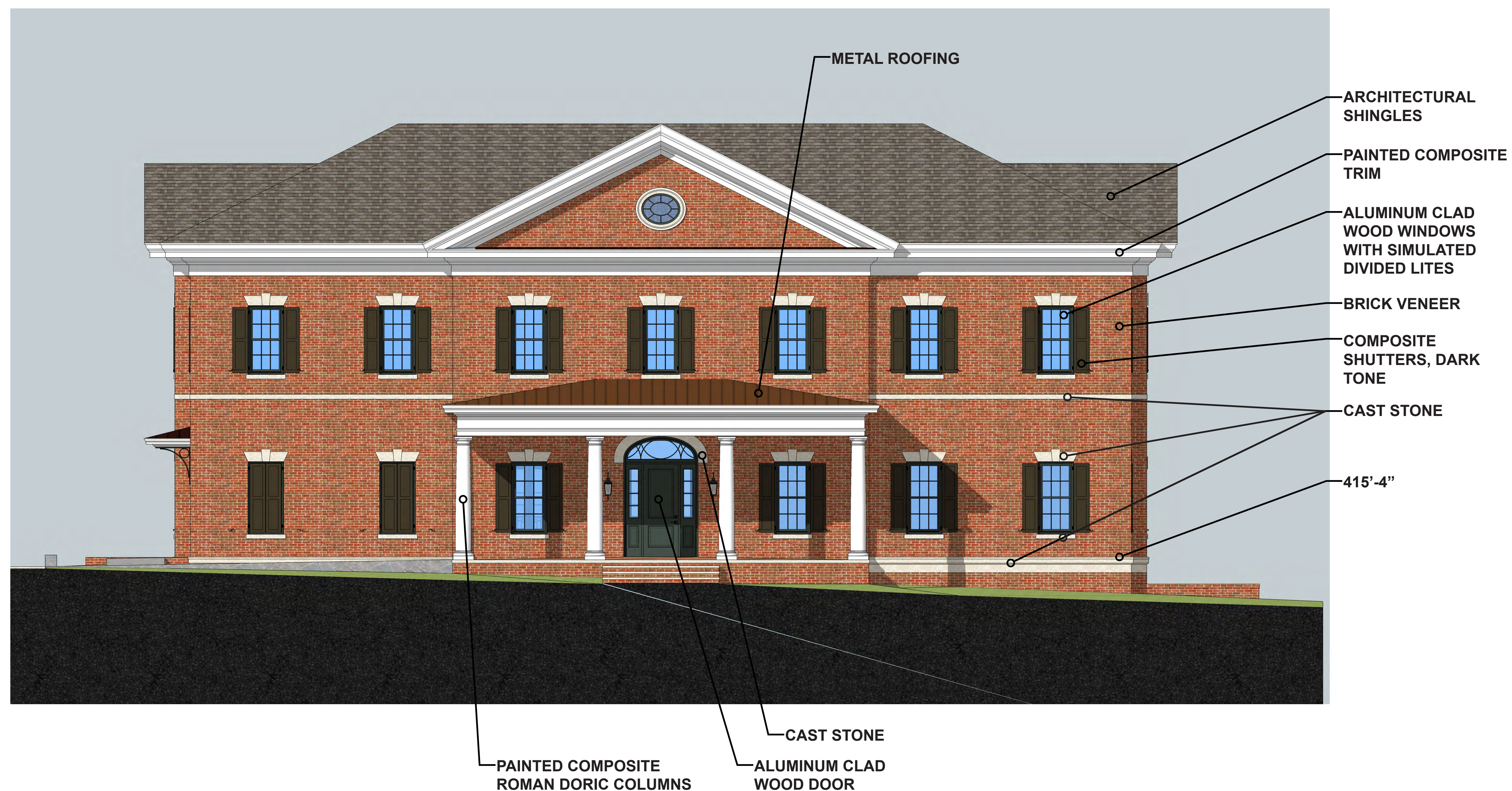
RIGHT SIDE ELEVATION



LEFT SIDE ELEVATION



A NEW SORORITY HOUSE FOR
▪ ZETA TAU ALPHA ▪
NORTH CAROLINA STATE UNIVERSITY - RALEIGH, NORTH CAROLINA



REAR ELEVATION



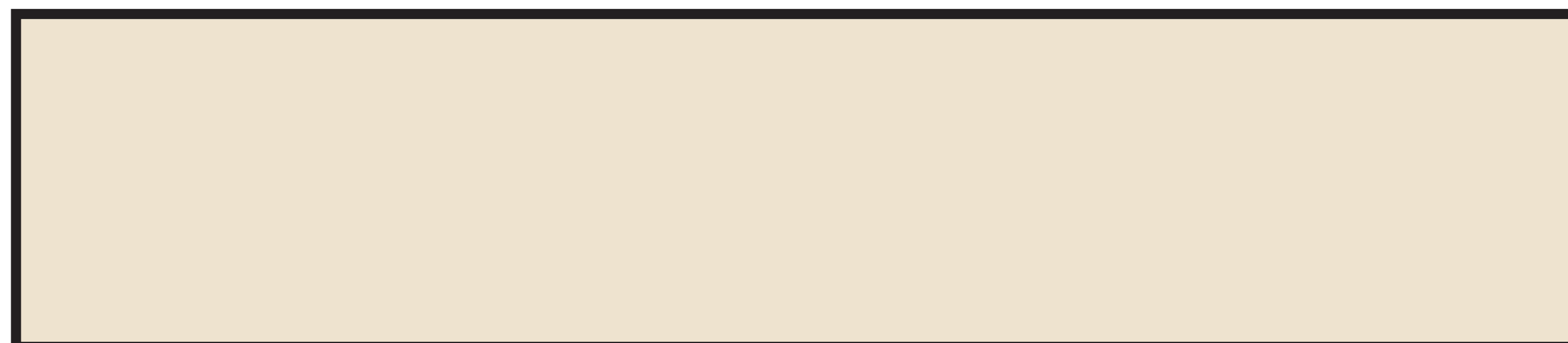
TYPICAL BRICK
CHEROKEE BRICK - "ANTE BELLUM"
MODULAR BRICK SIZE



TYPICAL ROOF SHINGLE
GAF CAMELOT II - "ANTIQUE SLATE"



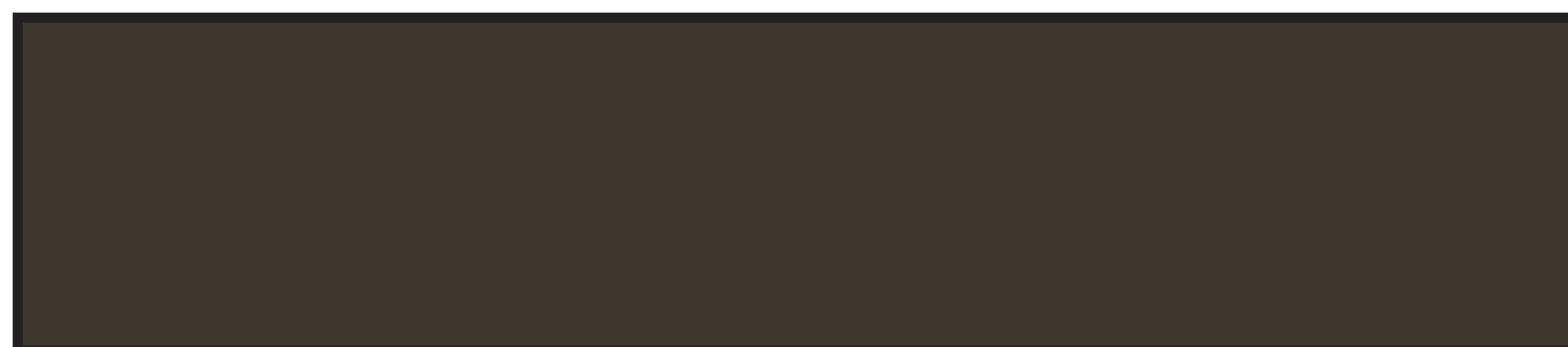
TYPICAL CAST STONE
BASSCO - "LIGHT BUFF"



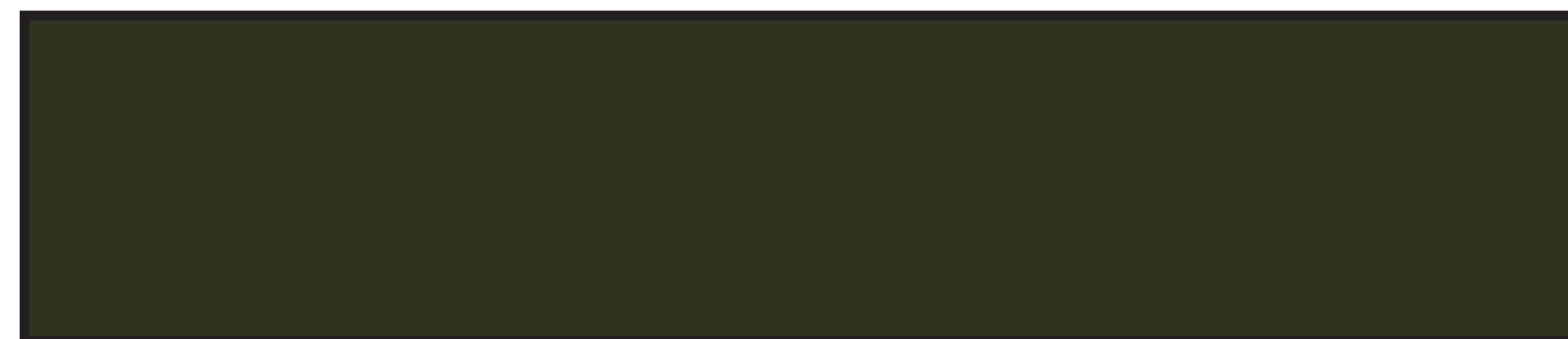
TYPICAL TRIM COLOR
BENJAMIN MOORE 947 - "NAVAJO WHITE"



TYPICAL METAL ROOF & METAL RAILING COLOR
BERRIDGE - "DARK BRONZE"



TYPICAL SHUTTER COLOR
BENJAMIN MOORE 2139-10 - "RIVER ROCK"



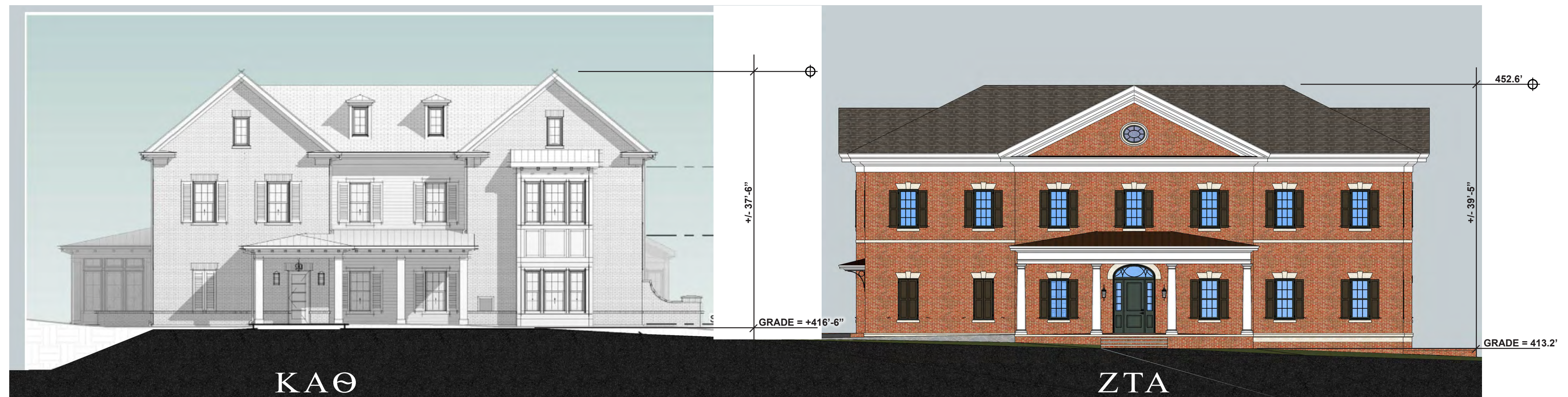
TYPICAL WINDOW & DOOR COLOR
SIERRA PACIFIC 057 - "ANTIQUE BRONZE"

5.8.A.2

TYPICAL MATERIALS



FRONT STREETSCAPE ELEVATION COMPARISON (1/16" = 1')



REAR STREETSCAPE ELEVATION COMPARISON (1/16" = 1')



FRONT PERSPECTIVE RENDERING



REAR PERSPECTIVE RENDERING

**BOARD OF TRUSTEES
NORTH CAROLINA STATE UNIVERSITY**

Committee: Buildings and Property

Meeting Date: September 20, 2018

Agenda Item / Issue:	5.8.A.4	Plan Review & Approval/Zeta Tau Alpha House – South Campus								
Requested / Required Action:	Approval									
Functions:	The Zeta Tau Alpha Sorority House is planned for Lot #10 in the North Carolina State University’s Greek Village Phase 3. The house will be three levels, with a walkout basement/terrace level and porches on both the first and second floors. The house will have 40 beds plus a house director’s suite. The first floor plan will include the following spaces: Sleeping rooms, accessible guest suite, TV lounge, meeting room, group study room, front entry hall, coffee lounge, mailroom, craft room, bathrooms, laundry, and utility/mechanical spaces. The second floor plan will include dining room, living room, kitchen, house director’s suite, and restrooms. The third level will include sleeping rooms, community bathrooms, laundry, TV lounge, and electrical/mechanical spaces. The gross square footage of the house will be 18,747 SF, including unheated mechanical areas, and will have an estimated construction cost of \$6.1 million. The project is scheduled to break ground in June 2019, with an estimated construction schedule of 13 months, to be completed on July 2020.									
Project Scope:	<table><tr><td>\$ 610,000</td><td>Design/Consultant Costs</td></tr><tr><td>\$ 5,289,000</td><td>Construction</td></tr><tr><td>\$ 201,000</td><td>Contingency/Other Project Costs</td></tr><tr><td><u>\$ 6,100,000</u></td><td>Total Project Budget</td></tr></table>		\$ 610,000	Design/Consultant Costs	\$ 5,289,000	Construction	\$ 201,000	Contingency/Other Project Costs	<u>\$ 6,100,000</u>	Total Project Budget
\$ 610,000	Design/Consultant Costs									
\$ 5,289,000	Construction									
\$ 201,000	Contingency/Other Project Costs									
<u>\$ 6,100,000</u>	Total Project Budget									
Design Team:	Hug Architects – (Lead Designer) Core Landscape – (Landscape Architect)									
Master Plan Summary:	The Greek Village master plan envisions creating a sense of community with houses facing in towards a large campus green/community space. Each house will connect to the campus path system. There will be on-street parking but the majority of the parking for the residents will be behind the houses.									
Recommendation:	Reviewed by CDRP on May 30, 2018. Approval recommended.									
Suggested Motion:	Move approval of the Plan for the Zeta Tau Alpha House									
Funding Source:	Private Funding - \$6,100,000									
Responsible University unit University Presenter/Contact:	Office of Finance and Administration, Facilities Division Lisa Johnson, University Architect									

**Approval of Plans and Specifications of Formal Projects
\$2,000,000 or Less**

Note: The projects below are submitted to the Board of Trustees Buildings and Property Committee for formal acceptance of plans and specifications. This listing represents projects received since the April 19, 2018 meeting.

<u>Project</u>	<u>Construction Estimate</u>
E S King Village Project # 201724065 Roof Upgrades Phase III Designer: Swanson + Stewart Architects Raleigh, NC Fund Source: Housing Trust Funds	\$ 884,000
Daniels Hall Project # 201612141 Roof Replacement Designer: Raymond Engineering Conyers, GA Fund Source: University Carry Forward	\$ 791,357
Main Campus Project # 201720058 Phase 1 Steam Tunnel Repairs Designer: Dewberry Engineering Inc. Raleigh, NC Fund Source: Repair and Renovation	\$ 722,302
DH Hill Tower and Poe Hall Project # 201720026 Waterproofing Designer: SKA Consulting Engineers Greensboro, NC Fund Source: Repair and Renovation	\$ 529,408
Jordan Hall Project # 201720068 Traction Elevators 1 & 2 Modernizations Designer: The Wooten Company Raleigh, NC Fund Source: Repair and Renovation	\$ 344,783
Daniels Hall Project # 201720055 Fire Alarm Replacement 3 rd /4 th Floors Designer: Optima Engineering, PA Raleigh, NC Fund Source: Repair and Renovation	\$ 327,000
512 Brickhaven Drive Project # 201820008 AHS Test Kitchens Designer: Ross/Deckard Architects, PA Raleigh, NC Fund Source: AHS Trust Funds	\$ 279,995

**Approval of Plans and Specifications of Formal Projects
\$2,000,000 or Less**

CVM	\$ 275,000
Project # 201720135	
Replace Existing Siemens MRI with New 3T Equipment	
Designer: RND Architects PA	
Durham, NC	
Fund Source: CVM Trust Funds	
Jordan Hall	\$ 255,199
Project # 201724067	
Roof Replacement	
Designer: Isley Hawkins, Inc.	
Durham, NC	
Fund Source: Repair and Renovation	
Poe Hall	\$ 254,957
Project # 201720121	
Upfit 1 st Floor Workshops	
Designer: McGahey Design PA	
Garner, NC	
Fund Source: College of Education Appropriated Funds	
Horticulture Field Lab	\$ 250,000
Project # 201620026	
Sweet Potato Greenhouses	
Designer: McKim & Creed	
Raleigh, NC	
Fund Source: Golden Leaf Trust/Plant Pathology Trust Funds	
Burlington Laboratory	\$ 250,000
Project # 201720083	
Reactor Bay Stair and Platform Reconfiguration	
Designer: LHC Structural Engineers	
Raleigh, NC	
Fund Source: College of Engineering Trust Funds	
Avent Ferry Complex E&F	\$ 250,000
Project # 201720122	
Site Enhancements	
Designer: Timmons Group	
Raleigh, NC	
Fund Source: Housing Trust Funds	
Erdahl Cloyd Wing	\$ 250,000
Project # 201820010	
Chick-fil-A Atrium Upgrades	
Designer: New City Design Group	
Raleigh, NC	
Fund Source: Dining and Catering Trust Funds	
Nelson Hall	\$ 245,000
Project # 201720115	
Rm 2403 Classroom Renovations	
Designer: Andre Johnson Architect	
Raleigh, NC	
Fund Source: College of Management Academic Affairs Funds	

**Approval of Plans and Specifications of Formal Projects
\$2,000,000 or Less**

Nelson Hall	\$ 235,000
Project # 201724068	
Roof Replacement	
Designer: Atlas Engineering	
Raleigh, NC	
Fund Source: Repair and Renovation	
Lee, Sullivan, Bragaw Halls	\$ 230,000
Project # 201820002	
Improve Courtyard	
Designer: OBS Landscape Architects	
Raleigh, NC	
Fund Source: Housing Trust Funds	
Biomedical Campus CVM	\$ 225,000
Project # 201720134	
Fiber Optic Duct Bank at Blue Ridge/Trinity	
Designer: McKim & Creed	
Raleigh, NC	
Fund Source: ComTech Trust Funds	
CVM	\$ 225,000
Project # 201820009	
CVM Main Dean's Suite A233 Renovations	
Designer: New City Design Group	
Raleigh, NC	
Fund Source: CVM Trust Funds	
Carter Finley Stadium	\$ 200,000
Project # 201824101	
Roof Replacement SE/SW Concourse	
Designer: TerraCon Consulting Engineers	
Raleigh, NC	
Fund Source: Athletic Trust Funds	
Talley Student Union	\$ 157,150
Project # 201720131	
Upfit for PNC E-Branch	
Designer: Winstead Wilkinson Architects	
Raleigh, NC	
Fund Source: Campus Enterprises Trust Funds	
Carmichael Gym	\$ 156,300
Project # 201720062	
Classroom and Office Swing Space	
Designer: CRA Associates Inc.	
Chapel Hill, NC	
Fund Source: Athletics Trust Funds	
Case Academic Center	\$ 152,527
Project # 201720158	
Chilled Water System Upgrade	
Designer: Edmondson Engineers, PA	
Durham, NC	
Fund Source: Athletics Trust Funds	

**Approval of Plans and Specifications of Formal Projects
\$2,000,000 or Less**

Wolf Village Apt – Arctic Hall **\$ 150,000**

Project # 201820044

ADA Design and Renovations Apt 115 & 134

Designer: Davis Kane Architects PA
Raleigh, NC

Fund Source: Housing Trust Funds

Libraries Satellite Shelving **\$ 145,000**

Project # 201824098

Roof Replacement

Designer: Atlas Engineering
Raleigh, NC

Fund Source: Materials Support Trust Funds

Coliseum, MRC, Poulton, Toxicology Parking Decks **\$ 103,668**

Project # 201720114

Parking Deck Assessments and Summer 2018 Repairs

Designer: Atlas Engineering
Raleigh, NC

Fund Source: Transportation Trust Funds

Engineering Building III **\$ 100,000**

Project # 201720136

Upfit for Combustion Equipment Relocated from VA Tech

Designer: Edmondson Engineers, PA
Durham, NC

Fund Source: College of Engineering Trust Funds

Capital Projects at a Glance
as of August 31, 2018

NORTH CAROLINA STATE UNIVERSITY						
	Bid 2018					
	Bid 2019					
	In Construction					
	Complete					
Code/Item	Project Name		Bid	Expected Acceptance	Total Project Budget	Remarks
41524 314	Centennial Campus Utility Infrastructure	Design	8/28/18	3/24/20	\$9.6M	Bid Evaluation Underway
41524 338	Dabney Hall HVAC and METRIC	Design	9/13/18	1/17/20	\$4.5M	Bid Advertisement Underway
41724-317	Fuel Oil Tank Expansion	Design	10/28/18	6/6/19	\$825K	CD Production Underway
41624 310	Exterior Lighting LED Conversion	Design	10/29/18	3/12/19	\$1.5M	CD Production Underway
41624-316	Murphy Center Sports Medicine	Design	11/27/18	6/5/19	\$1.0M	CD Production Underway
41724 305	Rigging Replacement Stewart Theatre	Design	12/13/18	8/16/19	\$1.1M	Awaiting Full Funding approval
41724 310	Price Music HVAC Renovations	Design	1/28/19	8/10/19	\$975K	CD Production Underway
41624 311	DH Hill Academic Success Center	Design	2/1/19	5/7/20	\$14.2M	DD Review Underway
41624 331	B104 Lab Renovation, CVM Main Building	Design	2/4/19	9/1/19	\$2.0M	CD Review Underway
41724 308	Creamery Café & Education Center	Design	2/23/19	10/22/19	\$1.2M	SD/DD Production Underway
41724 306	Equine Isolation Unit - CVM	Design	4/27/19	12/8/19	\$1.0M	On Hold Pending CVM Decisions
41524 314	Plant Sciences Building	Design	5/23/19	2/11/22	\$150.6M	CD Production Underway
41624 312	Bureau of Mines Renovation	Design	7/10/19	8/6/20	\$6M	SD/DD Production Underway
41724 313	Renovation of Memorial Belltower	Design	11/4/19	12/14/20	\$6.5M	Advance Planning Underway
41424 307	Patterson Business Center Renovation	Construction		9/14/18	\$3.0M	98% Construction Complete
41624 328	Daniels Hall Roof Replacement	Construction		9/21/18	\$1.0M	90% Construction Complete
41424 310	CBC Chiller Plant Expansion	Construction		10/1/18	\$4.98M	90% Construction Complete
41324 357	North & Central Electrical Distribution	Construction		10/4/18	\$4.1M	45% Construction Complete
41624 325	Steam Tunnel Structure Repairs-Main Campus	Construction		10/11/18	\$950K	50% Construction Complete
41524-337	Carbon Electronics Cluster Lab Renovations	Construction		11/27/18	\$1.3M	NTP 9/5/18
41424 314	CC Thermal Utilities & Infrastructure (CTI, COT & MRC)	Construction		11/30/18	\$12.975M	92% Construction Complete
41524 341	Scott Hall HVAC Upgrades	Construction		12/4/18	\$750K	45% Construction Complete
41524 339	Murphy Center Broadcast Studio	Construction		12/16/18	\$5.6M	35% Construction Complete
41624 339	DH Hill & Poe Waterproofing	Construction		12/18/18	725K	0% Construction Complete
41224 370	Energy Performance Contracting #4, CCUP Cogen	Construction		12/21/18	\$20.2M	88% Construction Complete
41524 340	Dearstyne Entomology and Avian HVAC Upgrades	Construction		12/28/18	\$1.5M	12% Construction Complete
41524 336	Reedy Creek Equine Farm	Construction		2/14/19	\$3.0M	30% Construction Complete
41224 352	Centennial Campus Substation Expansion-Phase 1 & 2	Construction		4/1/19	\$7.3M	79% Construction Complete
41724 311	ES King Village Roof Replacements - Ph 3	Construction		7/12/19	\$1.37M	Mobilizing
41624 313	Greek Village Phase 3 Infrastructure	Construction		8/16/19	\$5.5M	26% Construction Complete
41524 313	Engineering Building Oval	Construction		6/30/20	\$137M	18% Construction Complete
41624 302	Carmichael Renovation & Expansion	Construction		7/31/20	\$45M	12% Construction Complete
41624 313	Case Academic Center Dining Addition - Ph1	Complete			\$2.0M	Accepted August 8/16/18
41624 309	Harris Hall Student Services Renovation	Complete			\$1.75M	Accepted 8/17/18
41524 325	ES King Village Roof Replacements - Ph 2	Complete			\$1.2M	Accepted 8/23/18
41624 329	Water Line Replacements - various	Complete			\$605K	Accepted 8/31/18

STATUS OF PROJECTS IN PLANNING
Trustees' Buildings and Property Committee
and Campus Design Review Panel

SUBMITTAL NUMBER	PROJECT NAME	SCOPE	DESIGNER		TRUSTEE'S BPC SITE SELECTION		CAMPUS DESIGN REVIEW PANEL		TRUSTEE'S BPC REVIEW		PLAN	CONSTRUCTION	DURATION
			FIRM NAME	DATE SELECTED	REVIEW	APPROVAL	REVIEW	RECOMMENDATION	REVIEW	APPROVAL		ESTIMATED START	ESTIMATED COMPLETION
153	Sigma Kappa House	\$5,500,000	CJMW Architecture	Fall 2017	9/20/18		5/30/18	5/30/18	9/20/18			Feb, 2019	March, 2020
154	Zeta Tau Alpha House	\$6,100,000	Hug & Associates Architects	Fall 2017	9/20/18		5/30/18	5/30/18	9/20/18			June, 2019	July, 2020
	Upcoming Projects												
	Alpha Delta Pi House	\$5,000,000	Cline Design	Spring 2018			9/26/18					Spring, 2020	May, 2021
	Academic Success Center	\$14,234,213	Lord Aeck Sargent	2/24/17								May, 2019	June, 2020
	Student Housing Master Plan	\$250,000	LS3P Associates, Ltd.	4/13/18								NA	NA
	Lake Wheeler Road Creamery	\$1,248,870	Muter Construction (w/ Louis Cherry Architecture)	5/10/18								February, 2019	October, 2019
	Belltower Restoration	\$6,028,971	New Atlantic Contracting (w/ Walter Robbs Architecture)	5/24/18			11/28/18					November, 2019	December, 2020
	Bureau of Mines Renovation	\$6,000,000	Clearscapes Architecture + Art	02/13/17								July, 2019	August, 2020
	Approved Projects												
148	Carmichael Gym Addition & Renovation	\$45,000,000	CRA Associates, Inc.	11/05/16	9/21/17	9/21/17	10/25/17 7/26/2017 4/26/00	10/25/17	11/16/17	11/16/17		November, 2018	August, 2020
007	The Shores Residential Project - Phase I	\$25,000,000	White Oak Properties J Davis Architects			2/18/99	3/22/00 2/1/00	8/29/07 4/26/00	2/17/00 4/15/99	4/27/00		July, 2015	December, 2019
137	Sigma Phi Epsilon House	\$3,000,000	Hager Smith	2012	9/10/15		9/30/15 7/29/15	9/30/15 7/29/15	11/12/15 9/10/15			Summer 2017	Fall, 2019
140	Centennial Campus Utility Plant (Cogeneration and Building Addition)	\$18,226,054	AEI and Flad	4/19/13			2/24/16	2/24/16	NA			March, 2017	December, 2018
143	Lambda Chi House	\$4,600,000	Carl Winstead, AIA	June, 2015	2/16/17	2/16/17	11/30/16	11/30/16	2/16/17	2/16/17/		June, 2017	Fall, 2020
144	Delta Zeta House	\$4,600,000	Carl Winstead, AIA	May, 2015	2/16/17	2/16/17	11/30/16	12/19/16	2/16/17	2/16/17		June, 2017	Fall, 2019
145	Reedy Creek Equine Farm Therio Phase A	\$2,400,000	Szotak Design, Inc.	8/22/16	4/20/17		1/25/17	1/25/17	4/20/17			April, 2018	January, 2019
147	Harris Hall Renovation - One Stop Student Service	\$1,700,000	Lambert Architecture + Interiors	12/6/16	NA		3/29/17	3/29/17	NA			October, 2017	August, 2018
150	Case Academic Dining Addition	\$1,999,000	RND Architects	08/24/16	9/21/17	9/21/17	7/26/17	7/26/17	9/21/17	9/21/17		April, 2018	August, 2019
146	Engineering Building Oval	\$154,000,000	Clark Nexsen	11/18/08	4/20/17	4/20/17	7/26/17 3/29/17	7/26/17	9/21/17	9/21/17		March, 2018	June, 2020
149	Thermal Energy Storage	\$9,600,000	RMF Engineering	10/14/16	9/21/17	9/21/17	5/31/17	5/31/17	9/21/17	9/21/17		January, 2018	December, 2018
151	Plant Sciences Building	\$160,200,000	Flad Architects	09/15/16	2/15/18	2/15/18	3/23/18 1/31/2018	3/23/18	04/19/18 2/15/2018	4/19/18		July, 2019	December, 2021
152	Kappa Alpha Theta House	\$5,500,000	Cline Design	June, 2017	4/19/18	4/19/18	3/28/18	3/23/18	4/19/18	4/19/18		Spring, 2019	June, 2020

**BOARD OF TRUSTEES
NORTH CAROLINA STATE UNIVERSITY
AGENDA**

**University Advancement and External Affairs Committee
1:15 p.m. – 3:00 p.m., September 20, 2018
Chancellor's Conference Room – Holladay Hall**

**Stan Kelly, Chair
Members: Chip Andrews, Wendell Murphy,
Dewayne Washington, Ed Weisiger, Jr.**

CALL TO ORDER

Stan Kelly, Chair of Committee

ROLL CALL

Stan Kelly, Chair of Committee

READING OF STATE GOVERNMENT ETHICS ACT CONFLICT OF INTEREST STATEMENT

Stan Kelly, Chair of Committee

- | | | |
|-----------|---|--|
| 1. | CONSENT AGENDA
Approval of April 19, 2018 Minutes | TAB 6.1
6.1A |
| 2. | ACTION ITEMS

A. Review Committee Responsibilities

B. Review Plan of Work | TAB 6.2

6.2A

6.2B |
| 3. | INFORMATIONAL REPORTS

A. University Advancement Update
<i>Brian Sischo, Vice Chancellor, University Advancement</i>

B. Fundraising and Campaign Report
<i>Jim Broschart, Associate Vice Chancellor, University Development</i> | TAB 6.3

6.3A

6.3B |
| 4. | COMMITTEE DISCUSSION

A. Naming Opportunity Proposals
<i>Jim Broschart, Associate Vice Chancellor, University Development</i> | TAB 6.4

6.4A |

5. CLOSED SESSION **TAB 6.5**

- A. Approval of April 19, 2018 Closed Session Minutes * 6.5A
- ✓ B. Request Approval for Naming Specific University Facilities and Programs 6.5B

6. RETURN TO OPEN SESSION COMMITTEE DISCUSSION **TAB 6.6**

- A. University Advancement Road Mapping Presentation 6.6A
*Brian Sischo, Vice Chancellor, University Advancement, and
Bill Fahrner, Chief Operating Officer and Owner, Credo Higher
Education Consulting*

ADJOURN

- * Committee Approval
- ✓ Full Board Approval



CONSENT AGENDA

Approval of April 19, 2018 Minutes

University Advancement and External Relations Committee
Board of Trustees
North Carolina State University
April 19, 2018

The University Advancement Committee of the Board of Trustees of North Carolina State University met in Open Session at 1:15 p.m. in the Chancellor's Conference Room in Holladay Hall.

Chair Ward called the session to order and read the State of North Carolina's Government Ethics Act.

Chair Ward called roll after which she presented the consent agenda and the minutes from the February 15, 2018 meeting were approved. She then asked Vice Chancellor Sischo to present a University Advancement update. Brian recognized the Engineering Foundation staff in advance of historic ceremonies at the Engineering Oval on April 20, 2018. Brian then shared that \$1.3 billion toward the Campaign goal is within reach by fiscal year end. With that in mind, Brian discussed what it will take to make the decision to increase campaign goal, be it to \$1.8 billion or \$2 billion.

Next, Brian informed the Committee that University Advancement is hosting UNC System Advancement Symposium May 14-16, which will be a fantastic opportunity to showcase our campus and all the great things we're doing. He stated that University Advancement is going to have a CASE intern for the second year in a row, and a CASE Resident who will be here for a year is coming in August. These two CASE programs target development professionals from underrepresented populations in the industry. Internally, Brian shared that University Advancement is continuing to offer professional development through PlusDelta, which most of our development officers have or are currently taking advantage of.

Brian then reported that the Alumni Association is hosting an event on May 1 for the centennial of the end of WWI. The Belltower will be surrounded by a ring of live poppies, flowers which commemorate the end of the war. We have the only WWI memorial bell tower on a college campus in the USA. Next, Brian shared the University Communications is working on billboards that will go up throughout the state which will promote the "Think and Do the Extraordinary" theme. In reporting on Advancement Services, Brian noted that the process from the donation to the implementation of distinguished professorships is complicated and drawn out, and that Advancement Services leadership is working with the Provost's office the streamline the system.

Next, Jim Broschart presented a fundraising updated, stating that we're focusing on forecasting our fundraising potential. Noted that at 63% of the campaign goal achieved, most of the units are right on track toward their individual campaign goals and that we're working with units that are falling short to help them to develop and implement strategies to be successful. Jim explained that the idea is to tryto forecast based on the variables that impact campaign success, using conservative, moderate and aggressive approaches. Ranges among those approaches fall between \$1.7 billion – \$1.9 billion. Jim next shared that work continues on identifying prospects with \$25 million and event \$100 million giving capacity who aren't currently engaged, pointing out that in the pipeline, we have actively managed prospects who are overlooked. Jim then shared the alarming statistic that 80% of high-potential prospects are uncultivated nationally, and that we're working to find out NC State's data in this area. He noted that we have both challenge and opportunity in portfolio management; in terms of discovery, we have 9980 alumni with a giving capacity of \$100k or more, and as such, pipeline maintenance is critical and continuous. Jim concluded by sharing that talent is crucial to achieving our goals, and that we must attract, develop and retain the best staff. He noted that while we have a great team, we need to become more disciplined to reach our goals.

Next, External Affairs staff provided an update, noting that we work on a two-year budget. While there have been decreases in our budget from the state, the good news is that those decreases were less than expected. They shared that we do have our FY 18-19 budget in place and awaiting approval, and that the budget includes continuing state appropriation of \$511 million. Data of note is that 65% of our budget goes toward salaries, which is in line with the

Agenda

services we offer; all degree-seeking resident students' tuition is locked in for 4 years; and that the General Assembly will make adjustments to two-year budget during their short session. External Affairs staff also shared that the Board of Governors set their budget priorities when they met in March and identified priorities to inform, innovate and empower. \$2, 924,279,796 is total fy18-19 operating budget, which reflects a 5% change (increase.) The BOG is also working to establish a uniform number of hours across the system (120) required for a degree.

Staff then provided Annual Giving and pledge fulfillment and endowment minimums updates. Noting that pledges aren't legally enforceable, we hope to move toward getting at least 50% of gift in hand prior to offering a naming opportunity pledge. On the endowment minimums front, we are raising the minimum endowment from \$25 thousand to \$50 thousand, and also encouraging donors to consider making lower dollar amount gifts as unrestricted funds so that our Deans may use them as most needed. The last increase, from a minimum of \$15 thousand to \$25 thousand, was made in 2011.

Next, naming opportunities were presented from PCOM, Education and Engineering Buildings I, II and III in the amounts of \$250 thousand, \$1.6 million and \$122 million, respectively; all three were approved.

The committee then moved to go into closed session.

Respectfully submitted,

Susan P. Ward
Chair



ACTION ITEMS

**Review Committee
Responsibilities**

Review Plan of Work

**NC STATE BOARD OF TRUSTEES
UNIVERSITY ADVANCEMENT AND EXTERNAL AFFAIRS COMMITTEE
2018 – 2019 PLAN OF WORK**

September

- Fund Raising Reports (NC State Pol. 01.05.01, App IV.a)
- Review Campaign Priorities (NC State Pol.01.05.01, App IV.a.iii)) (Approval)
- Naming Specific University Facilities and Programs (NC State Pol. 01.05.01, App IV.a.iv) (Approval)
- University Advancement FY'18 Report
- Review Committee Responsibilities and Work Plan (Annually)

November

- Fund Raising Reports (NC State Pol. 01.05.01, App IV.a) Provide periodic updates
- Fund Raising Naming Plans (NC State Pol. 01.05.01, App IV.a.i.,a.iii) (Approval)
- Campaign Update (NC State Pol. 01.05.01, App IV.a.iii)
- Advancement Services Update
- Watauga Medal Nominations (NC State Pol.01.05.01, App IV.a.vi) (Approval)
- Naming Specific University Facilities and Programs (NC State Pol. 01.05.01, App IV.a.iv) (Approval)

February

- Fund Raising Reports (NC State Pol. 01.05.01, App IV.a) Provide periodic updates
- Fund Raising Naming Plans (NC State Pol. 01.05.01, App IV.a.i.,a.iii) (Approval)
- Campaign Update (NC State Pol.01.05.01, App IV.a.iii)
- Alumni Engagement Update (NC State Pol.01.05.01, App IV.a.vii)
- Naming Specific University Facilities and Programs (NC State Pol. 01.05.01, App IV.a.iv) (Review all proposals to name facilities or programs as recommended by the Special Donor and Honorary Committees) (Approval)

April

- Fund Raising Reports (NC State Pol. 01.05.01, App IV.a) Provide periodic updates
- Fund Raising Naming Plans (NC State Pol. 01.05.01, App IV.a.i.,a.iii) (Approval)
- Campaign Update (NC State Pol.01.05.01, App IV.a.iii)
- University Communications/Brand Update (NC State Pol.01.05.01, App IV.a.vii)
- External Affairs Update (NC State Pol. 01.05.01, App IV.b.iii)
- Naming Specific University Facilities and Programs (NC State Pol. 01.05.01, App IV.a.iv) (Review all proposals to name facilities or programs as recommended by the Special Donor and Honorary Committees) (Approval)



INFORMATIONAL REPORTS

University Advancement Update

Fundraising and Campaign Report

NC STATE UNIVERSITY

**THINK AND DO
THE
EXTRAORDINARY**



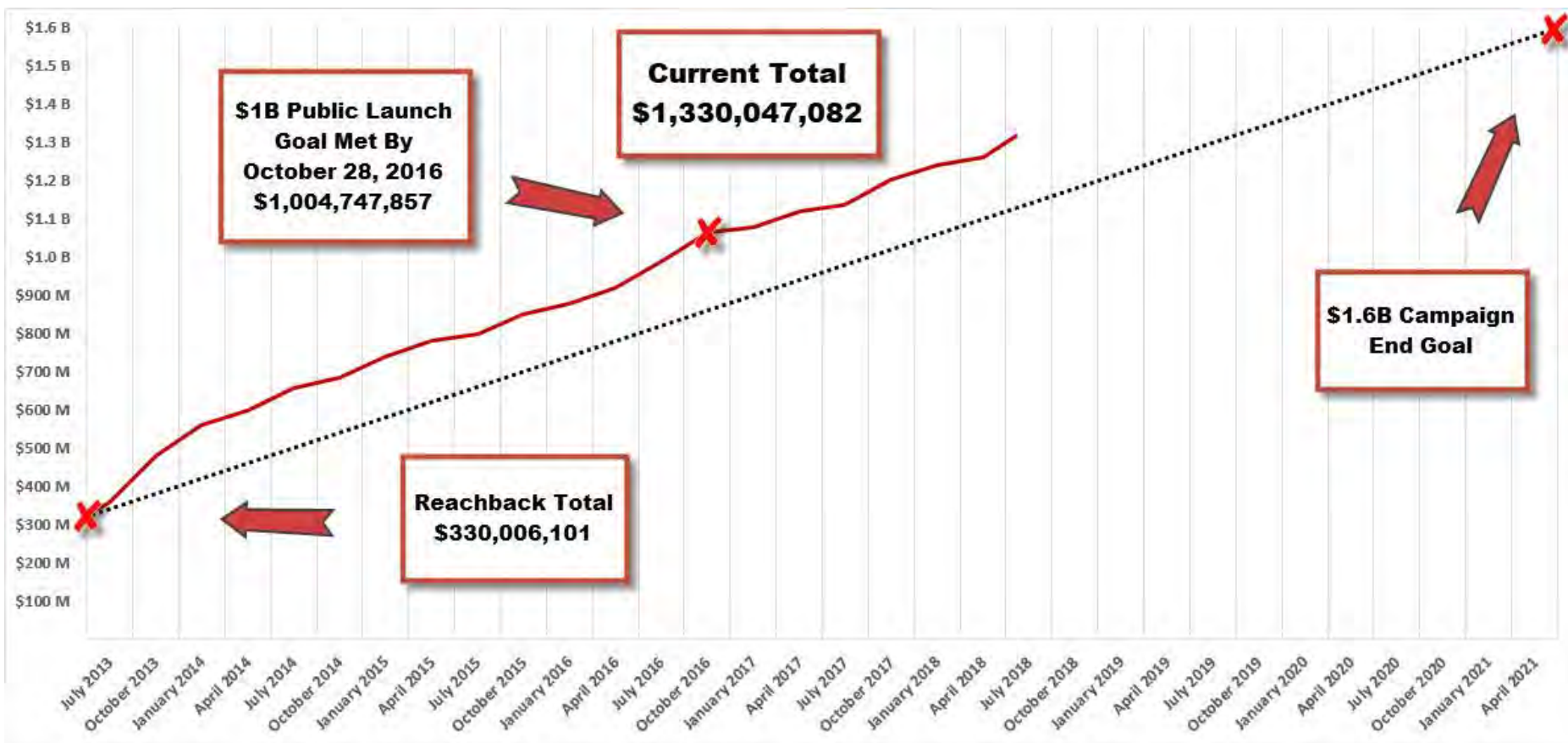
The Campaign for NC State

June 30, 2018

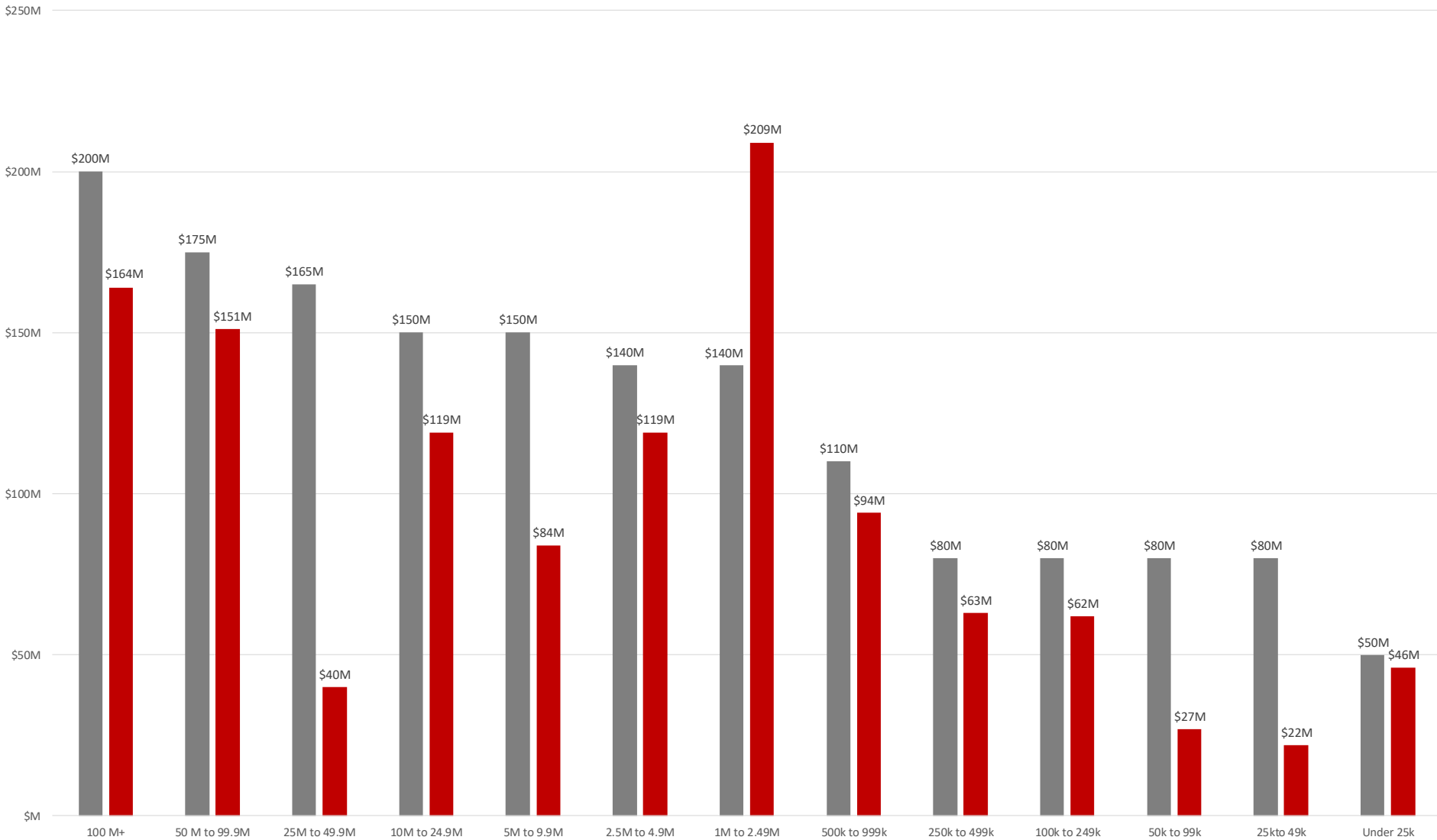


Campaign Reports

June 30, 2018



■ Target ■ Contributions



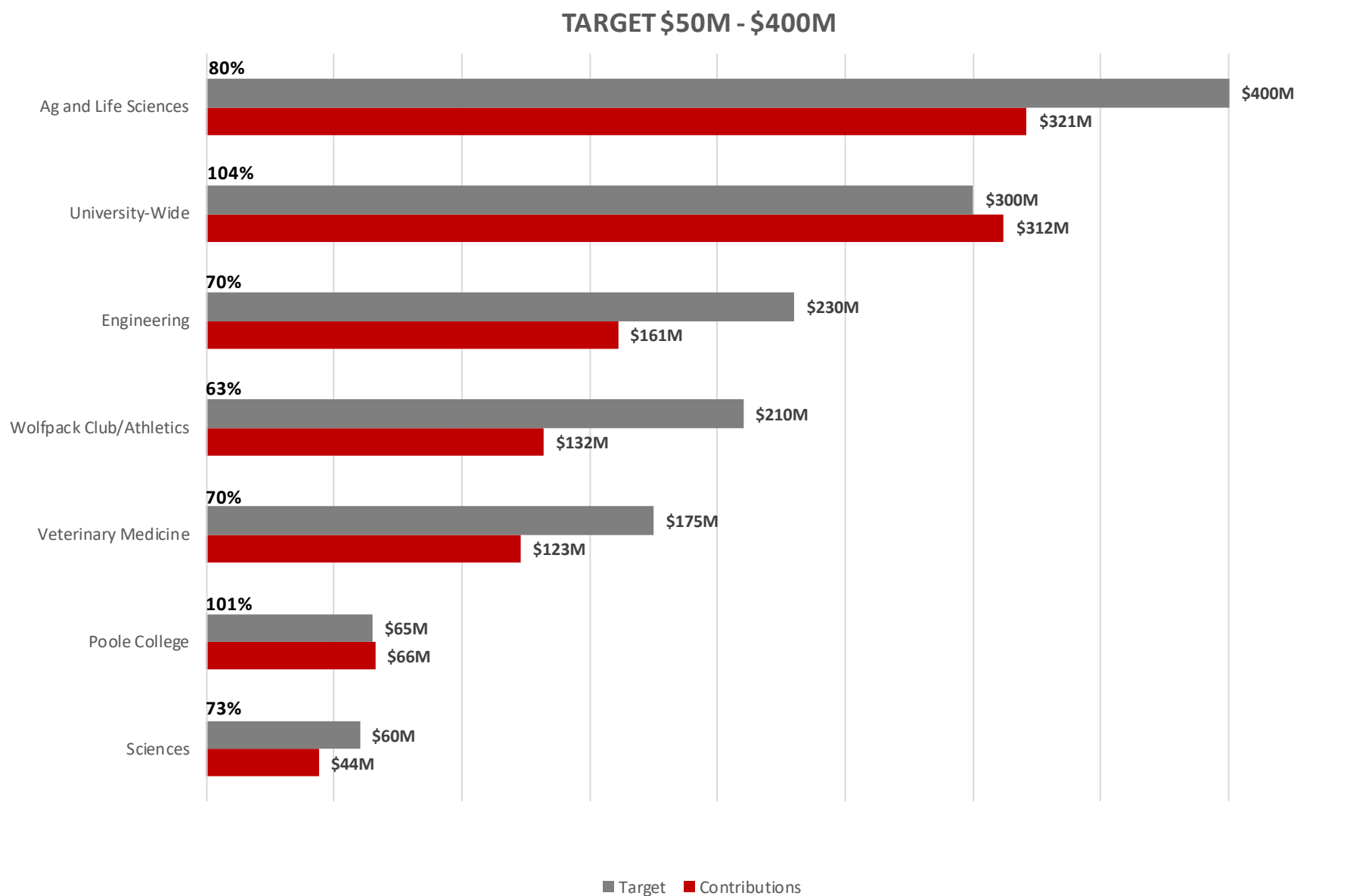
GOAL				RAISED TO DATE			YET TO BE RAISED	
Gift Range	# Donors	Dollars	% to Goal	# Donors	Dollars	% to Goal	# Additional Donors	# Additional Dollars
\$100,000,000 or Greater	1	\$200,000,000	13%	1	\$164,485,450	82%	0	\$35,514,550
\$50,000,000 to \$99,999,999	3	\$175,000,000	11%	2	\$151,313,153	86%	1	\$23,686,847
\$25,000,000 to \$49,999,999	6	\$165,000,000	10%	1	\$40,000,000	24%	5	\$125,000,000
\$10,000,000 to \$24,999,999	12	\$150,000,000	9%	7	\$118,749,375	79%	5	\$31,250,625
\$5,000,000 to \$9,999,999	25	\$150,000,000	9%	12	\$83,967,812	56%	13	\$66,032,188
\$2,500,000 to \$4,999,999	50	\$140,000,000	9%	34	\$118,963,366	85%	16	\$21,036,634
\$1,000,000 to \$2,499,999	125	\$140,000,000	9%	138	\$209,423,807	150%	-13	-\$69,423,807
Subtotal	222	\$1,120,000,000	70%	195	\$886,902,964	79%	27	\$233,097,036
\$500,000 to \$999,999	200	\$110,000,000	7%	141	\$94,220,282	86%	59	\$15,779,718
\$250,000 to \$499,999	300	\$80,000,000	5%	190	\$63,396,761	79%	110	\$16,603,239
\$100,000 to \$249,999	600	\$80,000,000	5%	411	\$61,753,093	77%	189	\$18,246,907
\$50,000 to \$99,999	1500	\$80,000,000	5%	408	\$26,827,585	34%	1092	\$53,172,415
\$25,000 to \$49,999	3000	\$80,000,000	5%	689	\$22,255,153	28%	2311	\$57,744,847
Under \$25,000	Many	\$50,000,000	3%	Many*	\$45,902,428	92%	Many	\$4,097,572
Subtotal	5600	\$480,000,000	30%	1839	\$314,355,303	65%	3761	\$165,644,697
Wolfpack Club/Textiles++				**	\$128,788,815			
Campaign Totals	5822	\$1,600,000,000	100%	62931	\$1,330,047,082	83%	3788	\$269,952,918

Wolfpack Club/Textiles++ information is reflected in the total dollars raised, but not on the the donor level.

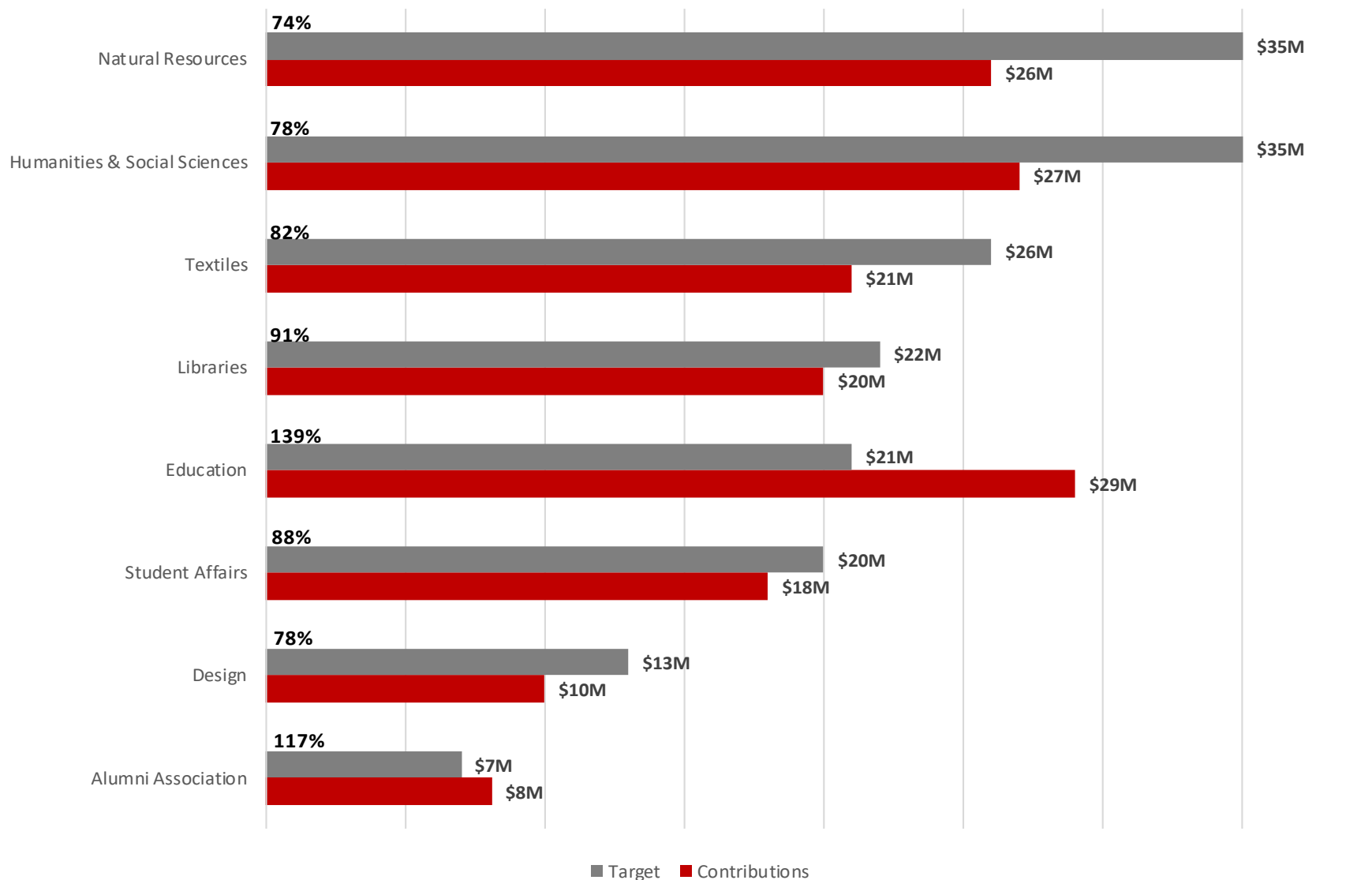
** Excludes WPC/Textiles Transactions processed in Advance.

Donors is the total number of households and organizations

* 60,897 donors to date



TARGET \$5M - \$50M

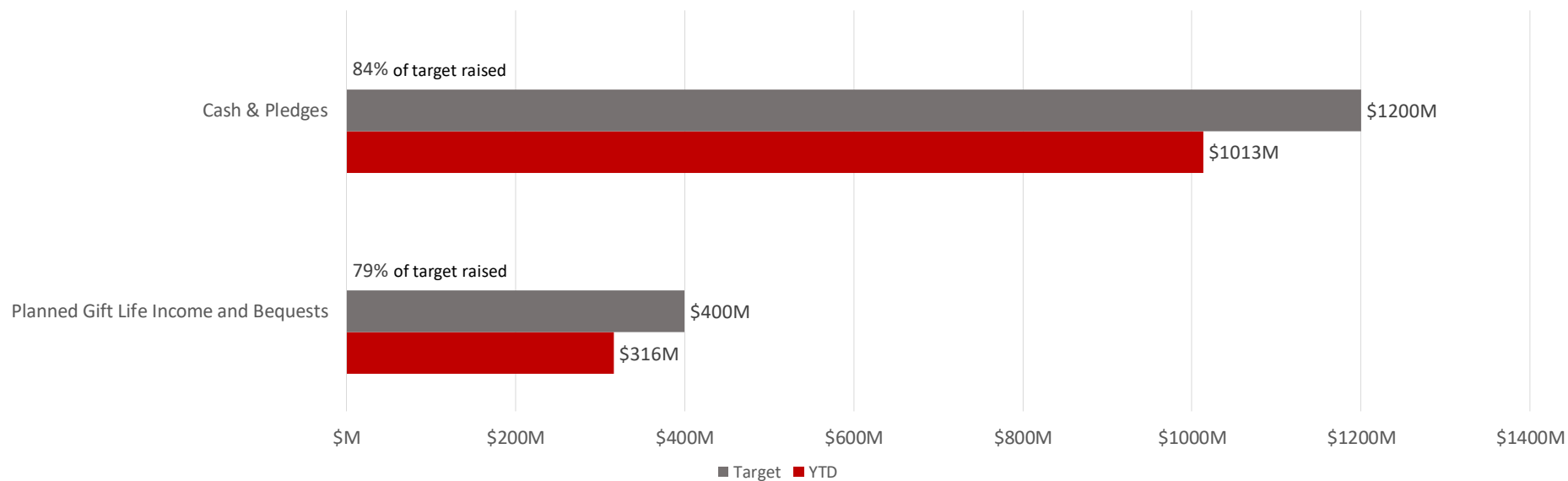




Campaign Progress

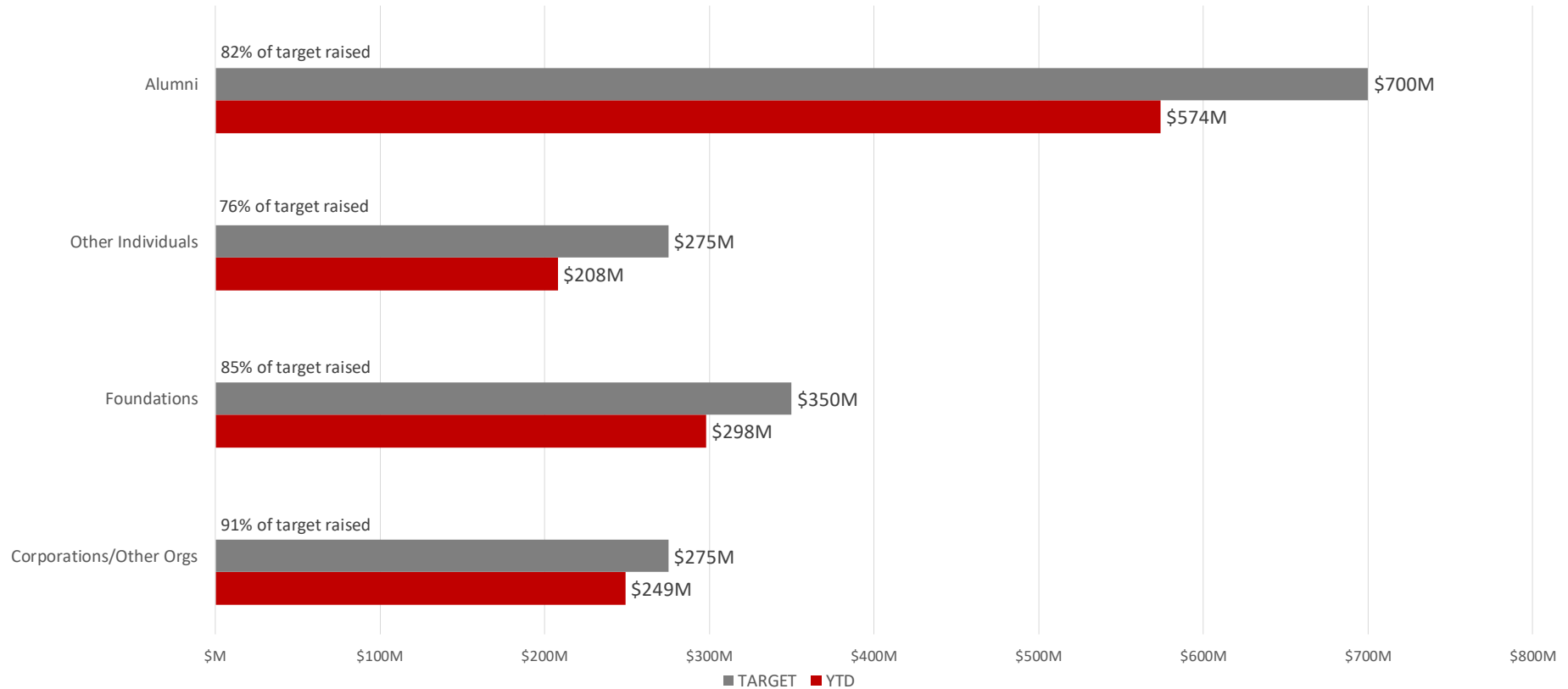
Gift Activity: Gifts by Type

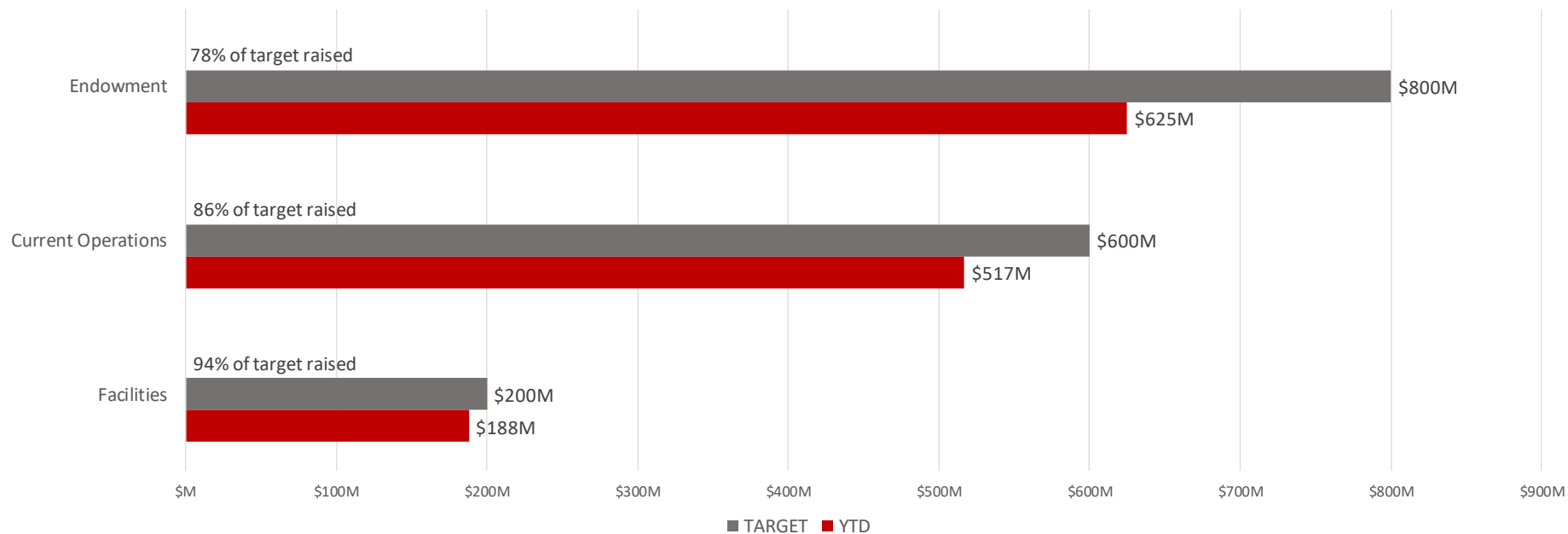
as of June 30, 2018





Campaign Progress Gift Activity: Gifts by Source as of June 30, 2018







University Advancement - Institutional Reports

Monthly Gift Receipts by Use

Report Date: July 31, 2018

	Current Operations	Endowment	Facilities	Year-to-date FY '19 Totals	Year-to-date FY '18 Totals	YTD Period % Change FY18/19	3 year Average (FY16 - FY18)	YTD Period % Change 3 yr avg/FY19
Ag and Life Sciences	\$724,980	\$72,852	\$35,321	\$833,154	\$504,543	65%	\$2,514,029	-67%
Design	\$106,890	\$10,054	\$0	\$116,943	\$10,289	1037%	\$12,664	823%
Education	\$19,715	\$15,795	\$10	\$35,520	\$17,951	98%	\$281,063	-87%
Engineering	\$399,535	\$139,485	\$175,450	\$714,470	\$905,361	-21%	\$1,888,815	-62%
Humanities & Social Sciences	\$8,533	\$530	\$0	\$9,064	\$70,923	-87%	\$592,514	-98%
Poole College	\$177,629	\$131,973	\$0	\$309,602	\$185,740	67%	\$122,586	153%
Natural Resources	\$28,571	\$18,918	\$0	\$47,489	\$45,630	4%	\$98,895	-52%
Sciences	\$79,866	\$9,830	\$0	\$89,696	\$1,025,767	-91%	\$540,430	-83%
Textiles*	\$59,810	\$10,585	\$0	\$70,395	\$61,357	15%	\$59,405	19%
Veterinary Medicine	\$340,168	\$58,139	\$32,662	\$430,969	\$133,775	222%	\$143,390	201%
Alumni Association	\$24,834	\$304,420	\$25	\$329,279	\$15,693	1998%	\$58,234	465%
DASA	\$10,614	\$16,194	\$5,278	\$32,085	\$406,979	-92%	\$238,702	-87%
Libraries	\$7,163	\$27,127	\$0	\$34,290	\$10,973	212%	\$596,911	-94%
University-wide	\$279,951	\$11,438,685	\$3,426	\$11,722,061	\$4,296,206	173%	\$4,154,477	182%
Wolfpack Club/Athletics**	\$1,025	\$0	\$0	\$1,025	\$1,109,376	-100%	\$1,582,402	-100%
Total	\$2,269,284	\$12,254,588	\$252,171	\$14,776,043	\$8,800,563	68%	\$12,884,518	15%

* Includes gift information provided by the North Carolina Textiles Foundation

** Includes gift information provided by the NCSU Student Aid Association

Reporting Period: July 1 - July 31, 2018

Data Refresh: Friday, August 3, 2018



University Advancement - Institutional Reports

Monthly Gift Receipts by Source

Report Date: July 31, 2018

	Alumni	Parents	Faculty Staff	Other Individuals	Corporations	Foundations	Other Organizations	Year-to-date FY '18 Totals
Ag and Life Sciences	\$30,639	\$6,766	\$819	\$50,259	\$608,882	\$13,435	\$122,353	\$833,154
Design	\$8,430	\$0	\$380	\$51,100	\$6,900	\$0	\$50,133	\$116,943
Education	\$18,994	\$60	\$1,291	\$15,175	\$0	\$0	\$0	\$35,520
Engineering	\$30,988	\$351	\$604	\$47,840	\$263,331	\$177,856	\$193,500	\$714,470
Humanities & Social Sciences	\$4,851	\$5	\$871	\$553	\$2,778	\$0	\$7	\$9,064
Poole College	\$116,937	\$1,000	\$3,315	\$10,200	\$148,151	\$0	\$30,000	\$309,602
Natural Resources	\$24,776	\$0	\$185	\$558	\$6,970	\$15,000	\$0	\$47,489
Sciences	\$49,146	\$250	\$921	\$2,800	\$28,354	\$0	\$8,225	\$89,696
Textiles*	\$19,710	\$10,000	\$185	\$500	\$40,000	\$0	\$0	\$70,395
Veterinary Medicine	\$5,007	\$1,505	\$584	\$308,414	\$49,027	\$25,250	\$41,183	\$430,969
Alumni Association	\$304,853	\$300	\$0	\$111	\$15	\$24,000	\$0	\$329,279
DASA	\$11,664	\$2,047	\$1,696	\$3,799	\$6,364	\$5,146	\$1,370	\$32,085
Libraries	\$22,306	\$20	\$1,171	\$6,193	\$4,100	\$500	\$0	\$34,290
University-wide	\$165,469	\$36,583	\$2,277	\$5,501	\$646,470	\$10,865,000	\$762	\$11,722,061
Wolfpack Club/Athletics**	\$25	\$0	\$0	\$1,000	\$0	\$0	\$0	\$1,025
Total	\$813,794	\$58,886	\$14,299	\$504,004	\$1,811,341	\$11,126,187	\$447,532	\$14,776,043

* Includes gift information provided by the North Carolina Textiles Foundation

** Includes gift information provided by the NCSU Student Aid Association

Reporting Period: July 1 - July 31, 2018

Data Refresh: Friday, August 3, 2018



University Advancement - Institutional Reports

Monthly Gift Receipts by Type

Report Date: July 31, 2018

	Cash Gifts	Gifts-In-Kind	Matching Gifts	PG Life Income	Realized Bequests	Non-Governmental Grants	Year-to-date FY '18 Totals
Ag and Life Sciences	\$827,502	\$5,321	\$331	\$0	\$0	\$0	\$833,154
Design	\$64,443	\$0	\$2,500	\$0	\$50,000	\$0	\$116,943
Education	\$35,520	\$0	\$0	\$0	\$0	\$0	\$35,520
Engineering	\$705,849	\$6,300	\$2,321	\$0	\$0	\$0	\$714,470
Humanities & Social Sciences	\$8,677	\$0	\$387	\$0	\$0	\$0	\$9,064
Poole College	\$296,552	\$0	\$13,051	\$0	\$0	\$0	\$309,602
Natural Resources	\$47,129	\$0	\$360	\$0	\$0	\$0	\$47,489
Sciences	\$79,362	\$0	\$10,334	\$0	\$0	\$0	\$89,696
Textiles*	\$70,395	\$0	\$0	\$0	\$0	\$0	\$70,395
Veterinary Medicine	\$398,307	\$32,662	\$0	\$0	\$0	\$0	\$430,969
Alumni Association	\$329,264	\$0	\$15	\$0	\$0	\$0	\$329,279
DASA	\$23,947	\$2,110	\$6,029	\$0	\$0	\$0	\$32,085
Libraries	\$34,290	\$0	\$0	\$0	\$0	\$0	\$34,290
University-wide	\$11,720,586	\$0	\$620	\$0	\$856	\$0	\$11,722,061
Wolfpack Club/Athletics**	\$1,025	\$0	\$0	\$0	\$0	\$0	\$1,025
Total	\$14,642,848	\$46,393	\$35,947	\$0	\$50,856	\$0	\$14,776,043

* Includes gift information provided by the North Carolina Textiles Foundation

** Includes gift information provided by the NCSU Student Aid Association

Reporting Period: July 1 - July 31, 2018

Data Refresh: Friday, August 3, 2018



University Advancement - Institutional Reports

Monthly Gifts and New Commitments by Use

Report Date: July 31, 2018

	Current Operations	Endowment	Facilities	Year-to-date FY '19 Totals	Year-to-date FY '18 Totals	YTD Period % Change FY18/19	3 year Average (FY16 - FY18)	YTD Period % Change 3 yr avg/FY19
Ag and Life Sciences	\$725,715	\$63,834	\$5,321	\$794,870	\$516,433	54%	\$1,145,621	-31%
Design	\$103,933	\$2,550	\$0	\$106,483	\$1,854	5643%	\$19,744	439%
Education	\$17,970	\$100	\$0	\$18,070	\$6,906	162%	\$79,336	-77%
Engineering	\$463,311	\$709,017	\$106,400	\$1,278,728	\$1,360,277	-6%	\$946,941	35%
Humanities & Social Sciences	\$6,530	\$125	\$0	\$6,655	\$73,163	-91%	\$61,039	-89%
Poole College	\$176,222	\$121,130	\$0	\$297,352	\$184,982	61%	\$122,774	142%
Natural Resources	\$26,259	\$13,700	\$0	\$39,959	\$45,344	-12%	\$89,649	-55%
Sciences	\$101,033	\$9,585	\$0	\$110,618	\$449,833	-75%	\$329,896	-66%
Textiles*	\$71,500	\$585	\$0	\$72,085	\$33,095	118%	\$69,058	4%
Veterinary Medicine	\$377,199	\$4,557,539	\$32,662	\$4,967,400	\$164,166	2926%	\$280,031	1674%
Alumni Association	\$24,636	\$3,550	\$25	\$28,211	\$14,813	90%	\$26,254	7%
DASA	\$8,306	\$10,015	\$3,110	\$21,430	\$207,259	-90%	\$112,865	-81%
Libraries	\$6,830	\$2,253	\$0	\$9,083	\$12,772	-29%	\$597,050	-98%
University-wide	\$254,452	\$5,964,908	\$0	\$6,219,360	\$1,838,471	238%	\$1,896,968	228%
Wolfpack Club/Athletics**	\$1,020	\$250,000	\$0	\$251,020	\$992,113	-75%	\$1,026,319	-76%
Total	\$2,364,916	\$11,708,891	\$147,518	\$14,221,324	\$5,901,481	141%	\$6,803,545	109%

* Includes gift information provided by the North Carolina Textiles Foundation

** Includes gift information provided by the NCSU Student Aid Association

Reporting Period: July 1 - July 31, 2018

Data Refresh: Friday, August 3, 2018



University Advancement - Institutional Reports

Monthly Gifts and New Commitments by Source

Report Date: July 31, 2018

	Alumni	Parents	Faculty Staff	Other Individuals	Corporations	Foundations	Other Organizations	Year-to-date FY '19 Totals
Ag and Life Sciences	\$38,365	\$6,375	\$170	\$74,790	\$606,382	\$13,435	\$55,353	\$794,870
Design	\$750	\$0	\$0	\$50,100	\$5,500	\$0	\$50,133	\$106,483
Education	\$2,885	\$0	\$10	\$15,175	\$0	\$0	\$0	\$18,070
Engineering	\$96,751	\$666,250	\$0	\$23,340	\$181,031	\$127,856	\$183,500	\$1,278,728
Humanities & Social Sciences	\$3,798	\$0	\$60	\$26	\$2,765	\$0	\$7	\$6,655
Poole College	\$104,626	\$1,500	\$2,875	\$10,200	\$148,151	\$0	\$30,000	\$297,352
Natural Resources	\$17,529	\$0	\$10	\$450	\$6,970	\$15,000	\$0	\$39,959
Sciences	\$73,179	\$100	\$75	\$2,685	\$28,354	\$0	\$6,225	\$110,618
Textiles*	\$19,410	\$0	\$175	\$500	\$52,000	\$0	\$0	\$72,085
Veterinary Medicine	\$8,334	\$2,480	\$2,000,450	\$2,840,777	\$48,927	\$25,250	\$41,183	\$4,967,400
Alumni Association	\$3,945	\$250	\$0	\$1	\$15	\$24,000	\$0	\$28,211
DASA	\$4,257	\$922	\$870	\$2,503	\$6,364	\$5,146	\$1,370	\$21,430
Libraries	\$3,165	\$0	\$150	\$1,168	\$4,100	\$500	\$0	\$9,083
University-wide	\$468,760	\$27,007	\$245	\$4,616	\$271,470	\$5,446,500	\$762	\$6,219,360
Wolfpack Club/Athletics**	\$20	\$0	\$0	\$251,000	\$0	\$0	\$0	\$251,020
Total	\$845,773	\$704,884	\$2,005,090	\$3,277,332	\$1,362,028	\$5,657,687	\$368,532	\$14,221,324

* Includes gift information provided by the North Carolina Textiles Foundation

** Includes gift information provided by the NCSU Student Aid Association

Reporting Period: July 1 - July 31, 2018

Data Refresh: Friday, August 3, 2018



University Advancement - Institutional Reports

Monthly Gifts and New Commitments by Type

Report Date: July 31, 2018

	Cash Gifts	Gifts-In-Kind	Matching Gifts	PG Life Income	Realized Bequests	Bequest Expectancies	Pledges	Non-Governmental Grants	Year-to-date FY '19 Totals
Ag and Life Sciences	\$714,099	\$5,321	\$331	\$0	\$0	\$25,000	\$50,120	\$0	\$794,870
Design	\$53,983	\$0	\$2,500	\$0	\$50,000	\$0	\$0	\$0	\$106,483
Education	\$18,070	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$18,070
Engineering	\$521,715	\$6,300	\$2,321	\$0	\$0	\$666,000	\$82,393	\$0	\$1,278,728
Humanities & Social Sciences	\$6,268	\$0	\$387	\$0	\$0	\$0	\$0	\$0	\$6,655
Poole College	\$282,301	\$0	\$13,051	\$0	\$0	\$0	\$2,000	\$0	\$297,352
Natural Resources	\$39,599	\$0	\$360	\$0	\$0	\$0	\$0	\$0	\$39,959
Sciences	\$75,284	\$0	\$10,334	\$0	\$0	\$0	\$25,000	\$0	\$110,618
Textiles*	\$60,085	\$0	\$0	\$0	\$0	\$0	\$12,000	\$0	\$72,085
Veterinary Medicine	\$382,172	\$32,662	\$0	\$0	\$0	\$4,500,000	\$52,566	\$0	\$4,967,400
Alumni Association	\$27,696	\$0	\$15	\$0	\$0	\$0	\$500	\$0	\$28,211
DASA	\$13,292	\$2,110	\$6,029	\$0	\$0	\$0	\$0	\$0	\$21,430
Libraries	\$9,083	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$9,083
University-wide	\$5,518,384	\$0	\$620	\$0	\$356	\$200,000	\$500,000	\$0	\$6,219,360
Wolfpack Club/Athletics**	\$1,020	\$0	\$0	\$0	\$0	\$250,000	\$0	\$0	\$251,020
Total	\$7,723,051	\$46,393	\$35,947	\$0	\$50,356	\$5,641,000	\$724,579	\$0	\$14,221,324

* Includes gift information provided by the North Carolina Textiles Foundation

** Includes gift information provided by the NCSU Student Aid Association

Reporting Period: July 1 - July 31, 2018

Data Refresh: Friday, August 3, 2018



COMMITTEE DISCUSSION

Naming Opportunity Proposals



Board of Trustees Consent Agenda University Advancement Committee Naming Opportunities Proposals

September 20, 2018

Background

As per POL 03.00.02 – Criteria and Procedures for Naming Facilities and Programs, the act of naming a facility or program shall be that of the Board of Trustees, acting after receiving the recommendation of the Chancellor.

Recommended Action

Chancellor W. Randolph Woodson recommends to the Board of Trustees the following program and facilities fundraising projects for approval.

College of Textiles

The College of Textiles is the only textiles college in the United States and is internationally recognized for research, innovations and education that continue to advance the global textiles industry.

- **Naming Type:** College naming
- **Total Naming Opportunities:** 1
- **Total Gift Amount of Naming Opportunities:** \$28 million
- **Fundraising Goal:** \$28 million

College of Agriculture and Life Sciences

NC Plant Sciences Initiative Building (PSI)

The Centennial Campus building will be a world-class facility for innovation in plant science research, including cross-discipline collaboration and education.

- **Naming Type:** New construction
- **Total Naming Opportunities:** 114
- **Total Gift Amount of Naming Opportunities:** \$50 million-\$62.1 million
- **Fundraising Goal:** \$70 million
- **Project Budget:** \$160.2 million

College of Veterinary Medicine

Equine Reproduction Facility at Reedy Creek Farms

As home to the Advanced Reproductive Technology program in equine health, the facility will provide professional veterinary training, undergraduate educational experiences and extension/outreach.

- **Naming Type:** New construction
- **Total Naming Opportunities:** 17
- **Total Gift Amount of Naming Opportunities:** \$2.85 million
- **Fundraising Goal:** \$1.5 million
- **Project Budget:** \$3 million



**Board of Trustees Consent Agenda
University Advancement Committee
Naming Opportunities Proposals**

September 20, 2018

South Theater, CVM Main Building

This large lecture hall was renovated with significant technological and environmental upgrades including audio-visual systems, lighting, seating, HVAC and an exterior window.

- **Naming Type:** Renovation
- **Total Naming Opportunities:** 1
- **Total Gift Amount of Naming Opportunities:** \$250,000
- **Fundraising Goal:** \$250,000
- **Project Budget:** \$500,000

NC State Athletics

NC State Athletics Sports Medicine Center, Wendell H. Murphy Football Center

The renovated Center will upgrade technology and equipment, optimize use of space and improve preventative, acute and rehabilitative care.

- **Naming Type:** Renovation
- **Total Naming Opportunities:** 1
- **Total Gift Amount of Naming Opportunities:** \$1 million
- **Fundraising Goal:** \$2.5 million
- **Project Budget:** \$2.5 million

NC State Athletics Broadcast and Production Center, Wendell H. Murphy Football Center

The Center will produce game-day and year-round television and digital programming, meeting and exceeding requirements established by the new ACC Network.

- **Naming Type:** Renovation
- **Total Naming Opportunities:** 2
- **Total Gift Amount of Naming Opportunities:** \$5.5 million
- **Fundraising Goal:** \$6.6 million
- **Project Budget:** \$6.6 million

Policy References

POL 03.00.02 – Criteria and Procedures for Naming Facilities and Programs

**North Carolina State University
Proposal for Naming Opportunity of a Program**

College of Textiles

Presented by: College of Textiles

The College of Textiles requests approval from the Board of Trustees to name the college for a minimum gift value of \$28,000,000 to be endowed for unrestricted use. A gift to name the College of Textiles would be historic, propelling the college even further in the textile industry and in research.

NC State's College of Textiles is the last remaining textile college in the United States. The college has played a vital role in North Carolina and at NC State University since 1899 when it became one of the university's first schools. North Carolina quickly became a global leader in the textile industry and the NC State textile school was established as experts in education, discovery, development and service. Through the 20th century, the College of Textiles adapted to changes in the industry with unique vision, surviving and thriving when other colleges closed their doors.

The College of Textiles of the 21st century is recognized for research, innovations and education that continue to advance the global textile industry. Industry partners, the State of North Carolina and several federal agencies provide over \$12 million annually to support NC State textile research. Teaching and research facilities include one of the most advanced computing facilities found in any university in the world. In addition, a complete Model Manufacturing Facility makes it possible for students to participate in research in the entire range of manufacturing processes. Other advanced laboratories and systems provide for diverse research in a wide variety of general and specialized studies.

Today, the College of Textiles annually serves nearly 1,000 undergraduate students and over 200 graduate students with an education that is hands-on, interdisciplinary and high-tech. The college offers five bachelor's degrees with fourteen concentrations, as well as four graduate programs, including several concentrations and programs that are unique in the world. Education in the College of Textiles is a foundation of science and practical application that can take students to fashion houses, NASA, textile design companies, laboratories, medical schools, graduate schools and beyond.

As a donor is identified for this naming opportunity, official NC State University forms and other required documentation will be submitted for Board of Trustees approval.

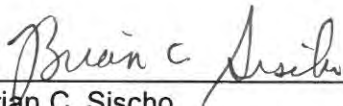
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Required Signatures

Carrie Bhada
Executive Director, North Carolina Textile Foundation

Date: 8-17-18

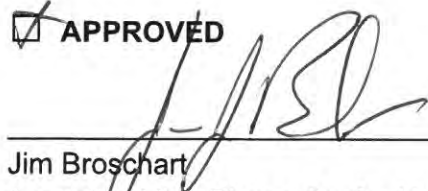
David Hinks
Dean, College of Textiles

Date: 8-17-18

Brian C. Sischo
Vice Chancellor for University Advancement

Date: 8/22/18

Scott R. Douglass
Vice Chancellor for Finance and Administration

Date: 8/24/18☒ **APPROVED**

Jim Broschart
Associate Vice Chancellor for University Development
Chair of Special Committee on Naming Opportunities

☐ **NOT APPROVED**8-17-18
Date of Committee Review

If not recommended for approval, please attach rationale for the Committee's decision.

**North Carolina State University
Proposal for Naming Opportunity of a Facility**

NC Plant Sciences Initiative Building

Presented by: College of Agriculture and Life Sciences

The College of Agriculture and Life Sciences requests approval from the Board of Trustees to name the NC Plant Sciences Building as well as spaces in the facility.

NC State's College of Agriculture and Life Sciences (CALS) has launched its North Carolina Plant Sciences Initiative (PSI) to construct a high-tech facility to serve as a platform for innovation in plant science research. Plant scientists will work across disciplines with other internationally recognized professionals to deliver science-based solutions for farmers, urban and rural landscapers, manufacturers and regulatory agencies.

This state-of-the-art facility will be located on NC State's Centennial Campus and will house research, meetings, seminars and offices, including over 30,000 square feet of specialized greenhouses. The estimated construction costs are \$160.2 million and, to date, 90% of funding has been secured through combined support from NC State, the Connect NC Bond, the Golden LEAF Foundation and other philanthropic support.

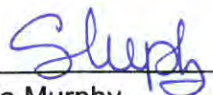
Plans for the NC PSI building are in the late design construction stage. After the design has been finalized, the specific naming opportunities will be prepared for potential donors. Groundbreaking is anticipated in Fall 2019 with completion in Fall 2021.

Attachments:

- PSI List of Naming Opportunity Ranges by Category
- PSI slides

As donors are identified for each of the listed naming opportunities, official NC State University forms and other required documentation will be submitted for Board of Trustees approval.

Required Signatures



Sonia Murphy
Assistant Dean, College of Agriculture and Life Sciences

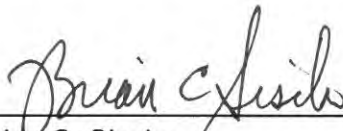
Date: August 6, 2018

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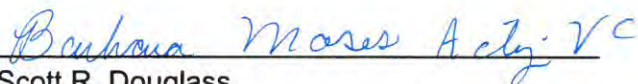
Richard H. Linton
Dean, College of Agriculture and Life Sciences

Date: 8-6-18



Brian C. Sischo
Vice Chancellor for University Advancement

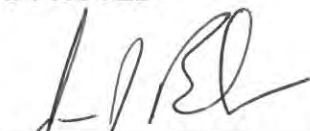
Date: 8-22-18



Scott R. Douglass
Vice Chancellor for Finance and Administration

Date: 8-24-18

☒ **APPROVED**



Jim Broschart
Associate Vice Chancellor for University Development
Chair of Special Committee on Naming Opportunities

☐ **NOT APPROVED**



Date of Committee Review

If not recommended for approval, please attach rationale for the Committee's decision.

Plant Sciences Institute

List of Naming Opportunity Ranges by Category

Summary of Category Ranges	
Number	Range of Minimum Gift Values
1	[Building naming]
2	\$3 million - \$4 million
9	\$2 million - \$2.75 million
5	\$1 million - \$1.75 million
11	\$500,000 - \$900,000
12	\$400,000 - \$475,000
7	\$300,000 - \$375,000
9	\$200,000 - \$275,000
22	\$100,000 - \$175,000
36	\$25,000 - \$75,000
114 Spaces	\$51 million - \$62.1 million

Summary of Categories	Number	Range of Minimum Gift Values
Named Building	1	[TBD]
Featured Opportunities	18	\$50,000 - \$4.25 million
Greenhouse Areas	14	\$225,000 - \$4.25 million
Laboratories	25	\$75,000 - \$2.5 million
Meeting Rooms	32	\$25,000 - \$1.25 million
Multi-purpose/Common Spaces	20	\$25,000 - \$850,000
Office Areas	4	\$100,000 - \$625,000

*Subject to change

**BoT approved at this level Feb. 2018

Note: Gray indicates a space no longer available.

Plant Sciences Institute

List of Naming Opportunity Ranges by Category

Featured Opportunities	Square Feet *	Number	Range of Minimum Gift Values
Named Building	185,000 sq ft	1	[TBD]
Seminar Room	2,600 sq ft	1	\$3.75 million - \$4.25 million**
Main Entry/2-Story Hearth	1,900 sq ft	1	\$2.25 million - \$2.75 million
Porches (front and side)	NA	2	\$1 million - \$2.75 million
The Commons	NA	1	\$1 million - \$1.25 million
Named Floors 1-4	NA	4	\$500,000 - \$2 million
Feature Sculpture	NA	1	\$500,000 - \$750,000
Staircases	NA	2	\$450,000 - \$550,000
Test Planting Plots (front exterior)	NA	4	\$100,000 - \$125,000
Elevator Lobbies	NA	2	\$50,000 - \$75,000

Greenhouse Areas	Square Feet *	Number	Range of Minimum Gift Values
5th Floor Growing Area only	7,500 sq ft	1	\$3.75 million - \$4.25 million
5th Floor Operations Area only	3,800 sq ft	1	\$1 million - \$1.5 million
4th Floor Mechanicals Area	11,000 sq ft	1	\$1 million - \$1.25 million
Individual Greenhouses	476-2,112 sq ft	11	\$225,000 - \$900,000

Laboratories	Square Feet *	Number	Range of Minimum Gift Values
Laboratories	3,500-4,000 sq ft	4	\$1.75 million - \$2.5 million
Laboratories	1,000-2,000 sq ft	3	\$450,000 - \$900,000
Laboratories	500-950 sq ft	8	\$225,000 - \$425,000
Laboratories	200-350 sq ft	10	\$75,000 - \$175,000

*Subject to change

**BoT approved at this level Feb. 2018

Note: Gray indicates a space no longer available.

Plant Sciences Institute

List of Naming Opportunity Ranges by Category

Meeting Rooms	Square Feet *	Number	Range of Minimum Values
Board Room	1,000 sq ft	1	\$1 million
Conference Rooms	450-550 sq ft	2	\$375,000 - \$425,000
Meeting Rooms	150-350 sq ft	6	\$75,000 - \$225,000
Staff Huddle Rooms	60-150 sq ft	10	\$25,000 - \$50,000
Student Study Rooms	50-70 sq ft	13	\$25,000 - \$50,000

Multi-Purpose/ Common Spaces	Square Feet *	Number	Range of Minimum Values
Education Area	1,500 sq ft	1	\$775,000 - \$850,000
Seminar Room Lobby	1,200 sq ft	1	\$675,000 - \$725,000
Lounge Areas	80-500 sq ft	6	\$25,000 - \$200,000
Corridors with Seating Areas	650-800 sq ft	3	\$250,000 - \$325,000
Breakroom Areas	100-500 sq ft	9	\$40,000 - \$225,000

Office Spaces	Square Feet *	Number	Range of Minimum Values
Administration Suite	1,600-1,800 sq ft	1	\$575,000 - \$625,000
Think Tanks	1,000-1,200 sq ft	2	\$475,000 - \$525,000
Director's Office	150-200 sq ft	1	\$100,000 - \$150,000

Notes:

- These recommendations are proposed for submission to the Board of Trustees.
- Ranges are approximate. Spaces are still subject to change as the planning phase progresses. Once finalized, the Office of Donor Services will prepare a menu of specific values for spaces available for naming. Those values will replace the wider category ranges.
- Donor commitment to a specific space is not final until Board of Trustees approval of these recommendations and approval of that specific donor commitment. If a space is no longer available, then we will attempt to accommodate the donor with a comparable space.

*Subject to change

**BoT approved at this level Feb. 2018

Note: Gray indicates a space no longer available.

**North Carolina State University
Proposal for Naming Opportunity of a Facility
Equine Reproduction Facility at Reedy Creek Farm**

Presented by: College of Veterinary Medicine

The College of Veterinary Medicine requests approval from the Board of Trustees to name the Equine Reproduction Facility at Reedy Creek Farm and the spaces of the facility.

The Equine Reproduction Facility at Reedy Creek Farm is designed to be the flagship teaching and research space for the College of Veterinary Medicine (CVM) and the College of Agricultural and Life Sciences (CALS). The construction of this facility will enhance and grow education and research, facilitate cross-disciplinary engagement and collaboration, and serve as a model of best practices in facility design.

As a physical home to the Advanced Reproductive Technology program in stallion and mare health, the facility will provide a platform for professional veterinary training, undergraduate educational experiences and extension/outreach. Educational experience for CVM students will focus on equine primary care, theriogenology (reproduction), and advanced, high-risk pregnancy management and foaling care. Educational experience for CALS undergraduate students will focus on farm management, horse care, foaling management and nutrition.

The 2017 North Carolina Equine Economic Impact Study estimates that 30.5% of North Carolina households contain horse enthusiasts (1.2 million people) who contribute approximately \$3.44 billion in economic impact in the state. With an estimated 306,000 horses in North Carolina, we remain one of the top ten states in horse population. The Equine Reproduction Facility, located minutes from the CVM campus, will make equine reproductive services more accessible to the Triangle and will benefit veterinarians, horse owners and students.

The construction cost of the Equine Reproductive Facility is estimated at \$3 million. The College of Veterinary Medicine has committed \$1.3 million of the project cost. \$1.87 million of private funding sources have been identified in outright gifts, pledges and unrestricted bequest expectancies. Construction of the new Equine Reproduction Facility began in May 2018 with anticipated completion in Winter 2019.

Attachments:

- Equine Reproduction Facility at Reedy Creek List of Naming Opportunities
- Equine Reproduction Facility at Reedy Creek Slides

As donors are identified for each of the listed naming opportunities, official NC State University forms and other required documentation will be submitted for Board of Trustees approval.

Required Signatures



Dianne Dunning

Associate Dean for Advancement, College of Veterinary Medicine

Date: 8 Aug 2018



D. Paul Lunn

Dean, College of Veterinary Medicine

Date: 8/8/18



Brian C. Sischo

Vice Chancellor for University Advancement

Date: 8/22/18



Scott R. Douglass

Vice Chancellor for Finance and Administration

Date: 8/24/18

☒ **APPROVED**



Jim Broschart

Associate Vice Chancellor for University Development

Chair of Special Committee on Naming Opportunities

☐ **NOT APPROVED**

8-17-18
Date of Committee Review

If not recommended for approval, please attach rationale for the Committee's decision.

Equine Reproduction Unit at Reedy Creek

List of Naming Opportunities

Total Number of Naming Opportunities	Total Potential Gift Value
17	\$2.85 million

Therio Building	Room(s)	Square Feet *	Minimum Gift Value
Named Therio Building	All	7,042 sq ft	\$1.5 million
Mare Treatment Area	120	2,140 sq ft	\$350,000
Stallion Treatment Area	140	1,204 sq ft	\$250,000
Reception and Office Suite	100-108	416 sq ft	\$150,000
Therio Lab	112	353 sq ft	\$50,000
Rounds Room	110	305 sq ft	\$25,000
Mare Stall 1	121	124 sq ft	\$25,000
Mare Stall 2	122	164 sq ft	\$25,000
Mare Stall 3	123	145 sq ft	\$25,000
Mare Stall 4	124	148 sq ft	\$25,000
Stallion Stall 1	141	148 sq ft	\$25,000
Stallion Stall 2	142	148 sq ft	\$25,000
Embryo Lab	112A	134 sq ft	\$25,000
Cryo Lab	112B	117 sq ft	\$25,000

Recipient Mares Barn	Room(s)	Square Feet *	Minimum Gift Value
Named Recipient Mares Barn	All	3,724 sq ft	\$150,000
Mares Barn Paddock	Exterior	23,000 sq ft	\$100,000
Exam Room	101	1,024 sq ft	\$75,000

Note: These recommendations are proposed for submission to the Board of Trustees. Donor commitment to a specific space is not final until Board of Trustees approval of these recommendations and approval of that specific donor commitment. If a space is no longer available, then we will attempt to accommodate the donor with a comparable space.

*Subject to change

Note: Gray indicates a space no longer available.

North Carolina State University
Proposal for Naming Opportunity of a Facility
South Theater in the CVM Main Building

Presented by: College of Veterinary Medicine

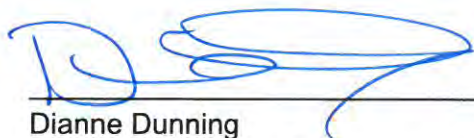
The College of Veterinary Medicine (CVM) requests approval from the Board of Trustees to name the South Theater in the CVM Main Building for a recommended minimum gift of \$250,000.

Construction of the CVM Main Building was completed in 1982 when the School of Veterinary Medicine emerged as a full program at NC State. Since then, the South Theater has been one of three large lecture halls that have served as the primary classrooms for more than 2,470 veterinary students who have graduated with DVM degrees. The Theater seats approximately 100 and also is equipped for "classroom capture" distance learning.

The 2,140-square-foot South Theater was renovated in 2016 with significant technological and environmental upgrades that greatly enhance the classroom experience for DVM students. The \$500,000 renovation transformed this educational space by installing a new ceiling, LED lighting, ergonomic seating, desks with power ports, lecture podium, advanced audio/visual systems, all new finishes and carpeting, HVAC and an exterior window.

As donors are identified for the listed naming opportunities, official NC State University forms and other required documentation will be submitted for Board of Trustees approval.

Required Signatures



Dianne Dunning

Associate Dean for Advancement, College of Veterinary Medicine

Date: 8 Aug 2018

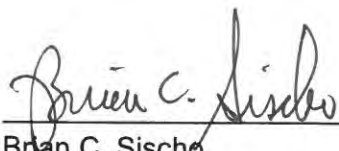


D. Paul Lunn

Dean, College of Veterinary Medicine

Date: 8/8/18

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Brian C. Sischo

Vice Chancellor for University Advancement

Date: 8/22/18



Scott R. Douglass

Vice Chancellor for Finance and Administration

Date: 8-24-18

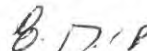
☒ **APPROVED**



Jim Broschart

Associate Vice Chancellor for University Development
Chair of Special Committee on Naming Opportunities

☐ **NOT APPROVED**



Date of Committee Review

If not recommended for approval, please attach rationale for the Committee's decision.

**North Carolina State University
Proposal for Naming Opportunity of a Facility
NC State Athletics Sports Medicine Center
in the Murphy Football Center**

Presented by: NC State Athletics and the Wolfpack Club

NC State Athletics and the Wolfpack Club request approval from the Board of Trustees to name the NC State Athletics Sports Medicine Center in the Wendell H. Murphy Football Center for a recommended minimum gift of \$1 million.

Sports Medicine is essential to the continued success of NC State athletics. To provide optimal care to the Wolfpack's football student-athletes, it has become necessary to modernize and expand the primary Sports Medicine Center that serves the football program through a \$2.5 million renovation project. Any gifts toward this project will be placed in a restricted use fund for the purpose of funding the renovation.

The renovated Sports Medicine Center will house state-of-the-art rehabilitative technology and equipment and will optimize the functionality of the 5,700-square-foot space. The renovation will greatly improve the program's ability to provide preventative, acute and rehabilitative care, all with the goal of quickly and safely returning student-athletes to competition. This level of care and professionalism also will strengthen recruitment and retention of student-athletes, coaches and Sports Medicine and Athletic Training staff.

The naming opportunity for this project will recognize the donor who values the welfare and wellness of Wolfpack football student-athletes. It will also affiliate the new name with a world-class Sports Medicine program and with the Wendell H. Murphy Football Center, the largest operations facility in the country devoted solely to football.

Renovation of the Sports Medicine Center will begin in January 2019 with anticipated completion in Spring 2019.

Attachments:

- Sports Medicine Center plan
- Sports Medicine Center slides

As donors are identified for each of the listed naming opportunities, official NC State University forms and other required documentation will be submitted for Board of Trustees approval.

Required Signatures

Deborah A. Yow
Deborah A. Yow
Director of Athletics

Date: 8.15.18

Brian Clark
Brian Clark
Director of Major Gifts, The Wolfpack Club

Date: 8/16/18

Brian C. Sischo
Brian C. Sischo
Vice Chancellor for University Advancement

Date: 8/22/18

Scott R. Douglass
Scott R. Douglass
Vice Chancellor for Finance and Administration

Date: 8/24/18☒ **APPROVED**

Jim Broschart
Jim Broschart
Associate Vice Chancellor for University Development
Chair of Special Committee on Naming Opportunities

☐ **NOT APPROVED**

8.17.18
Date of Committee Review

If not recommended for approval, please attach rationale for the Committee's decision.



**North Carolina State University
Proposal for Naming Opportunity of a Facility**

**NC State Athletics Broadcast and Production Center
in the Murphy Football Center**

Presented by: NC State Athletics and the Wolfpack Club

NC State Athletics and the Wolfpack Club request approval from the Board of Trustees to name the NC State Athletics Broadcast and Production Center in the Wendell H. Murphy Football Center, as listed below:

Naming Opportunities for Athletics Broadcast and Production Center	Recommended Minimum Gift
Athletics Broadcast and Production Center	\$4,000,000
Control Room	\$1,500,000

The new NC State Athletics Broadcast and Production Center will be a state-of-the-art facility where the Athletics Broadcast and Video staff will tell the stories and promote the brand of NC State Athletics. The total project cost of \$6.6 million includes the facility's design, construction and equipment. Any gifts toward this project will be placed in a restricted use fund for the purpose of funding the construction.

The project objective is to build and equip the Broadcast and Production Center to produce game-day video and year-round television and digital programming, meeting and exceeding the requirements established by the new ACC Network. It also will house the game-day operations center for display board productions at all NC State Athletics venues.

The facility will feature broadcast studio space, production control rooms, a green screen studio and editing/production suites. Live broadcast operations will be visible to visitors, engaging interest and creating excitement surrounding NC State Athletics. This visibility also will encourage recruitment and retention of student-athletes, coaches, fans and donors.

The naming opportunities for the Broadcast and Production Center will provide wide name recognition through television and digital broadcasts, as well as additional exposure to visitors at the Wendell H. Murphy Football Center at Carter-Finley Stadium.

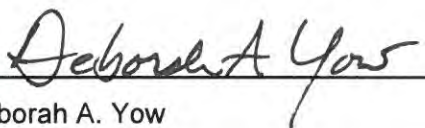
Renovation of the facility began in June 2018 with anticipated completion in Spring 2019.

As donors are identified for each of the listed naming opportunities, official NC State University forms and other required documentation will be submitted for Board of Trustees approval.

Attachments:

- Broadcast & Production Center slides

Required Signatures



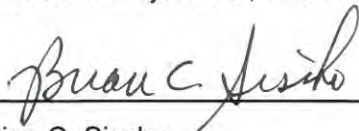
Deborah A. Yow
Director of Athletics

Date: 8.15.18



Brian Clark
Director of Major Gifts, The Wolfpack Club

Date: 8/16/18



Brian C. Sischo
Vice Chancellor for University Advancement

Date: 8/22/18



Scott R. Douglass
Vice Chancellor for Finance and Administration

Date: 8-24-18

☒ **APPROVED**



Jim Broschart
Associate Vice Chancellor for University Development
Chair of Special Committee on Naming Opportunities

☐ **NOT APPROVED**

8.17.18

Date of Committee Review

If not recommended for approval, please attach rationale for the Committee's decision.

**BOARD OF TRUSTEES
NORTH CAROLINA STATE UNIVERSITY
AGENDA**

**University Affairs Committee
1:15 p.m. – 3:00 p.m. September 20, 2018
Winslow Hall Conference Room**

Ann Goodnight, Chair

Members: Tom Cabaniss, Jess Errico, Jim Harrell, Ron Prestage, Susan Ward

CALL TO ORDER

Ann Goodnight, Chair

ROLL CALL

Ann Goodnight, Chair

READING OF STATE GOVERNMENT ETHICS ACT CONFLICT OF INTEREST STATEMENT

Ann Goodnight, Chair

- | | | |
|-----------|--|----------------|
| 1. | RESPONSIBILITIES OF THE COMMITTEE | TAB 7.1 |
| A. | Review Committee Responsibilities as established in Bylaws
<i>Presenter: Warwick Arden, Executive Vice Chancellor and Provost</i> | 7.1A |
| B. | Review Draft Plan of Work for the 2018-2019 Year
<i>Presenters: Ann Goodnight, Committee Chair
Warwick Arden, Executive Vice Chancellor and Provost</i> | 7.1B |
| 2. | CONSENT AGENDA | TAB 7.2 |
| A. | Approval of July 19, 2018 Minutes (open & closed session) | 7.2A |
| B. | Requests to Continue Centers/Institutes | 7.2B |
| | a. Advanced Self Powered Systems of Sensors and Technologies Center (ASSIST) | |
| | b. Center for Marine Sciences and Technology (CMAST) | |
| C. | Designation of Time Limited Option for Distinguished Professorships | 7.2C |
| D. | Requests to Confer Tenure | 7.6A |
| 3. | REQUESTED ACTION | TAB 7.3 |
| A. | Department of Athletics Proposed Bonus Structure for Baseball
<i>Presenter: Deborah Yow, Director of Athletics</i>
<u>Rationale:</u> Requires approval per Non-Salary and Deferred Compensation Policy 05.15.03. | 7.3A |

-
- | | | |
|-----------|--|----------------|
| 4. | REPORTS | TAB 7.4 |
| A. | Fall Enrollment Report
<i>Presenter: Louis Hunt, Senior Vice Provost, Enrollment Management & Services</i> | 7.4A |
| B. | UNC Employee Engagement Survey
<i>Presenters: Marie Williams, Associate Vice Chancellor, Human Resources
Nancy Whelchel, Director of Survey Research, Inst. Research & Planning</i> | 7.4B |
| C. | Student Body President Report
<i>Presenter: Jess Errico, Student Body President</i> | 7.4C |
| D. | Provost Update
<i>Presenter: Warwick Arden, Executive Vice Chancellor and Provost</i>
a. 2018-2019 Faculty Salary Ranges
b. Update on Leadership Position Searches | 7.4D |
| 5. | TOPIC OF INTEREST/COMMITTEE DISCUSSION | TAB 7.5 |
| A. | The Promotion and Tenure Process at NC State
<i>Presenter: Warwick Arden, Executive Vice Chancellor and Provost</i> | 7.5A |
| 6. | CLOSED SESSION (Personnel Matters) | TAB 7.6 |
| 7. | RECONVENE OPEN SESSION | |
| 8. | ADJOURN | |

NC STATE UNIVERSITY**Board of Trustees - University Affairs Committee****Delegated Authority and Assignments**

Based on Board of Trustees Bylaws - POL 01.05.01, Appendix 1, Section V

EHRA Personnel**Non-salary compensation**

- Approve non-salary compensation for all EHRA employees other than Vice Chancellors

Salary matters

- Establish salary ranges for SAAO employees that are not otherwise established by UNC-GA
- Recommend any salary increase for an EHRA employee, other than for Vice Chancellors, that requires approval by the Board of Governors

Administrative separation and retreat rights

- “Retreat rights” are those conditions of employment that would apply should the administrator leave his/her administrative position.
- Review and approve any administrative separation or retreat rights subject to BOT approval under UNC and NC State policies.

Conferral of permanent tenure

- New faculty hires tenured at a previous institution
- Faculty candidates reviewed through annual reappointment, promotion, and tenure process

Designation of particular Distinguished Professorships as time limited**Conferral of Emeritus status to SAAO Tier I employees****Appoint or extend the contract of the Athletic Director and Head Coaches**

Review and recommend petitions relating to employees seeking political candidacy and/or public office holding

Employee Appeals

Hear appeals of discharged or suspended employees

Hear and render a decision on appeals from the disposition of grievances

Academic Programs

Review and recommend academic degree proposals

Receive notification of other academic program proposals (ex. certificates)

Student Affairs

Review and recommend campus initiated tuition increases and student fees

Honorary Degrees, Awards and Distinctions**Honorary Degrees and Holladay Medals**

- Receive and review nominations
- Recommend nominees to Board of Trustees for approval

Provide advice in Chancellor's selection of a commencement speaker

Planning

Review and recommend changes in the university's mission statement

Advise chancellor on development of plans to carry out the university's mission

Review and approve establishment, continuation and discontinuation of Centers and Institutes

Policy Development

Recommend to Board policies related to:

- Personnel
 - Collection of tuition, fees and other monies from students
 - Administration of scholarships and other financial aid to students
 - Provision of student services activities, including government and intercollegiate athletics
 - Research, Centers and Institutes
-

Reports

Hear reports from the Chair of Faculty, Chair of Staff Senate, and Student Body President

Carolyn Bird
Chair, Faculty

Jason Painter
Chair, Staff Senate

Jess Errico
Student Body President

Other reports include:

- Enrollment
- Faculty retention
- Graduation statistics
- Intercollegiate athletics
- Residency for full scholarship undergraduate students
- Students requiring special consideration

**NC STATE BOARD OF TRUSTEES
UNIVERSITY AFFAIRS COMMITTEE
2018-2019 PLAN OF WORK (DRAFT)**

September

- Centers and Institutes Requests (UNC Pol. 400.5 (R) (NC State Pol 01.05.01 App. 1, V.f.iii) (as needed)
Review and approve the establishment, continuation and discontinuation of Centers and Institutes.
- Committee Responsibilities and Plan of Work (Annually)
Review committee's delegated authority and assignments and develop plan of work for the year.
- Degree Program Proposals (NC State Pol. 01.05.01, App.1, V.c.i.) (as needed)
Review and recommend approval to the BOT.
- Fall Enrollment Report / Progress Toward Enrollment Planning (NC State Pol 01.05.01, App 1, V.f.ii)
Receive report and comment as warranted.
- Honorary Degree Recommendations (UNC Pol. Ch. 100.1, Appendix 1 (IV) (NC State Pol 01.05.01, App.1, V.e.i)
Receive and review nominations as needed. Recommend nominees for approval to the BOT.
- Personnel Requests (NC State Pol 01.05.01, App 1.V.a.i.ii.iii.iv.v.vi.vii.viii.ix.b.i.ii)) (as needed)
Approve or recommend approval to the BOG.
- Salary Ranges for Faculty (Annually)
The Chancellor has delegated authority for faculty salary ranges. Upon the Chancellor's approval, these ranges are shared with the committee.
- Student Body President Report (NC State Pol 01.05.01 App.1, V.h.i.)
Receive report and comment as warranted.

November

- Campus Initiated Tuition Increase and Student Fees (UNC Pol. 1000.11, II, 3.A. iii) (NC State Pol. 01.05.01, App. 1, V.d.i)
Review and recommend approval to the BOT.
- Centers and Institutes Requests (UNC Pol. 400.5 (R) (NC State Pol 01.05.01 App. 1, V.f.iii) (as needed)
Review and approve the establishment, continuation and discontinuation of Centers and Institutes.
- Commencement Speaker – December (NC State Pol 01.05.01 App. 1, V.e.ii)
Provide advice in Chancellor's selection of Commencement Speaker.
- Degree Program Proposals (NC State Pol. 01.05.01, App.1, V.c.i) (as needed)
Review and recommend approval to the BOT.
- Faculty Retention Report
Receive report and comment as warranted.

**NC STATE BOARD OF TRUSTEES
UNIVERSITY AFFAIRS COMMITTEE
2018-2019 PLAN OF WORK (DRAFT)**

- Faculty Senate Report (NC State Pol 01.05.01 App.1, V.h.i.)
Receive report and comment as warranted.
- Honorary Degree Recommendations (UNC Pol. Ch. 100.1, Appendix 1 (IV) (NC State Pol 01.05.01, App.1, V.e.i)
Receive and review nominations as needed. Recommend nominees for approval to the BOT.
- Personnel Requests (NC State Pol 01.05.01, App 1.V.a.i.ii.iii.iv.v.vi.vii.viii.ix.b.i.ii)) (as needed)
Approve or recommend approval to the BOG.
- Staff Senate Report (NC State Pol 01.05.01 App.1, V.h.i.)
Receive report and comment as warranted.
- UNC Report on Intercollegiate Athletics (UNC Pol. 1100.1) (Annually)
Receive and review report prior to submission to UNC System Office.

February

- Centers and Institutes Overview (Informational report provided every 2 years.)
Receive report and comment as warranted.
- Centers and Institutes Requests (UNC Pol. 400.5 (R) (NC State Pol 01.05.01 App. 1, V.f.iii)) (as needed)
Review and approve the establishment, continuation and discontinuation of Centers and Institutes.
- Degree Program Proposals (NC State Pol. 01.05.01, App.1, v.c.i) (as needed)
Review and recommend approval to the BOT.
- Graduation Report
Receive report and comment as warranted.
- Holladay Medal Recommendations (NC State Pol 01.05.01, App.1, V.e.i) (Annually)
Receive and review nominations. Recommend nominees for approval to the BOT.
- Honorary Degree Recommendations (UNC Pol. Ch. 100.1, Appendix 1 (IV) (NC State Pol 01.05.01, App.1, V.e.i)
Receive and review nominations as needed. Recommend nominees for approval to the BOT.
- Personnel Requests (NC State Pol 01.05.01, App 1.V.a.i.ii.iii.iv.v.vi.vii.viii.ix.b.i.ii) (as needed)
Approve or recommend approval to the BOG.
- Reappointment, Promotion and Tenure Process
Receive report and comment as warranted.
- Student Body President Report (NC State Pol 01.05.01 App.1, V.h.i.)
Receive report and comment as warranted.

**NC STATE BOARD OF TRUSTEES
UNIVERSITY AFFAIRS COMMITTEE
2018-2019 PLAN OF WORK (DRAFT)**

April

- Annual Human Resources Compliance Report (The UNC President has delegated responsibility for an annual review and approval of the Annual HR Compliance Report to the Boards of Trustees under UNC Policy 600.3.4.)
Review and approve report prior to submission to UNC System Office.
- Centers and Institutes Requests (UNC Pol. 400.5 (R) (NC State Pol 01.05.01 App. 1, V.f.iii) (as needed)
Review and approve the establishment, continuation and discontinuation of Centers and Institutes.
- Commencement Speaker – May (NC State Pol 01.05.01 App. 1, v.e.ii)
Provide advice in Chancellor's selection of Commencement Speaker.
- Degree Program Proposals (NC State Pol. 01.05.01, APP1, v.c.i.i)(as needed)
Review and recommend approval to the BOT.
- Distinguished Professorship Update
Receive information about recently awarded professorships of distinction as applicable.
- Faculty Senate Report (NC State Pol 01.05.01 App.1, V.h.i.)
Receive report and comment as warranted.
- Honorary Degree Recommendations (UNC Pol. Ch. 100.1, Appendix 1 (IV) (NC State Pol 01.05.01, App.1, V.e.i)
Receive and review nominations as needed. Recommend nominees for approval to the BOT.
- Nepotism Report (UNC Pol. 300.4.2) (Annually)
Receive annual report on university's compliance with UNC Policy 300.4.2.
- Personnel Requests (NC State Pol 01.05.01, App 1.V.a.i.ii.iii.iv.v.vi.vii.viii.ix.b.i.ii) (as needed)
Approval or recommend approval to the BOG.
- Residency for Full Scholarship Undergraduate Students (§ 116-143.6) (NC State Reg 02.70.03)
Receive report and comment as warranted.
- Staff Senate Report (NC State Pol 01.05.01 App.1, V.h.i.)
Receive report and comment as warranted.
- Students Requiring Special Consideration (NC State Reg 02.10.04)
Receive report and comment as warranted.
- Salary Ranges for Senior Academic and Administrative Officers (SAAO) (NC State Pol 01.05.01, App. 1, V.a.ii)
Review and approve recommended ranges.

**NC STATE BOARD OF TRUSTEES
UNIVERSITY AFFAIRS COMMITTEE
2018-2019 PLAN OF WORK (DRAFT)**

Special Meetings (called as needed)

- There may be items that need the committee's consideration in between the regularly scheduled meetings. In these cases, a special meeting of the committee will be held.

Additional Topics for Discussion

- Topics associated with implementation of the strategic plan/other topics of interest
- Updates from the Provost

Desired Outcomes

- To comply with delegated authority and assignments as prescribed by N.C. General Statutes, UNC Board of Governors Policies and NC State University Policies.
- To keep the Board fully informed of major issues and policies associated with the governance of the university.
- To solicit the Board's input on policy, strategy and goal-setting for the university.

CONSENT AGENDA ITEMS

MINUTES**UNIVERSITY AFFAIRS COMMITTEE**

Board of Trustees
North Carolina State University
July 19, 2018

The University Affairs Committee of the Board of Trustees of North Carolina State University met July 19, 2018 in the Chancellor's Conference Room, Holladay Hall.

Members Present: Stan Kelly, Committee Chair
Jess Errico
Wendell Murphy
Ed Weisiger, Jr.

Other Trustees Present: Jimmy Clark, Board Chair
Ron Prestage
Susan Ward

Chair Kelly called the meeting to order at 10:30 a.m. He called roll and certified that a quorum was present.

All members of the Committee were reminded of their duty to avoid conflicts of interest and appearances of conflicts of interest under the State Government Ethics Act. It was inquired as to whether there were any known conflicts of interest or appearances of conflict with respect to any matters coming before the Committee at this meeting. There being none, the meeting continued.

Consent Agenda

A motion was made by Mr. Weisiger to approve the consent agenda items which included approval of the April meeting minutes; continuation of three Centers that have completed the required periodic review; designation of a time limited option for five distinguished professorships; and conferral of tenure to nine new faculty members joining the university in the fall. Ms. Errico seconded the motion. The motion carried.

Requested Action

Chair Kelly noted that four policy revisions needed the committee's review and recommendation to the full board. First, Provost Arden presented revisions to Policy 05.25.01 – Faculty Grievance and Non-Reappointment Review. The revisions, in section 2.1 of the policy, are to adjust the requirements for the grievance/review committee membership in order to account for the University College in the Division of Academic and Student Affairs which only appoints faculty on non-tenure track contracts.

Next, Vice Provost Sherri Schwab discussed revisions to Policy 04.25.05 – Equal Opportunity, Non-Discrimination and Affirmative Action. The revisions are made to include a values statement, to better align the policy with Title IX guidelines and to provide overall clarity throughout the policy.

Vice Chancellor and Dean Mike Mullen reviewed revisions to the Code of Student Conduct Policy 11.35.01. He noted that a New Director of Student Conduct, a new Counsel in the Office of General Counsel's Office focusing on student affairs and the need for Title IX related revisions precipitated revisions to the policy. The policy changes would become effective August 1, 2018.

Finally, Ms. Marie Williams, Associate Vice Chancellor for Human Resources, reviewed two changes to the EHRA Policy 05.15.01. The first revision in section 4.2 broadens the method of delivery, other than certified mail with return receipt that the university can use when sending an individual a written statement of intention to discharge or suspend. The other change allows the Chancellor or designee discretion to

accept the transfer of partial or full accrued annual leave from other UNC institutions and state agencies. This revision will help in recruitment efforts. The changes will be retroactive to July 1, 2018 in order to align with the fiscal year.

A motion was made by Mr. Murphy to recommend the four policy revisions to the full board for approval. As it relates to the Student Conduct Policy, the effective date will be August 1, 2018. As it relates to the EHRA policy, the effective date will be July 1, 2018. Mr. Weisiger seconded the motion. The motion carried.

Director of Athletics Deborah Yow discussed updates to the bonus structure for softball staff and the newly created bonus structure for rifle as one did not exist previously. Both structures include competitive and academic bonus categories. Mr. Weisiger moved to approve the bonus structures for softball and rifle. Mr. Murphy seconded the motion. The motion carried.

Informational Report

Provost Arden provided an update on four new graduate certificates that will be effective this fall: Certificate in Global Health; Online Graduate Certificate in Biology for Educators; Graduate Certificate in Tax Analytics and Technology; and Graduate Certificate in Mathematics Teaching and Learning. Three of the four certificates are offered online which is useful for practicing professionals who are seeking these additional credentials.

Closed Session

At 10:52 a.m. a motion was made by Mr. Weisiger, and seconded by Mr. Murphy, to go into closed session to prevent the premature disclosure of an honorary degree or award; to establish the amount of compensation and other materials terms of an employment contract or proposed employment contract; and to consider the qualifications, competence, performance, character, fitness, conditions of appointment or conditions of initial employment of an employee or prospective employee. The motion carried.

Reconvene in Open Session

After coming out of closed session, Chair Kelly announced the meeting in open session.

Mr. Murphy moved to approve the personnel items discussed in Closed Session related to the approval of head coach employment agreements for Softball and Rifle. Ms. Errico seconded the motion. The motion carried.

With no further business, Chair Kelly announced the meeting adjourned at 11:05 a.m.

Stan Kelly, Chair

2018 SITE VISIT REPORT



Nanosystems Engineering Research Center (NERC)

**Center for Advanced Self-Powered Systems of Integrated Sensors and Technologies
(ASSIST)**

6th Year Renewal Site Visit

Site Visit ID: V181533

**May 15-17, 2018
North Carolina State University (NCSU)**

Lead:

North Carolina State University (NCSU)

Core Partners:

**Florida International University (FIU), Pennsylvania State University (PSU), University of
Michigan (UM), University of North Carolina (UNC), University of Virginia (UVA)**

Site Visit Team Members

Lisa Abrams
Associate Chair, Department of Engineering Education
The Ohio State University

Shaikh Ahmed
Professor
Southern Illinois University Carbondale

Evangelyn Alocilja
Professor
Michigan State University

David Cunningham
Professor
Eastern Kentucky University

Randolph Hatch
President
Cerex, Inc.

Konrad Jarausch
Entrepreneur in Residence
Capricorn Investment Group

Zoran Krivokapic
Senior Member, Tech Staff
Global Foundries

Alexander Leonessa
Associate Professor
Virginia Tech

Rajasekharam Mannam
Engineering Technology Development Manager
Intel Corporation

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A. Executive Summary

Intellectual Merit: The Intellectual Merit criterion encompasses the potential to advance knowledge.

Is the ERC focused on a transformative engineered system(s)? Does the strategic plan target and organize a high quality and integrated research program with challenging barriers to achieve the systems goals? How important is the activity to advancing knowledge and understanding within its own field or across different fields? To what extent does the activity suggest and explore creative and original concepts? How well qualified is the team to conduct the project? How well conceived and organized is it? Is there sufficient access to resources?

The vision of ASSIST to improve health and wellness through long-term continuous monitoring of personal health and exposures is being addressed by developing and building self-powered, wireless, wearable, and multimodal sensing platforms. This will and is leading to transformative low power and energy harvesting systems followed by storage in hybrid supercapacitors all of which are key to the development and deployment of wearable sensors. Record low power consumption levels are being achieved with the advanced circuitry and architectures, which is necessary for enabling the energy harvesting to be sufficient to drive the devices. The supercapacitors are also key to enabling self-powered devices by storing and smoothing intermittent power sources from body heat and motion. Through its efforts to integrate sensors, energy harvesting, energy storage and communications into textiles, there are now wearable devices which are providing the ability to monitor ECG as well as environmental factors influencing health. The progress made with this effort in textiles has been excellent with a shirt for monitoring ECG now ready for human testing and demonstration. This should further enhance the visibility of ASSIST and lead to funding opportunities beyond NSF. It will also add to the potential for new start-up companies and hand offs to industrial partners.

The HET and SAP testbeds serve to integrate the research activities across the Center. While the barrier analysis is ongoing as the research program evolves, there is a good effort to identify such barriers and potential solutions. The overall strategy is good; however, full integration of the HET and SAP testbeds comes near the end of the ten-year effort.

New efforts have been added for coupling the ASSIST technologies with implantable sensors as well as new energy harvesting from external sources (RF and ultrasound). This will give the Center additional capabilities for monitoring key health-related parameters in a larger range of applications although there is a possibility of diluting the current efforts to deploy self-powered wearable systems.

Overall the Center is well organized with integration across multiple disciplines and institutions. The goals and roadmaps are clearly established and the appropriate resources are in place for continued progress towards the goals and vision of the Center.

Broader Impacts: The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

How well does that activity advance discovery and understanding while promoting teaching, training, and learning? Will the research be integrated into curricular materials for students at all levels? Will the pre-college program serve to motivate students to pursue engineering careers? How well does it broaden the participation of underrepresented groups (e.g. gender, ethnicity, disability, geographic, etc.)? To what extent does it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Is there a strong, active partnership with industry/practitioners that will strengthen the ERC and speed technology transfer? Are the results disseminated broadly to enhance scientific and technological understanding? What are and may be the benefits to society?

ASSIST is focused on unique engineering concepts of low-power and self-sustaining energy harvesting devices and sensors for medical applications. This has resulted in: (1) low-power energy harvesting devices (2) accurate low-power sensors (3) low-power systems-on-chip (SOC) with effective communication capabilities. Diseases and clinical conditions that are targeted as potential applications of the technologies under development, such as asthma, diabetes, wound healing, and heart conditions are significant issues that add to the overall cost of healthcare. Individuals with these conditions are expected to enjoy a better quality of life and less morbidity if continuous monitoring of certain related biomarkers becomes possible with minimal overhead, such as changing batteries or wearing/carrying bulky devices.

For the ASSIST Center to be successful, it will need to develop groundbreaking novel materials that have high power generation capabilities in mW range at room temperature; sensors that can operate at low power and provide accurate results; SOC's that can integrate all the components and communicate with the power generated by the energy harvesting devices. To achieve these goals, the ASSIST Center has developed a strong strategic plan with thrust areas and leaders who are multidisciplinary and collaborative from multiple universities in the US and abroad. ASSIST has 27 industrial members who are active in the program, engaging faculty with discussion, and providing industry requirements and needs. Their current members are impressed with the depth and strength of research and quality of students. More than 200 students are involved in ASSIST-related projects across the participating campuses. Within the Center, they have the opportunity to not only focus on their main area of research but also to be exposed to the other collaborators' research that together build up the testbeds under development. They can gain a broader view in engineering, research, and education, and, in some cases, engage in a multidisciplinary collaboration.

ASSIST is well focused on training K-12 and undergraduate students to ensure the next generation of researchers are engaged and interested in engineering and science. ASSIST is engaging students through academic programs and courses, undergraduate research opportunities, extracurricular activities for undergraduate/graduate students, and K-12 education programs. In the last three years, ~ 20 courses with ASSIST content were offered annually and four new courses were created. To date, ASSIST had 35 students enrolled in the minor program of which five enrolled during the reporting year. During the last three years, 22 of these students graduated and received their minor. ASSIST conducted fifteen workshops, short courses and webinars, 62 outreach events for K-12 students, and 18 seminars and invited talks. Research Experience for Teachers (RET) is strong and gives teachers hands-on experiences in the lab and allows them to use the knowledge to create classroom projects. The Wearable Device Challenge

program for middle and high school students continues to show impressive participation. ASSIST's work in learning opportunities for disabled students expands the ASSIST opportunities to a new K-12 venue. The Center should continue to do similar activities.

One area of weakness is the under representation of different demographic and women. ASSIST should work towards focusing this metric. For example, they can develop interdisciplinary projects and engaging students from areas such as Bio to participate in Electrical/Material projects to increase their interest. A platform for students to better communicate with each other needs to be established. Specifically, students working on similar area but in two different labs or universities should be able to communicate with each other and share ideas. Also, ASSIST program should clarify and align students to focus on fundamental research while keeping the end product goals in mind. Activities related to commercialization of end products should be kept separate to as minimum as possible unless students choose to do so.

ASSIST is gaining strength in engineering and developing systems to make an end product. While doing this, ASSIST should work on understanding, developing and pushing the fundamental science and material development frontier. Also, ASSIST should engage with industry more frequently, updating them with monthly progress on results from partnership activities.

Some graduate students are receiving internship opportunities and full time jobs from industry partners, and there is room to further emphasize and expand on this relationship. The Industry Advisory Board (IAB) is engaged in the activities of the Center and would like to interact with the students.

2018 SVT SWOT Analysis

Strengths

- Center management is effective; Center team is well integrated and working well together.
- Strong REU program.
- Wearable Device Challenge (WDC) competition is well received.
- Very technically sound team, excellent research results in some Thrust areas (for example, low-power electronics and integration).
- Much better defined specifications and requirements than early years of the Center with input from stakeholders on use cases.
- Promising international collaborations.
- The institutional commitment and support is very strong.
- The Center has evolved to more of the top-down organization to achieve its vision and mission moving from individual research projects, research thrusts, to testbeds.
- High quality students are involved with the Center. Student placement is impressive. Students received several awards.
- Deep involvement of the IAB and Scientific, Medical, and Military Advisory Board (SMM) members in the selection of projects.
- Early commercialization efforts are bearing fruits; there have been several spin-off companies using Center developed technologies.

Weaknesses

- **The IAB is not growing as quickly as necessary. A stronger engagement and long-term commitment of industry partners would be critical for Center sustainability beyond 10-year graduation.**

Response: *We agree with the SVT. Increasing membership numbers at the Full Member and Associate Member level is a primary goal of the Industry Program in Year 7. As ASSIST's technologies have developed from early-stage research demonstrations to higher-TRL units, corporate attention is expected to increase in commercial development and licensing. Attracting medical devices companies such as Boston Scientific, Medtronic, Phillips Healthcare, GE Healthcare, and Stryker as Industry Advisory Board members will increase the Center's research relevance and bring early innovations in front of companies, which may act as early advocates for development within startups for later acquisition. The ILO will continue to recruit at industry-facing events, conferences, workshops, and other events to increase membership through all levels of the IAB.*

- **Mostly incremental progress in SAP Testbed. SAP Testbed is still not mature enough to be integrated into the engineered system.**

Response: *The SAP is by definition a more complex system than the HET, as the former is a self-powered version of the latter. As the multi-modal sensing capabilities and application use case requirements are developed within the HET, the energy harvesting and storage devices and the ultra-low power circuits are developed to support self-powered operation of those capabilities and requirements. Significant progress has been made on all of these technologies, many with world-record results, and they are now converging into the SAP 1 engineered system for self-powered vigilant cardiac monitoring. Save a demonstration setup error that has been resolved since the site visit and an integrated circuit re-spin that is planned for Fall 2018, SAP 1 is achieving self-powered operation, consuming 2+ orders of magnitude less power than comparable state-of-the-art systems, and is ready for human subject deployment in collaboration with Dr. J. Randall Moorman at UVA. ASSIST is putting plans in place to accelerate producing deployable versions of SAP to increase SAP functionality and engage clinicians and industry partners.*

- **More fundamental research and transformative ideas are encouraged to gain fundamental understanding of relationship between performance and material properties**

Response: *There is an inherent balance between developing new fundamental research and transformative ideas and technology development inherent in any ERC. In the first six years, we carried out considerable amount of fundamental work in a number of fronts, most notably in thermoelectric and piezoelectric materials optimization during the early years of the Center. As the ASSIST engineered systems continue to mature, the work is naturally shifting from materials to systems oriented work. To insure a continued pipeline of new fundamental understanding, we anticipate increasing the weighting for fundamental understanding of structure-property-processing relationships in the funding call to be announced in summer 2018.*

- **Insufficient diversity in academic majors of the students involved in the ASSIST Center**

Response: During the first six years of ASSIST, electrical engineering departments were more strongly represented in ASSIST. However, PIs from biomedical engineering, materials science, chemical engineering, mechanical and textile engineering also had major contributions to ASSIST platforms. As we move into the last four years of ASSIST new opportunities are emerging for increasing the diversity of academic majors. Specifically, as we are now in the position to field complete systems for clinical work, ASSIST will need to engage larger numbers of medical professionals and data scientists; the latter will help ensure the Center is able to engage outside members and industry partners with the data coming out of its platforms. We are also looking for new opportunities to engage PIs from biomedical engineering departments in order to fill critical gaps in ASSIST platforms. This includes PIs outside the four core partnering institutions. We also intend to fill the two remaining ASSIST tenure track positions with individuals from diverse academic disciplines.

- **Educational activities are routine and this program could be more innovative. Action research is not comprehensive and there are insufficient efforts in the assessment process.**

Response: Since its inception, ASSIST has focused on developing and implementing educational activities that are impactful within the requirements and constraints of the ERC program. We believe that several of these programs are also unique such as the Translational Engineering Skills Program, a minor program in Nano-Science and Technology, and a unique multidisciplinary course to introduce Nano-Science and Technology to students from all Engineering Departments. ASSIST has also sponsored and mentored numerous successful Senior Design teams, hosted many undergraduate researchers, won an REU Site grant, and most recently won an REM Supplement grant.

We have an assessment plan in place for all education programs. In the coming year we will review and update this plan in collaboration with our assessment coordinator. We appreciate the necessity and benefit of comprehensive action research and assessment and are working to improve this aspect further within the available resources.

- **Students participating in ASSIST could benefit from a stronger sense of the mission and vision of the Center and on-boarding process could be further improved.**

Response: We agree and this is something that we continue to work on in the Center, especially in light of the fact that we have had many students graduate recently and a new cohort of students is entering the Center. The formal onboarding process implemented last year was a first step in this direction and we will strengthen this effort. Furthermore, an effort will be made to streamline the Center meeting process so they follow more of a town hall format that focuses on key messages for the Center that the students could attend. The Center's tendency to spread the meetings and seminars throughout the semester led to somewhat lower attendance, as we believe students often

don't have the time to commit to more frequent meetings. This will further improve students' understanding of the Center's mission and vision.

As discussed at the SV, the Center will begin to incorporate demographic data collection into the onboarding process in a more direct manner. To date, in order to protect personnel information the demographic data was collected separately from other identifying information in a manner more in line with conducting social science research, rather than a human resources approach. This will change for AY2018-19 and the demographic data request will be set up in a way that respondents will either provide information, or by not providing it will indicate that it is their intention to not make that information available. This process will align with federal standards for collecting this data, and no one will be compelled to provide detailed responses.

- **Dissemination of curriculum is not satisfactory. For example, course materials could be further disseminated through platforms such as nanoHUB and Teachengineering.**

Response: *Although we do currently have a presence on nanoHUB with our entire E-304 Introduction to Nano-Science and Technology Course, we agree with the SVT feedback that additional efforts in this area could be beneficial. We will make efforts in the coming year to further disseminate course materials through nanoHUB platforms.*

- **The strategy for sustainability and long-term planning needs to be further developed (market survey, business model, need assessment, etc.). Define the opportunities to build center(s) of excellence, with differentiation/value, and a critical mass of partners who benefit. Identify key focus areas (like warrior-tech or clinical-trial monitoring or sports) around which to build differentiation/technology, expertise and applications.**

Response: *At the site visit, ASSIST presented its initial plan for self-sufficiency. As the SVT has pointed out, this plan needs further development and strategy behind it and we will take several steps in the coming months to do so. We will work closely with our industry partners to identify key areas of interest to them to ensure industry relevance after Year 10. Already, clinical trials has emerged as a key area but warrior-tech is another area that is growing within the DoD.*

For ASSIST to become a center of excellence involves achieving key mid and long term outcomes which have been mapped onto our logic model and presented in the Year 6 annual report. Examples of these include increased clinical validation, economic impact through increase in startups, licensing and commercialization, increase in number of algorithms based on ASSIST produced data, growth in the number of applications of ASSIST technologies in emerging areas in health and even beyond health such as IoT. The foundational ASSIST research that drives its mission can support various directions and the ASSIST leadership will build a business plan around these. One of ASSIST's major missions is to reach long-term relevance in low power systems research. Key to enabling this long-term relevance is developing projects for specific needs to deliver excellence in innovation and high value technologies to critical partners. The Industry Program's focus in Year 7 will highlight our most developed platforms to deliver early wins in human performance (for both sports and defense applications) and patient care for chronic

conditions. In order to ensure that our development is on target, we will engage closely with future technology stakeholders (patients, entrepreneurs, care providers, and other ecosystem partners) to approach challenges with holistic perspective and to build early stakeholder engagement in our solutions.

- **Center needs to expand on human trials and data reporting to validate the use case of technologies**

Response: *Year 7 and beyond will focus more on expanding the human trials where the first generation engineered systems will be evaluated on a larger pool of subjects ($N > 20$) and the next generations will be evaluated through the proof-of-concept studies with limited number of subjects ($N \sim 20$). Our current and strong collaboration with our medical partners lays the clinical foundation for these studies to ensure the test of the correct healthcare related hypotheses and measurement of the correct end-points. We will continue to populate more engineered systems and make these ready for clinical experiments. The HET engineered system team with its graduate students, postdocs and the collaboration with the ASSIST start-ups is ready to continue in this direction, run more experiments and generate more data. As for the data reporting, we already have established a solid data management strategy during Year 6. Starting in Summer 2018, we will seek a dedicated person (on the level of a postdoctoral scholar or research assistant professor) who will own the data management and organize the processing efforts. As this is more of a “developmental” effort, we have assessed during Year 6 that having a dedicated person will help the Center to overcome the logistical roadblocks instead of relying on the individual PIs engaged in the “research” aspect. This new person will be mentored by the Chief Systems Engineer and Testbed Leaders. S/he will work with the current PIs and Testbed teams and extend collaborations to new external data analytics partners both in the industry and academia. We expect this focused effort on data analytics to have an even stronger demonstration of the potential of ASSIST generated technologies and engineered systems.*

- **Demographic data collection must be strengthened in order to verify progress being made to meet Diversity Strategic Plans goals.**

Response: *To date, much of the effort in situating student understanding of the Center’s mission and vision have been through regular Center-wide meetings. However, we are reviewing the onboarding process and will incorporate a greater variety of mediums for conveying information to current and incoming Center personnel. This will include print material, PowerPoint presentations, videos, and other items that will provide an overview to individuals as well as a more comprehensive welcoming to the ASSIST team.*

- **Mentor training for faculty, graduate students, and undergraduate students is still not in place.**

Response: *We agree that this is necessary and are working to ensure we implement a high-quality mentor training program in the Center. We are working with Dr. Christine Grant at NC State*

towards implementing this training. Also, we have been awarded a recent REM supplement that will provide mentoring for undergraduate students.

- **Liquid sample acquisition and transfer to the device is at rudimentary stage with a high level of failure risk.**
- **Biosensors based on sweat and ISF platform, which is restricted by the 7-10 day lifetime of the platform.**

Response: *Liquid sample acquisition and transfer is an essential subsystem of the devices that ASSIST is applying to non- and minimally-invasive biomarker monitoring. Thus, we had to develop novel technology principally through new breakthrough ideas, enabling zero-power extraction and monitoring of sweat or ISF for hours to days. At the present time, there is no alternative to this emerging technology as no literature or commercial source describes comparable capabilities of continuous sweat sampling and monitoring for such long periods. In summary, we recognize that this research contains elements of "high risk," but we believe that this is also a high reward direction. Preliminary results show the concept works on skin mimics (membranes) and a pilot human subjects study has been conducted with positive extraction of sweat and ISF using both the osmotic pump and microneedle technologies, respectively. As we explain below, the new technique has the potential to have transformative effect not only on wearable low-power devices but also on many other pharmaceutical and personal healthcare products.*

Given that our work is conceptually ahead of other large efforts, we believe that 7-10 days of noninvasive monitoring constitutes a pioneering breakthrough. Additionally, we point out that the 7-10 day lifetime restriction does not strictly apply to the whole platform, but only to the consumable and replaceable part of the module (paper strip and hydrogel). Typically, biochemical sensing and disposal of the body fluid will require some consumable and replaceable part, as this is basically how such sensing devices operate (and the present ones are usually one-shot, not working for days on end). We will seek means to improve even further and have plans how we could extend the operational time by shedding off the accumulated deposit on the backend.

Finally, we also recognize that there are several excellent global research efforts focused on extracting power from biochemical sources such as lactate and glucose. It is possible that these biofuels could effectively drive the biochemical fluid collection platforms since one of the unique and disruptive features of our technology is the zero power consumption utilizing osmotic pumps. This way the individual device can be replaceable as a whole rather than requiring a new patch to be attached to the electronics each time. We will monitor this area as it progresses as it would synergistically fit our self-powered sensing goals.

Opportunities

- Major corporations involved in this space could/should be added to the IAB.
- Development of an overall system model that would aid in the comprehension of the complexities of the systems, provide estimates of system effectiveness, performance or technical attributes, reliability, and cost from a set of known or estimable quantities.

- Broaden the pre-college program by incorporating other ASSIST components (e.g., data management, app development, social and human factors, market research).
- Add/leverage a communication officer to improve ASSIST's presence (connectivity) in social networking and public outreach.
- Collaborate more actively with outside groups to boost the Center outcomes.
- There is an opportunity to expand inter-campus interactions such as student exchanges between member institutions.
- Include more disciplines outside engineering, particularly social scientists in medication adherence cases.
- Once the self-powered technology is finalized there are many applications for the technology within healthcare and in other fields (e.g., SIDS detection and exosuits).
- Improve the visibility of the Center in the market – more visible/public benchmarking against commercial projects/products and academic research as well as PR; i.e., invest NOW to help develop the brand/reputation of the Center, which will help drive incoming inquiries around partnerships/collaboration (not just outreach based) and expand the potential sources of funding for sustainability.
- Expansion of resources around commercial/innovation with a focus on med-tech device start-up / product launch to work with testbeds, PIs and students and to guide them through the commercialization process.
- Explore creative ways to address the natural tension between 'commercialization' and fundamental research – is there a way to allow students/faculty to focus on their passion while still being exposed-to and grounded-by the big picture?
- The Center should adapt to the rapid development of the biosensing field.

Threats

- **The Center focuses on wearable devices with many industrial competitors; hard to remain relevant and need to work hard to stay on top, by clearly identifying their areas of differentiation and benchmarking against academic and commercial efforts.**

Response: *With close communication with IAB and industry members, organizing workshops (four held so far and one planned for Year 7), attending several industry expos (such as Consumer Electronics Showcase - CES, the Healthcare Information Management Systems Society - HIMSS, Personal Connected Health - PCH, ID TechEx, and others) and relevant conferences on wearables every year, the Center Leadership Team has made sure to be aware of and stay on top of the wearables roadmap both in the academia and the industry. The Testbed Leader Dr. Alper Bozkurt is currently in IMEC, Belgium and has a visiting position for two months for a parallel assessment effort. Both the industry members and clinical partners have valued the applications and use cases we picked, and the engineered system platforms continue to attract attention and keep leading the field. The Center strategy is not to follow the industry to demonstrate incremental superiority but to come up with groundbreaking ideas and an inspiring strategy to drive and lead the roadmap on the wearables field. On the technology side, the SAP engineered system has set up a unique demonstration platform for self-powered vision whereas the application side has been moved forward for correlated sensing of health and exposure in wearable form factors through the HET engineered system. The respiratory exposure, diet management and medication adherence through wearable air quality and biochemical sensing are the unique aspects that the Center has been and*

will continue to lead the field on the application dimension. On the technology forefront, the Center leads the thermo-electrical and body-mechanical energy harvesting combined with ultra-low power sensors for the aforementioned applications. Going towards Year 10 and beyond, we will make sure to strengthen our differentiation and make sure to benchmark with the other efforts to proof our leadership in the field.

- **Risk of diluting the Center effort with ever evolving and changing testbeds. SVT recommends Center focus on strength areas to achieve self-sufficiency and demonstrate viable platform technology.**

Response: *The Center leadership has already started to have initial discussions on this, and we believe that near-term deployment of SAP 1 (self-powered vigilant ECG) and HET 2 (battery-powered diabetes use case) technologies – in addition to ongoing HET 1 (battery-powered asthma) deployments – are critical to positioning the Center for maximum impact and post-graduation self-sufficiency. As such, the Summer 2018 leadership retreat will focus on plans for this, and project selection will prioritize efforts that contribute to these systems and associated deployments, including data management and analysis support. Demonstrating clinical and industry impact with deployment-ready systems and bringing next-generation technologies to data generation stages will position the Center to grown its opportunities for external funding beyond Year 10. In the mean time, ASSIST will seek external funding for Gen 3 technologies through exploratory research mechanisms (NSF and NIH R21, NOT clinical (R01) or defense which asks for high TRL), as such efforts will be de-emphasized for core ASSIST funding.*

- **The measurement of sweat and shallow depth ISF may not correlate with blood chemistries and may prove to be insufficient to support FDA approvals. This would be a dead end for this effort. It is critical that this potential barrier be explored ASAP to avoid wasted efforts.**

Response: *We are not aware of any other method besides our new osmotic sweat withdrawal and the earlier established microneedles, which could achieve the Center's goal of performing long-term, noninvasive biomarker measurement. We understand and take into account the limitations of these methods and do not plan to seek the long-term detection of any sweat or ISF biomarkers that cannot be correlated to physiologically relevant blood or other levels. With regards to the physiological correlation between ISF and circulating biomarker levels, there is significant research in this field illustrating well-known and stable correlations. This includes both rapidly (hour-by-hour changing) biomarkers like glucose, and long-duration (hours to days) changes in biomarkers. For reference, a recently published article by colleagues we have consulted with very directly reports the majority overlap of biomarkers and proteins in ISF, blood, and plasma. (Polksy et al. J. Proteome Res. **2018**, 17:479-485. Proteomic Characterization of Dermal Interstitial Fluid Extracted Using a Novel Microneedle-Assisted Technique; Diamandis et al. J. Proteomics. **2017**, 155:40-48. Proteomic Characterization of Dermal Interstitial Fluid Extracted Using a Novel Microneedle-Assisted Technique). Our primary model biomarkers are lactate in sweat and glucose in ISF which are both established in terms of their correlation with their blood concentrations. We are also running studies to investigate the sweat-ISF-blood correlation of lactate and glucose. We*

also chose these two analytes primarily as model analytes to demonstrate the long-term use of our sampling platform. Based on our scientific findings, it is possible that the importance of ISF vs. sweat may change depending on the accuracy and clinical relevance of the targeted biomarkers and ASSIST will take the necessary steps to overcome these challenges. Our long-term plan is to use this platform for multiplexed detection of analytes of interest for a given use case. Last, but not least, our present sampling and sensing research effort is expected to be of much broader value because of its the likely numerous applications in wearable patches, pharmaceutical monitoring, long-term observation of drug adherence, compliance, and numerous other applications where we see the IP on the new techniques as being applicable.

- **Reliability/risk analysis and validation efforts appear under resourced.**

Response: *As the individual technologies and integrated systems coming out of the Center reach higher Technology Readiness Levels (TRL), the Center will be able to increase the amount of resources put toward these efforts organically through increased exposure of these devices to the rigors of intense engineering validation. The Center will also hire a data analyst during Year 7 that can be a direct resource toward both managing the data coming out of the Center's clinical studies and can vet this data, and by extension the engineered systems under test, for reliability and repeatability of data outputs. This will increase the amount of effort the Center puts into this type of validation and can help the Center identify and resolve problems sooner.*

- **Time is a threat if the Center is slow to develop necessary technologies.**

Response: *The Center is strategically focused on developing sensing technologies that can vigilantly monitor targeted health conditions in self-powered modalities within the lifetime of the Center. While time is always a concern in any engineering environment within a competitive sector, we believe our timeline will help us achieve our goals ahead of our competition in both academia and the market and will lead toward long-term acceptance of self-powered monitoring as a necessity for monitoring of users' health and wellness. Additionally, as mentioned in an earlier comment, we will focus on smaller set of use cases to ensure that we are able to achieve the goals in a timely manner.*

- **Risk of inadequate technology to effectively package the energy storage cells. The energy/power density of a small battery or supercapacitor cell could be order(s) of magnitude lower than that estimated based on electrode materials alone.**

Response: *The weight of the supercapacitors, including the full amount of passive materials is currently not problematic for a wearable system. Thus, this risk is a small one. Nonetheless, to decrease weight, currently, efforts are underway to fabricate pouch cells. Based on our preliminary study, we intend to fabricate a Li-ion pouch cell using the following active and passive components as follows:*

Component	Weight (g)	Weight (%)
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Electrode + binder (Anode & Cathode)	0.1	14
Electrolyte	0.3	42
Aluminum current collector	0.026	3.6
Copper current collector	0.051	7.1
Membrane	0.036	5
Package material	0.194	27.1
Sealant	0.009	1.2
Total weight	0.72	

The projected pouch cell dimensions will be (2.5cm (L) x 2 cm (W) x 0.05 cm (T)) with a tab length of 1 cm and a total weight of 0.7g. With our current electrode materials performance, we estimate an energy density of 13 Wh/kg for a 6F (7 mAh, 4.2V) pouch cell. Preliminary attempt to fabricate a pouch cell is shown below:

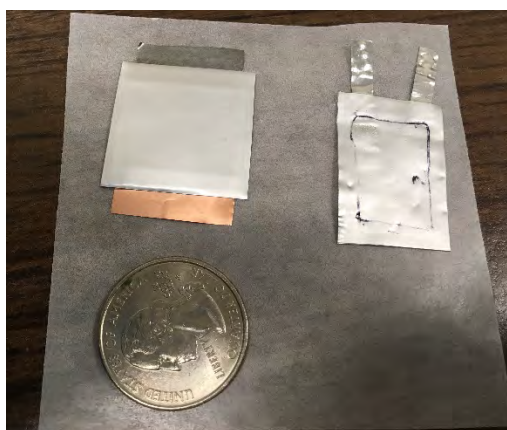


Figure 1: Preliminary attempt at fabricating a Li-ion pouch cell for engineered systems

List of Significant Achievements:

Technology

- In Year 6, the Center has produced deployable versions of its engineered systems, which are being evaluated and refined in clinical studies at UNC and UVA. Example includes: a chest patch with photoplethysmograph (PPG) paired with a wrist system that allows interoperability between the ASSIST ozone and volatile organic compound (VOC) sensors.
- Significant progress for the integration of the HET Gen 1 system (asthma). The HET Gen 1 platform includes a chest patch with (PPG) paired to a wrist system. This system allows interoperability between the ASSIST ozone and VOC sensors.
- The Center initiated clinical studies to correlate health and environmental exposure using HET Gen 1 systems by participating in three UNC/EPA-funded IRB studies in asthma management and allergen exposure.
- Demonstration of SAP Gen 1 into a fully wearable self-powered engineered system to monitor ECG and motion that consumes less power, 100 μ W.
- The power output of ASSIST mechanical energy harvesters based on eccentric rotors has progressively increased from 42 μ W in Year 4 to 142 μ W in Year 5.

- Initiated a database repository vetted by the SMM advisory boards to allow all the data to be stored and available.
- The Center demonstrated an SiP and associated multi-chip architecture with ultra-low power chip-to-chip IO. This system incorporated several technologies from the Center, including a new microcontroller (MCU)/bus, non-volatile memory (NVM), lower power SRAM, new ADC, University of Michigan's ECG AFE and RF transmitter, PSU's supercapacitor and antenna, and a flexible TEG as the power source. The power consumption for this SiP is 507 nW, which allows most of the harvested power to support multimodal sensing.
- Demonstration of novel flexible antenna designs incorporation into textile systems with a radiation efficiency of ~83%.
- The team developed a flexible platform for TEG incorporation using liquid metal interconnects that allows TEG legs of any material and size to be incorporated in the flexible device.
- ASSIST has demonstrated a unique microfluidic-osmotic approach as a platform for long-term sweat, ISF, or wound fluid sampling and non-invasive biochemical sensing.
- Significant advancement in ferroelectric field-effect-transistor (FeFET) based non-volatile memory.
- ASSIST has been able to branch out and attract alternative funding in related areas (e.g., NSF CPS for self-powered IoT systems).

Education

- Good number of undergraduate and graduate students involved in the Center; close to 230 students are directly involved in ASSIST's research.
- Summer REU programs, TESP (Translational Engineering Skills Program) and capstone course projects continued to develop new activities for both graduate and undergraduate students.
- Hosted fifteen workshops, short courses and webinars, 62 outreach events for K-12 students, and eighteen seminars and invited talks.
- The SVT is pleased to see that the Center is engaged with the Wearable Device Challenge (WDC) and that this event has seen steady growth for the third consecutive year.

Innovation

- ASSIST commercialization has progressed substantially. The Center is now more engaged with I-Corps, start-ups (SBIRs), partnerships, etc. Technology developed at the Center has led to 5 commercial agreements and ASSIST faculty and students have founded 6 companies.
- 8 new industry members were added in Year 6. One new company (Funxio Wear) licensed ASSIST IP.
- ASSIST's intellectual property portfolio continues to develop significantly in the last year. The Center has 57 invention disclosures and 20 active filings since inception.
- Involvement of the IAB remains very active in reviewing strategic plans, reviewing projects, etc.
- Direct projects sponsorship from member companies continues to grow at the Center.

Culture of Inclusion

- The present and immediate past chairs of the IAB are women, and among the Center's current industry membership are African American and Hispanic owned businesses.
- The SVT commends the program implemented for disabled students. This program mentors disabled students on deploying an animal monitoring system using biomedical embedded system design. The team received an appreciation letter from President Barack Obama in 2016 and won the Technical Achievement Award at MIT-Lemelson competition in June 2017.
- ASSIST continues to support programs for minorities such as the Minority Engineering Program, REU students from the Minority Summer Research Program, among others.

Recommendation (Place an X beside the recommendation chosen)

- **Renew Support** X
- **Renew Support pending approval of a strategy to address a significant weakness of the ERC that must be corrected before the ERC can be recommended for renewal by the site visit team**
(Provide a brief statement specifying the weakness to be addressed)
- **Do Not Renew and begin phase-down of support**
(Provide a brief rationale for the recommendation)

If recommending renewal, provide any necessary guidance or comments regarding the ERC's budget request

B. Analysis of the ERC's Key Features for an ERC in Years Four through Six**(1) Vision and Impact**

High Quality Systems Vision and Value Added (Years 4-6)	Low Quality Systems Vision and Value Added (Years 4-6)
<u>Systems Motivation</u> : Strong transformational systems vision is fully operational as a motivator for the ERC, systems requirements understood, vision is evolving as appropriate	<u>Systems Motivation</u> : Systems vision does not motivate the ERC or it has been achieved already; no compelling challenges remaining
<u>Transformational</u> : Vision is transforming or significantly impacting industry/practitioners, the workforce, and society	<u>Transformational</u> : Promise of the vision and its potential impacts are lost
<u>Leading-edge</u> : Center is recognized as one of the leaders in the field because of its cross-disciplinary, systems level vision and significant output	<u>Leading-edge</u> : Center is behind leaders in the field and Center contributions are rarely recognized by the field as significant
<u>High Quality Research</u> : Research output is high quality and largely derived from cross-disciplinary collaboration, extensive cross-disciplinary publications in important journals	<u>High Quality Research</u> : Research output is low quality; or if high quality, it resembles the output of a collection of single investigator projects
<u>Educational Impact</u> : ERC research is impacting the curriculum and the ERC is preparing graduates to be more effective in practice, and more creative and innovative. Pre-college partnerships are bringing engineering concepts to the classrooms and students are engaged in engineering experiences	<u>Educational Impact</u> : Education programs are having little or no impact of the curriculum, ERC graduates resemble single-investigator trained graduates with little knowledge of industry, little experience in advancing technology, Pre-college partnerships have little or no impact
<u>Innovation Ecosystem</u> : ERC is producing broad-based, unique and potentially transformational impact on technology (inventions, licenses, technology in use in industry or other arenas) –all innovation partners are functioning effectively to achieve impact and speed commercialization – translational research partnerships are beginning to pay off	<u>Innovation Ecosystem</u> : ERC has largely failed to impact technology and practice and has not formed an alliance of partners to accelerate innovation

The stated vision of the ASSIST Center “Is to develop and integrate Nano-enabled technologies to pioneer a paradigm shift towards data driven health management and revolutionize the quality of health care. To achieve this vision, the Center is building and demonstrating self-powered,

wearable, wireless, multi-modal, modular sensing platforms that enable continuous monitoring of health and environmental exposures with maximum comfort”.

The vision is now expanding to include implantable devices and power sources beyond human body harvesting. These changes come as a result of opportunities presented by IAB members and feedback from HET experiences. As a result, it will be more likely that functional and user acceptable devices will be possible and deployable for critical applications in monitoring human health.

The vision of ASSIST continues to support the need to shift the burden of human health from solely the health care provider to a combination of the provider with involvement of the individual. The wearable sensors targeted by ASSIST will allow individuals to better manage their lifestyle to maintain and improve their health as well as provide critical information to health care providers concerning disease states and chronic conditions. With a growing emphasis on the individual taking ownership of their health and incentives being provided by insurance companies and businesses to adopt healthy lifestyles, wearable devices will play a growing role in this space. In this regard the vision is extremely timely and positions the Center to be at the leading edge.

It is also noted that while the focus continues to be on improving human health there are very significant opportunities for low power and energy harvesting devices to be in the environmental, agricultural, animal husbandry and veterinary areas.

Response: *The ASSIST team concurs with this statement. As a result, we are exploring the utilization of ASSIST technology in a much broader set of application areas. To avoid diluting ASSIST funding, this is being pursued through alternative funding sources.*

This is important to the Center as deployment of ASSIST technologies are much less likely to be delayed by regulatory approvals and can attract industrial partners for commercialization.

The vision is systems driven incorporating research outputs from five thrusts to support integrated devices in two testbeds, SAP and HET. These testbeds have resulted in prototypes which have been tested at the bench and are proceeding to trials with human subjects. Students are involved at all phases of development resulting in significant interactions across research groups and across universities. The IAB and SMM are involved in guiding the selection of target applications. They are also providing guidance for the project RFPs and research directions of the Center.

As a result of input from its IAB, ASSIST has added sensors for drug monitoring to its platforms and has outlined a program to initiate testing of its biosensor platform. While this is still early stage, depending upon the success of the platform with human subjects, such biosensors could be tested within the remaining life of NSF funding. Drug adherence is not only a key problem in drug delivery but it is increasingly recognized that drug assimilation impacts effectiveness of drugs. A wearable device which monitors drug levels in the patients would be key to demonstrating effectiveness of medications and optimizing delivery as well as detecting overdoses.

Once sufficient data bases are built it will be possible to determine needs and effectiveness at a much finer granular level. Specific sub populations of individuals will be tested to show what drugs and delivery systems are most effective. It will also be possible to predict which individuals are most at risk and in need of early intervention either by drug delivery or life style changes.

With the five thrusts of the Center (energy harvesting and storage, low-power emerging nanoelectronics, low-power wearable nanosensors, low-power systems on chip and wearability and data) all supporting the requirements of the system level devices residing in the testbeds, the Center is well positioned to ultimately achieve its vision. This has led to early prototypes of devices (including the ECG shirt at FIU) which have excited the members of the ASSIST Center and have aided the outreach program to K-12 as well as supported the RET program.

The research program is progressing well with key advances being made. In most research areas of the thrusts, the Center has demonstrated leadership positions particularly in low-power electronics, energy storage and thermoelectronics. This provides the basis for the Center to become the leader in the field of wearable devices for health care applications. While the field is very competitive, for those applications where battery recharging/replacement poses problems, energy harvesting could be a game changer.

The pre-college program continues to evidence excellent progress with an active RET program with some 50 teachers to date which has translated to many pre-college classrooms. Wearable device challenges and competitions are in place in both North Carolina and Pennsylvania, which has reached numbers of high school students. There is also a large and growing number of partnerships with high schools established and there is a Young Scholars Program. At the undergraduate level, 15 new courses have been established with many ongoing courses and 5 text books written based upon ERC research.

The innovation ecosystem is large and well established with 29 members of the IAB and 39 innovation partners. NCSU has a well-established innovation program and ranks in the top ten universities for innovation. This is complemented by the vibrant start-up community in the local research triangle area which is one of the top three locations in the country for entrepreneurship and start-ups. This has resulted in 6 start-up companies being spun off with ASSIST technologies. The most successful Center spin-off is Psikick at UVA. The innovation efforts at the other core partner institutions continue to be less prominent.

Considering all the criteria above, the ASSIST Systems Vision and Value Added is evaluated as a **High Quality Systems Vision and Value Added**.

(2) Strategic Research Plan to Achieve the Vision

High Quality Strategic Research Plan (Years 4-6)	Low Quality Strategic Research Plan (Years 4-6)
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<u>Systems</u> : Systems requirements and technology goals have matured and integrated all levels of research, and will continue to evolve appropriately	<u>Systems</u> : Systems requirements and technology goals have not matured or evolved as necessary; research levels are not integrated
<u>Research Integration</u> : Research effectively organized into well integrated thrusts that contribute to the vision, results being used within and across thrusts	<u>Research Integration</u> : Thrusts have little relationship to each other and the vision; ineffective thrusts have not been redirected or terminated
<u>Barriers</u> : Strategic plan focuses on remaining significant and transformational barriers and challenges, many initial barriers have been overcome, research leads the field and advances the state of the art	<u>Barriers</u> : Little progress toward overcoming barriers and challenges, identified barriers and challenges are not significant or relevant to the vision, research is lagging the field
<u>Test-beds</u> : Test beds effectively integrate the research to explore and prove enabling and systems level technologies	<u>Test-beds</u> : No test beds underway or are not integrated with the research thrusts
<u>Cross-disciplinary</u> : The team is appropriately cross-disciplinary with strong interdependence between disparate disciplines and sub-disciplines; foreign partner(s) appropriately integrated into research activities	<u>Cross-disciplinary</u> : Team is not sufficiently cross disciplinary, necessary disciplines or sub-disciplines are missing, no interdependence evident; little to no effective contribution by foreign partner(s).
<u>Translational Research Speeding Product Development/Service Adoption</u> : Support to faculty to form conflict free translational research partnerships with small firms is speeding pathway to product development or adoption of new service models/technology	<u>Translational Research Speeding Product Development/Service Adoption</u> : Little or no translational research underway with small firms or little impact.

The goal of the ASSIST Center is to improve health and wellness through long-term continuous monitoring of personal health and exposure leading to data-driven, personalized, preventative, and low-cost healthcare, while using nanotechnology as the primary enabling technology. Five different thrusts and two testbeds are integrated to achieve this goal, with five use cases selected to focus their attention in the forthcoming period. The primary engineered system has been divided in two systems- Health and Exposure Tracker (HET) and Self-Powered and Adaptive Platform (SAP) which work in concert to achieve ASSIST mission. The overall strategic plan is a net result of two individual roadmaps for these two subsystems.

Significant progress has been made in Year 6. The Center has a very good strategy for systems and research integration. Five use cases have been selected (in consultation with their advisory boards, which vigorously supported their course of action and choices) to be pursued in the forthcoming period.

First the Center made significant progress in their SAP Gen 1 platform, designed for self-powered cardiac monitoring. The technologies were down selected based on maturity and accomplishments so far. The area of energy harvesting has shown the most notable progress, in which the highest

performance thermoelectric harvesters and mechanical harvesters for human arm motion have been developed. This progress is of particular significance, because they are one of the key components for self-powered systems. The research integration has been pursued vigorously across and within thrusts; the future of some thrusts and their relationship with the others (energy harvesting) is much better defined than the relationship and the direction of some other thrusts (low power electronics). **It was noted that this SAP Gen1 platform is not in clinical studies yet, and the SVT suggests maximum attention and focus to accomplish that task.**

Response: *The Center continues to work with Dr. J. Randall Moorman of the UVA Heart & Vascular Center toward deployment of the Center's vigilant ECG monitoring system on atrial fibrillation patients. The first deployments will be with the Dialog-based system, which is already at a deployment-ready TRL, followed by the fully custom self-powered SAP 1 system, both with the ASSIST ECG shirt. These initial deployments will be limited to 1-2 days, as they will be done side-by-side with a gold standard Holter monitor setup for system verification and validation. Subsequent deployments will be longer-term and will test the system's wearability and self-powered capabilities "in the wild". The ASSIST leadership is making these deployments a top priority for Year 7 and beyond, as they will strategically position the Center for maximum impact and long-term self-sufficiency.*

The Center also made good progress with their HET platform. HET1 platform targets the use case of asthma and is in three initial clinical studies in UNC Chapel Hill, which is an important milestone. However, SVT has noted that clinical trial data has not been analyzed yet, which brought in the forefront the need to bring aboard the dedicated data scientist to support this effort (from additional funds or from core if additional funds are not available). The presence of full time data analyst is extremely important at this point in time.

The past period brought important new technology breakthroughs that will be implemented for HET Gen 2 (diet management in pre-diabetics), HET 2.5 (wound care) and HET 3 (non-invasive medication detection in body fluids). In addition to progress in ultralow gas sensing of ozone and volatile organic compounds, novel (potentially disruptive) research has been conducted on osmotic pumps for zero-power extraction of interstitial fluids from the body. This is a promising line of research; however, SVT suggests that more research has to be done to explore whether this technology can deliver sufficient amount of fluid for the needs of this platform. As before, SVT suggests continued refining of the sensor development technology pathway to ensure successful integration.

Another notable change in Year 6 was much larger presence of international collaborations (Korea, Belgium, China, Ireland) which added to inherent cross-disciplinarity of this Center and adds yet another important dimension.

SVT has noted that Industrial Team has been growing in numbers, although the number of full members is still lower than needed for a sustainable Center post-graduation. Going forward, and as fees from the industrial team become more substantial source of income, the SVT suggests revisiting the membership fee structure and benefits to provide more incentive for industrial members to participate at the higher level of membership. The SVT also notes

that it would be beneficial for the Center to recruit some large companies present in the targeted application space. The presence of start-up companies currently prevailing in the Industrial Team makeup bodes well for translational research partnerships.

Response: *Increasing engagement at higher membership tiers is a good technique to increase Industry Program funding. In addition to adding additional value at increased membership tiers, ASSIST may consider creating an even higher “super” tier of membership which grants opportunities such as automatic sponsorship recognition of events and workshops, first choice of students pursuing internships, dedicated student design teams. Increasing membership at the Associate and Full level will involve increasing specific value at those tiers. In addition to priority access to ASSIST IP and increased voting authority in our IAB, we are considering adding additional value through private workshops and webinars, availability for at-cost consulting, special website portal access, hosted ASSIST networking events at their sites, etc.*

It is apparent that the Center has recognized both the need and the opportunity to exploit their strengths in other application areas in the future (such as Internet of Things and, in the shorter timeframe, implantables). The ability of Center to reinvent themselves in shifting sands of new requirements and killer applications will be very important as it prepares to be weaned from NSF funds in several years and become self-sufficient.

Considering all the criteria above, the ASSIST Strategic Research Plan is evaluated as a **High Quality Strategic Research Plan**.

(3) Research Thrusts

High Quality Research Program (Thrust level) (Years 4-6)	Low Quality Research Program (Thrust level) (Years 4-6)
<u>Relevance</u> : Thrust and its projects contribute significantly to the goals and vision of the ERC	<u>Relevance</u> : Thrust has little relevance to the goals and vision of the ERC
<u>Interdependence</u> : Projects are appropriately cross-disciplinary and integrated, interdependence of projects within the thrust, robust interdependence among thrusts	<u>Interdependence</u> : Thrust resembles a collection of single investigator projects, most or all projects are isolated from one another, thrust is isolated from the others
<u>Methodology</u> : Prior and current significant research barriers/challenges effectively addressed through high quality research methods	<u>Methodology</u> : Research barriers/challenges are not significant or have not been effectively addressed; or research methods are not advancing the state of the art
<u>Project Selection</u> : Projects are appropriate to fulfill thrust goals; decisions based on external input when needed, and sufficiently funded; weak or inappropriate projects are terminated	<u>Project Selection</u> : Projects are not appropriate to fulfill thrust goals; decisions are not based on external input when needed, and are not sufficiently funded; weak or inappropriate projects are not terminated

<u>Team Dynamics</u> : Thrust team is cohesive, opportunities for cross-institutional collaboration effectively implemented	<u>Team Dynamics</u> : Faculty not cohesive and/or opportunities for cross-institutional collaboration not pursued
<u>Significant Results</u> : Delivering results that are unique in the field, high quality publications in journals important for the field, many results are due to cross-disciplinary collaboration and insight	<u>Significant Results</u> : Results do not appear to be unique in the field, could have been achieved by a collection of individual projects, minimal publications resulting from cross-disciplinary collaboration
<u>Technology Transfer</u> : Results significantly impacting industry/practitioners (patents, licenses, technology transferred to industry and practice), translational research opportunities pursued.	<u>Technology Transfer</u> : Results are not advancing technology/processes/procedures for industry/practitioners, opportunities for translational research ignored

I. Energy Harvesting and Storage

The overall objective of Thrust I is to conduct fundamental research to improve advanced energy harvesting and storage devices in support of the platforms, since the energy harvesting and storage are key components in the platforms.

Thrust I has yet again been the main focal point of the ASSIST, since it is so centrally positioned to its vision. The areas of interest were thermal energy harvesting, mechanical energy harvesting, and energy storage.

Significant progress has been made in energy harvesting, and the stated targets have been reached. Notably, highest performance flexible thermoelectric harvesters have been developed, high performing wrist-based mechanical harvester for human arm motion has been demonstrated and a system model from the harvesters to the supercapacitors has been developed. Chest-based and elbow-based harvesters are deemphasized or dropped because of user discomfort issues or lack of versatility. New, very aggressive goals for the upcoming year have been set. It was noted that both current goals and future goals have been better defined than in the past.

This Thrust is tightly coupled to the SAP low power stems and wearable sensors with good effort and seems on track to deliver storage requirements. Over the last three years, the Thrust has published 54 papers; approximately 25% of these are coauthored by people from multiple disciplinary backgrounds. Team consists of several interdisciplinary and cross institutional members in the areas of thermoelectric, flexible packaging, heat sinks, liquid metal contacts, PZT, power management circuits, and supercapacitors from NCSU, PSU, FIU, and the University of Utah, with additional collaborations with Kongju National University, the University of Adelaide, Korea Institute of Materials Science, Virginia Tech, Columbia, and companies such as Analog Devices and Kinetron.

Team demonstrated significant results, e.g., the energy density of ~74 Wh/kg for EDLC and ~160 Wh/kg for lithium-ion capacitor. The lithium-ion capacitor was able to deliver ~76 Wh/kg at a power density exceeding 10 kW/kg, which is among the highest reported in literatures. One of the unique aspect of this study includes developing on-chip level hybrid micro capacitors as stand-

alone energy storage and power source for powering portable electronics, wearable and implantable devices. Another fundamental approach is developing hierarchical porous carbon to improve specific capacitance. Study also identified barrier for the integration of these devices with electrode selection that has traded off with power and energy density, voltage window, and provides reasonable plans to address them.

However, all energy and power densities reported for supercapacitors were calculated based on electrode active materials. The energy and power densities should be based on full weight of a packed cell. The values would be much less than the values mentioned above.

Response: *The energy and power densities for supercapacitors were reported based on electrode active materials in order to compare and benchmark our materials performance relative to the best reported in the literature, as NSF mandates benchmarking for each technical area. The ASSIST team has used the standard normalization currently employed in the literature. We agree that the energy and power densities will be much lower when we include the passive components. Thankfully, the overall weight of the supercapacitors is currently not problematic for a wearable system, so this is not likely to be a significant problem moving forward.*

The focus on these programs is primarily on materials development and new cell concepts; however, the viability of these approaches has yet to be demonstrated.

There is a lack of clear metrics that should be targeted for the energy storage cells for the platforms.

Response: *The current metrics for Li-ion polymer batteries used for wearable technologies demonstrate 80% capacity retention over 500 cycles with charging and discharging rates of 1C (www.evebatteryusa.com/linked/wearable_lipo.pdf). Figure 2 clearly shows the limitation in cycle life of various lithium polymer batteries considered for wearable platforms. Lithium ion capacitors will clearly outperform in terms of cycling, rate stability and degradation rates as we have already demonstrated cycling stability of ~81% capacitance retention over 21000 cycles with 75% depth of discharge in coin cell format at a charge/discharge rate of 170C (~21 s charge/discharge time) as shown in Figure 3. The energy efficiency of the capacitor even at such charging/discharging rates was ~91%. The capacitor also shows 93% capacity retention when at 4.2V for 300 hours. With these specifications, we expect to meet both the energy and power demands of the engineered system platforms.*

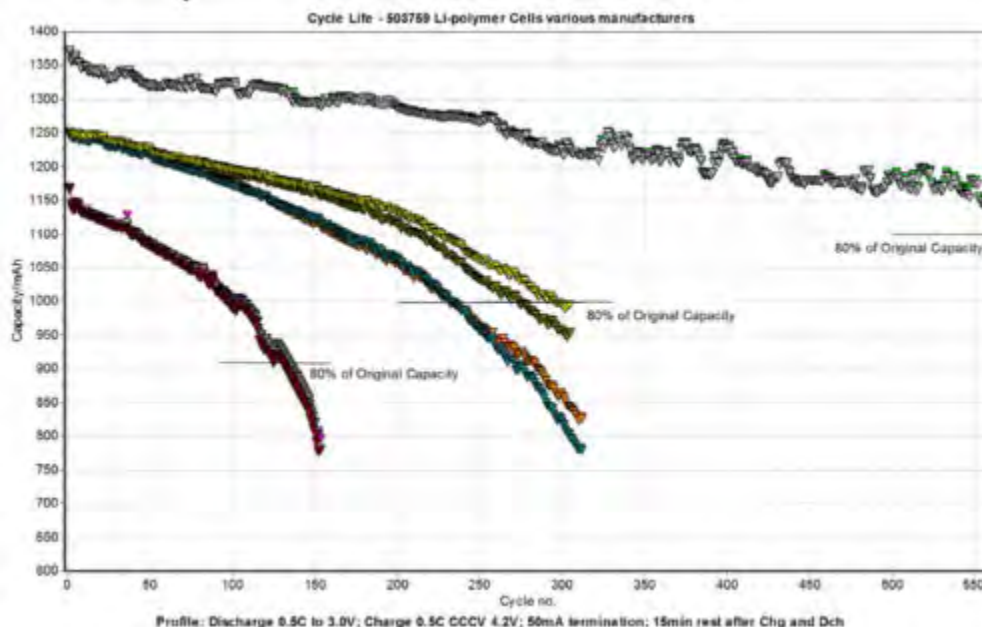


Figure 2: Cycling limitation of various lithium polymer batteries currently manufactured for wearable technologies (<http://inventuspower.com/wearable-medical-devices-embrace-lithium-polymer-cells/>)

Such targets could include energy and power density, cycle life, round trip efficiency, depth of charge and discharge limitations, acceptable degradation rates, etc. This would help guide the research on individual cells and suggest ways to make a decision of these different types of devices for a range of specific applications. Also, these types of metrics will make clear how the advanced energy storage research will support Center vision. One concern is that the battery technology will not be included in the metrics after considering requirements of energy storage in the platforms.

The focus of research and development should also include how to design energy storage cells such as dimension, shape, and weight for fitting into the devices, and fabricate energy storage cells. On the energy harvesting front, textile based harvesting provided plans to increase power generation through arrays of antennas, and a specific use case was demonstrated by further integrating supercapacitors to provide reliable energy supply. Liquid metal contacts for TEG is a unique proof-of-concept developed for flexible thermoelectric harvesters. Nanocomposite BiTe TEG fabrication conditions are optimized through MW/SPS technology to narrow down optimized conditions to improve ZT.

The SVT recommends that more fundamental research can be done to improve materials properties, understand model for improved ZT obtained with MW/SPS techniques.

Response: Our previous system modeling efforts indicated that for body heat harvesting, thermal conductivity is more important than ZT. This is due to the fact that on-body TEGs have to work with large external thermal resistances including those of the human skin and the small heatsink. As such, to date, optimization of the nanocomposite materials using MW/SPS techniques targeted development of materials with low thermal conductivity and acceptable electrical conductivity. To achieve the desired properties, MW/SPS techniques are used in conjunction with other techniques such as glass inclusion. Currently, both p- and n-type nanocomposites have thermal conductivity

values less than 1 W/mK (as opposed to 1.5 W/mK of commercial legs) and comparable electrical conductivities. The ASSIST team believes that future efforts need to be directed to device integration and optimization of the overall system design to achieve significant gains in harvested power levels.

The SVT recommends that the ASSIST team continue to explore teaming with National Labs, university research consortiums, and non-domestic university researchers to provide additional perspective from a research and an application point of view, and to leverage the benefits of partnerships.

Energy harvesting and storage are getting closer to the ultimate goal. It would be even more beneficial to provide the projection of the energy harvesting goals in the upcoming years.

Considering all the criteria above, the Thrust I Program is evaluated as a **High-Quality Research Program**.

II. Low Power Emerging Nanoelectronics

Thrust II investigates novel semiconductor devices and circuits to fill in and drive the system-on-chip (SoC) and system-in-package (SiP) that are being developed in Thrust IV. Truly fundamental in nature, Thrust II has, over the past several years, been mostly exploratory. This is quite natural given that the engineered platforms and systems ASSIST is developing are expected to be nano-enabled. The two PIs involved in this Thrust are world leaders and have long track record in their areas of interests. Student mentoring and placement record has also been impressive.

During the 2018 Site Visit, the Center has reported progress in two different areas, namely, 1) nonvolatile processors (NVPs) and 2) ferroelectric based devices. Recently, NVPs have received attention in the computing community for use in emerging low-power embedded systems that are expected to operate continuously under power fluctuations and failures. The NVPs employ *on-chip* non-volatile memory (flip-flop) elements that, compared to conventional *cross-chip* designs, help reducing the access time as well as reliability. In Year 6, ASSIST reported the fabrication of an NVRF chip, which shows 27x faster startup speed and 6.3x more package transmission capability. Also, the Incidental computing strategy as employed in the architectural design seems to be effective. However, given that the NVPs are quite different than the conventional processors, as far as design optimization is concerned, care should be taken in developing power management strategies for maximizing forward progress.

With regard to ferroelectric devices, ASSIST reported a) ferroelectric non-volatile *memory* elements, called FeFET, in 10-nm $\text{Hf}_{0.5}\text{Zr}_{0.5}\text{O}_2$ (HZO), and b) steep slope field-effect *transistors*, called NCFET, in the same material system. The FeFETs, when compared to the state-of-the-art non-volatile SRAM, were reported to provide a 597x improvement. The performance boost mainly stems from the absence of an additional capacitor, which is an integral part in the traditional 1-T 1-C (one-transistor one-capacitor) memory cell. When researched extensively and

taking some other issues such as retention, endurance and reliability into account, this particular device shows promise for use as on-chip backup elements within the proposed NVPs. On the other hand, NCFET (negative-capacitance field effect transistor) development is still in its infancy. Hypothesized in 2008, this new type of transistor exploits the negative differential capacitance as derived from its energetics characteristic to reduce the switching power when used in a computing platform. As demonstrated during the poster session, the gate-stack in this device was realized via ALD (atomic layer deposition) technique followed by a high-temperature annealing step. However, there remain some uncertainties in the formation of a contiguous (desired) ferroelectric domain. While the drain current vs. gate voltage (I_d - V_g) characteristic has the signature of polarization switching, the random distribution and non-uniformity in the ferroelectric film growth along the lateral direction will strongly influence the switching (and perhaps the data storage) characteristic of the device. Also, looking at the I_d - V_g characteristic, there seems to be no way to establish, with certainty, and claim that the device is operating under negative capacitance condition. Nevertheless, effort in characterizing the NCFETs via time-resolved measurements is commendable. Recognizing that the stability of the rather small domain in the material energetics, where the existence of negative capacitance is theorized, it would be critical to identify strategies to ensure stable operation of the device. At each iteration of device development, appropriate canonical tests to determine the existence of negative capacitance will be required. Another issue would be to maintain high structural quality of the material film. The role of self-heating on device performance may have to be investigated. Individual devices, when connected to power supply, are subject to self-heating that may destabilize the system. **To avoid unwanted transition into the paraelectric regime, self-heating beyond a critical point should be avoided. Also, both polarization and dielectric constant of ferroelectric materials are sensitive to temperature variation. These issues may lead to non-uniformities and disharmony across the chip.**

Response: *We appreciate the comments made by the Site Visit Team about the thermal stability of the Ferro FETs. We will perform a detailed temperature dependent characterization of the FeFETs to determine their stability. Our preliminary data suggests that the Curie temperature in these Zr doped Hafnium dioxide films is well over 450C. This means that we do not expect any ferroelectric to paraelectric phase transition in our devices over the standard operating temperature range.*

There is a plan for scaling the devices for area and power constraint operations. However, given the complex nature of the ferroelectrics in the sub-10 nm regime, the design and fabrication of these FETs could benefit from detailed and atomistic numerical modeling of underlying physics. Beyond these fundamental material parameters, design optimization efforts should consider other geometrical parameters such as film positioning, film thickness, gate overlap/underlap, and interfacing with underlying channel material.

During the Site Visit this year, the Thrust II team did not report on their work on tunnel FETs. The SVT was curious about this transition (or departure from the previous plan) and was informed that this particular technology was being deemphasized. The main reason, which was cited, stems from a lack of interest in the industrial community in III-V materials that constitute the tunnel FETs. The SVT also noted that the budget allocated in this Thrust was relatively low compared to other Thrusts. Under these circumstances, and given the need

for demonstrating a functional product within a rather shorter timeframe, the SVT strongly recommends that the Center devise a solid strategy for this Thrust and provide a realistic path and timeline for integration into the SoC/SiP platforms.

Response: *We agree with the SVT that the budget allocated for Thrust II was relatively low compared to other Thrusts. This is consistent with the current priorities and maturity level of the ASSIST ERC, where a majority of the resources is strategically allocated towards Testbeds.*

Based on SVT's strong recommendation, we will develop a decisive strategy with timeline with our international partners at Tsinghua University that allows us to demonstrate the following:

- a) Year 7: integrate ozone sensor and EKG, PPG sensors with the NVP platform; and demonstrate self-powered (indoor solar powered) sensor correlated sensing and local processing of data for health monitoring*
- b) Year 8: demonstrate a self powered correlated sensing NVP chip in a wearable form-factor.*
- c) Years 9-10: demonstrate a fully integrated simulation platform with FeFET based NVP with embedded intelligence (AI) for self-powered, frequently on platform for correlated sensing and intelligent decision making.*

Considering all the criteria above, the Thrust II Program is evaluated as a **High-Quality Research Program**.

III. Low Power Wearable Nanosensors

Sensor efforts on low-power operations moved further into clinical trials for volatile samples and new efforts on liquid sample acquisition and testing were reported. Electrophysiology sensors and PPG were also demonstrated in advanced wearable testbeds. The overall efforts continue to align with the overall Center vision of developing sensors to integrate into systems including sensor control, transmission to external devices, and energy harvesting. The CMUT sensors for ozone are the most advanced gas sensors; however, limited human use data has been presented and foundational publications demonstrating the utility of the devices by people in controlled environments are needed. Likewise, electrophysiology and PPG data has been collected and representative data reported, but again, foundational publications are needed demonstrating performance in a controlled human use setting. Progress in evaluation of human trial data was reportedly delayed due to a variety of factors including inattention by affiliate medical team members, availability of data analysis resources, and presumably the priorities developed by the core management team. When possible, use of commercial devices along with ASSIST Center devices is recommended so that key figures of merit can be identified earlier (accuracy, precision, sensitivity, etc). When commercial devices are not available for real-time monitoring comparisons, samples should be collected for later laboratory analysis and comparisons. Preferably, results of these studies should be included in the yearly report.

Microfluidic sweat and microneedle concepts including biochemical sensing concepts were presented along with preliminary data on the fluidic and sensor components. Sampling of fluid using high osmotic strength solutions of glycerol or salt were demonstrated on gel-based phantoms

and results of surface dye extraction with microneedles in humans showed preliminary proof of concept. However, these studies are considered to be at the lowest technical level since flow rate from the phantom may likely be much higher than accessible from human skin and flow rates were not measured in the surface dye extraction study. The proposed target flow rate of 3-5 uL per hour requires modestly sized sensors and it is not clear that the biosensor development adequately anticipates this level of fresh sample flow. **Increasing the risk to this portion of the thrust is the lack of supporting information that even this modest level of fluid flow can be achieved. The field of microneedles is extensively published in terms of geometries (solid and through-hole) as well as materials (metals, ceramics and polymers); however, reports of the levels of ISF fluid extraction rates are quite limited, indicating potential difficulties in this approach. Similarly, the generation of sweat and transfer from the body to microfluidic devices is quite limited in the published literature, so there is concern that adequate flow rates for sensors can be achieved. Preferably, components capable of measuring the liquid flow rate should be included into the devices.**

Response: *We appreciate the positive notes regarding the achieved extraction and early proof of operation of our principles. The above text also clearly states that there are no preceding studies on long-term extraction and analysis of sweat and of ISF using microneedles. The paucity of results on such long-term extractions demonstrates that our Center has chosen to attack challenging problems that are not solved yet. We respectfully point out that addressing such challenging, previously unsolved, problems is well within the NSF funding mission. Unfortunately, our decision to boldly try to solve previously intractable problems in highly innovative ways has been presented in a report in a negative light because of the area we have chosen to address is still poorly understood and developed and will require some issues to be taken into account. We are planning to address the issues pointed out above as part of our ongoing research and development. Specifically, we absolutely agree that it would be essential to measure the liquid flow rate, which is being done in our preliminary work and will be implemented in the device design.*

The on-body fluid collection approaches will likely be limited to the time a device can remain on the skin (i.e., about 2 weeks). In this timeframe, the device does not completely achieve the “always on” vision of the Center devices. Other important issues including calibration of the sensors increase the risk that useful data will be forthcoming. **Additional resources appear to be needed in the sensor area; however, there is a risk that the amount of resources needed may deplete funds needed for other efforts. Thus, focus on one or two enzyme sensors to demonstrate feasibility at a higher technical capability level should be prioritized.**

Response: *We agree that the device presently does not yet achieve completely the vision of the Center of sweat sensing for unlimited time without any user intervention. However, we have pioneered a unique technique that can achieve long duration operation by a non-invasive zero-power method. Our present vision is that the sampling consumable will be enclosed in an inexpensive module, which will need to be replaced in periods ranging from days to weeks. Achieving even this goal would be a big breakthrough over the other present-day technologies. We will seek to find means by which our technology could operate for longer times, when using enzyme biosensors and materials that allow shedding off the accumulated salt deposits left behind by sweat evaporation. Our primary goal in the next research cycle will be to follow the excellent*

suggestions above and to focus on including one or two enzyme sensors in a wearable and demonstrating the feasibility of the device in our IRB human skin testing. We are also considering prioritizing ISF sampling over sweat for our initial demo as ISF-blood correlations are higher for a greater number of analytes compared to sweat-blood correlations. Also sample quality in general is higher for ISF compared to sweat. Finally, we will plan to select smaller number of enzymes to target to enable us to focus and achieve success at a higher level of technology readiness. To down select, we will recruit Dr. Koji Sode, (<https://www.bme.unc.edu/people/koji-sode/>) a world renowned enzyme expert and biomedical engineer to provide guidance on the best enzymatic options for ASSIST to pursue.

Considering all the criteria above, the Thrust III Program is evaluated as a **Low-Quality Research Program**.

IV. Low Power System-on-Chip

The System-on-Chip (SoC) Thrust is critical to integrate SAP and HET sensors. Integrated Sensor Node Design established a challenging target of low power consumption of 1 μ W and the team delivered 507 nW operation. This is a significant step achieved towards low power operation. The Thrust has a clear vision and provided a reasonable timeline of integrating Bluetooth communication and developing flexible textile antenna for effective and functional integration of SoC to SAP and HET.

To enable easy debugging and adapt to integration of future SAP and HET devices, SoC is divided into heterogeneous components and technologies. This is a key step for successful completion of this project. To avoid playing catch up with future design requirements, sensors are clustered into various groups based on signal needs and combined with analog systems to fit into SoC requirements. Also, Verilog modeling is used to predict future sensor behaviors. This will improve cycle time for SoC readiness. Multi-chip I/O included a new microcontroller (MCU)/bus, nonvolatile memory (NVM), lower power SRAM, new ADC, University of Michigan's ECG AFE, University of Michigan's RF transmitter, PSU's supercapacitor, PSU's antenna, and TEG as the power source. Furthermore, to expand functionality of SoC and for ease of communication, Bluetooth interface and protocols for cellphone integration are being developed.

This Thrust has published 13 papers and 4 invention disclosures and all of these are co-authored by individuals from multidisciplinary background and from several universities, namely, University of Michigan, PSU, and FIU.

With integration of additional sensors, Bluetooth devices, power requirements of SoC will increase. To overcome this problem, improved designs for decreasing power requirements of communication components as well as lowering leakage need to be identified. Additionally, integration of in-house solar power can also be considered.

Considering all the criteria above, the Thrust IV Program is evaluated as a **High-Quality Research Program**.

V. Wearability, Human Interface and Data

This thrust is complex in nature, and very interdisciplinary and with complex landscape of research directions.

Response: *We agree that that this Thrust is complex and maturing as the Testbeds become more mature. Core to the vision of this Thrust is the focus on the human and to promote the low power realization of the Testbeds. The approach taken to date has been to understand how design of the wearable, as well as the data management strategy, enables reducing the overall power of the system and to incorporate flexible materials the serve to make the system more comfortable and improve the power harvesting. Still, the population analysis provided by Amy Snipes has been aimed at understanding the limiting factors in the adoption of the HET Testbed to targeted populations. Our experience from this has established methods to promote the use of our technology to diverse, younger populations. In the coming years we aim to continue our studies on comfortable, wearable designs that have a high data efficacy and an examination of these wearable platforms for the HET and SAP Testbeds.*

Its main strategy is to engage and solve issues related to the human-device interface. As such, scope of this thrust encompasses a wide variety of activities, such as implementation and operational factors, packaging, perception of the human that influences the long term usage on how systems or devices operate on a human, adaptation of data inputs to aid health monitoring data inputs or economics of the device.

The growth of this thrust observed last year did not continue, even though it is apparent that its role should increase in the later stages of the Center.

Response: *There is significant opportunity to expand the scope of this Thrust, in particular to involve a multidisciplinary approach to understand the human-device interface/relationship. As the HET and SAP engineered systems mature, there is a unique opportunity to examine how the platform design influences use, particularly in the vulnerable populations that the Testbeds are designed to engage. It is well known that a primary reason for the lack of use of a wearable is the influence of the data collected on the user's health outcomes. However, non-compliance is a complex field of interest that goes beyond the data applicability. As the human trial studies of the SAP are a focus in the coming year, compliance of the operational factors, packaging, and user perception will be enabled. Regarding the promotion between the textiles groups between universities, Thrust V lead Jesse Jur recently accepted a committee membership on an FIU student, and has already engaged with student visits between universities to promote collaboration. In Fall 2019, a student from FIU will be hosted at NC State to explore printing on textiles for uric acid sensors (HET Gen 2). Finally, it worthwhile to mention that flexible form factors chosen for this effort are driven by the Testbeds. While tattoo electronics are a viable solution for some use cases, they require more robust and large area substrates for their realization and testing. HET Gen 2 provides opportunities for tattoo-like integration, which is currently being studied in Thrust III on thin film nanocellulose substrates. Finally, the role of data in this Thrust will also be revisited. As the Center produces more data, it is clear that a data effort will gain more importance and should*

play a prominent role in the program. The Center will evaluate in the Summer of 2018 on how best to position data expertise in the Center to maximize impact.

The opportunity to have more disciplines that organically can contribute to the Center (such as social sciences) has not been fully realized yet. For example, HET 3.0 with the focus on medication adherence, to be realized in the upcoming years, will be an excellent tool to engage behavioral experts to look closer at the root causes of non-compliance.

In the past period, a significant progress in the textile garment platform was observed. A new scalable printing process has been developed, and fiber assemblies for flexible and breathable thermal conductors have been explored. The correct construction of the garment in terms of maximizing the energy harvesting while enabling comfort was another focus area. Additionally, interesting studies have been done to explore directing, spreading and dissipating the heat in the garment. Finally, acceptance of the health device for asthma in certain segments of population has been explored. Groups working on textiles at different institutions (at NCSU as well as FIU) need to collaborate closer, and share their experiences and efforts more effectively.

Like the last year, data algorithms were developed in partnership with the industrial partner SAS, and the efforts to hire full time data scientist so far did not bear fruits. SVT thinks it is of crucial importance at this juncture.

Last year, SVT has suggested to look at tattoos as the alternative for the garments. There was a promise of follow up, but it was noted that this avenue (whether promising or not) was not addressed during this visit.

Considering all the criteria above, the Thrust V Program is evaluated as a **High-Quality Research Program** with some reservations.

(4) Research Thrust (Testbeds)

Early Testbed	
High Quality Research Program	Low Quality Research Program
<u>Testbed Requirements and Metrics</u> The ERC has begun to define requirements for the testbed derived from the vision and systems goals of the ERC	<u>Testbed Requirements and Metrics</u> Requirements for the testbed are not in line with the systems goals of the ERC
<u>Technology Integration</u> Testbeds are designed to prove the feasibility of the ERC's vision and implemented to probe the research by testing the enabling	<u>Technology Integration</u> The testbed are not designed to effectively prove the feasibility of the enabling technology, including devices, modules or subsystem components, in a system-like environment.

technology, including devices, modules or subsystem components.	
<u>Function in Research</u> The testbed is serving as a versatile experimentation site, through which the performance of novel technologies are measured and results are fed back into the research thrusts to stimulate improvements or generate new research directions. ERCs equipped with several testbeds have ensured complementary functionalities and exchange across testbeds.	<u>Function in Research</u> The testbed is not serving as a versatile experimentation site for novel technologies, and / or the measured performance of modules is not fed back into the research thrusts to stimulate improvements or generate new research directions. Testbeds are duplicating testing functions.
<u>Guidance</u> Testbeds requirements and metrics are reviewed on a yearly basis by the ERC team with input from the IAB, SAB, or other appropriate user inputs, i.e. clinicians or local government users, etc.	<u>Guidance</u> The testbed is not reviewed on a yearly basis by the ERC team with input from the IAB, SAB, and other appropriate user inputs, i.e. clinicians or local government users, etc.
<u>Role in Education</u> Testbeds are providing students with hands-on experience in “building” technology, integrating devices and components, or testing system-level performance.	<u>Role in Education</u> Testbeds are not providing students with experience in “building” technology, integrating devices and components, or testing system-level performance.
<u>Assessment</u> Through the definition of objective, stage-appropriate metrics, successful technologies are being identified and analyzed; the testbed is designed as a tool for comparing and validating the research approach(es).	<u>Assessment</u> The testbed is not being used as a tool for comparing and validating the research approach(es).
Developing Testbed	
High Quality Research Program	Low Quality Research Program
<u>Testbed Requirements and Metrics</u> With a set of performance metrics in place, the ERC has successfully implemented some of its near-term testbed milestones. In response to milestone accomplishments, testbed requirements are being refined to be consistent with the vision and system goals of the ERC. Long term testbed goals continue to push the state-of-the-art.	<u>Testbed Requirements and Metrics</u> The ERC has not achieved any of its testbed milestones nor refined the requirements for the testbeds, to meet the vision and systems goals of the ERC.

<u>Technology Integration</u> The testbed is utilized to probe the research by testing the enabling technology at its different levels of maturity, including devices, modules or subsystem components in a system-like environment.	<u>Technology Integration</u> Testbeds are not utilized to probe the research by testing the enabling technology, including devices and subsystem components in a system-like environment.
<u>Function in Research</u> The testbeds serve as a versatile experimentation site, through which the performance of component technologies may be measured and/or compared with competing technologies and results are fed back into the research thrusts to stimulate improvements or generate new research directions.	<u>Function in Research</u> The testbeds are not serving as a versatile experimentation site, through which the performance of component technologies may be measured and/or compared with competing technologies. The collected data is not fed back into the research thrusts to stimulate improvements or generate new research directions.
<u>Technology Translation</u> Testbed results are improving confidence in the technology's performance and reproducibility, highlighting relevant applications. The testbed data collection is designed to help facilitate potential technology translation opportunities.	<u>Technology Translation</u> Testbed results are not improving confidence in the technology's performance and reproducibility. The data collected in the testbed is not used to highlight relevant applications or facilitate potential technology translation.
<u>Guidance</u> Testbeds are reviewed on a yearly basis by the ERC team with input from the IAB, SAB, and other appropriate user input, i.e. clinicians or local government users, etc.	<u>Guidance</u> Testbeds are not reviewed on a yearly basis by the ERC team with input from the IAB, SAB, or other appropriate user inputs, such as clinicians or local government users, etc.
<u>Role in Education</u> Testbeds are providing students with hands-on experience in "building" technology that result in peer reviewed publications or conference presentations. Hands-on experience includes integrating devices and components, or testing system-level performance.	<u>Role in Education</u> Testbeds are not providing students with experience in "building" technology, integrating devices and components, or testing system-level performance. Very few opportunities for students to present at conferences are coming out of the testbed research.
<u>Assessment</u> Through the refining of objective, stage-appropriate metrics, successful technologies are being identified and pursued; the testbed has become a tool for comparing and validating the research approach(es). Accomplishments are benchmarked against the state-of-the-art.	<u>Assessment</u> The testbed has not become a tool for identifying successful technologies nor comparing and validating the research approach(es). Testbed results are not relevant to the state-of-the-art.
Mature Testbed	

High Quality Research Program	Low Quality Research Program
<u>Testbed Requirements and Metrics</u> The ERC has established, clear requirements for the testbeds derived from the systems goals of the ERC and a set of performance metrics has been implemented and refined.	<u>Testbed Requirements and Metrics</u> The ERC does not have established, clear requirements for the testbeds as derived from the systems goals of the ERC and a set of performance metrics has not been appropriately implemented.
<u>Technology Integration</u> Testbeds are utilized to probe the research thrusts by testing the enabling technology, including devices and subsystem components, and integrating functionalities in a system-like environment.	<u>Technology Integration</u> Testbeds are not utilized to probe the research thrusts by testing the enabling technology, including devices and subsystem components, nor integrating functionalities in a system-like environment.
<u>Function in Research</u> The testbed serves as a versatile experimentation site, through which the performance of novel technologies are measured and/or compared with competing technologies and results are fed back into the research thrusts to stimulate improvements or generate new research directions.	<u>Function in Research</u> The testbeds are not serving as a versatile experimentation site, through which the performance of component technologies are measured and/or compared with competing technologies. Testbed results are not fed back into the research thrusts to stimulate improvements or generate new research directions.
<u>Technology Translation</u> Testbed results are improving confidence in the technology's performance and reproducibility. They highlight relevant applications and help accelerate technology translation opportunities. Research projects nearing translation to industry are refined and consider the specific market requirements (such as performance, manufacturability or cost).	<u>Technology Translation</u> Testbed results are not improving confidence in the technology's performance or reproducibility. Relevant applications or potential technology translations are not being pursued. Research project nearing translation to industry, are not ensuring that the design addresses specific market requirements (such as performance, manufacturability or cost).
<u>Guidance</u> Testbeds are reviewed on a yearly basis by the ERC team with input from the IAB, SAB, and other appropriate user inputs, such as clinicians or local government users. Those inputs are used to optimize the testbeds functionality.	<u>Guidance</u> Testbeds are not reviewed on a yearly basis by the ERC team with input from the IAB, SAB, and other appropriate user inputs, such as clinicians or local government users. Those inputs are not exploited to optimize the testbeds functionality.
<u>Role in Education</u> Testbeds are providing students with hands-on experience in "building" technology that results in conference presentations and publications in refereed journals. Hands-on experience includes integrating devices	<u>Role in Education</u> Testbeds are not providing students with experience in "building" technology, integrating devices or components, testing system-level performance, or understanding market application requirements. Very few opportunities for students to present at

and components, testing system-level performance, and envisioning market application requirements.	conferences or publish in refereed journals are coming out of the testbed research.
<u>Assessment</u> Through the optimization of objective, stage-appropriate metrics, successful technologies are being identified and pursued; the testbeds are a critical tool for comparing and validating the research approach(es). The testbeds is clearly being used to push the technology state-of-the-art.	<u>Assessment</u> The testbeds are not utilized for comparing the research approach(es), nor validating that successful technologies are being identified and pursued. Testbed lags the state-of-the-art.

(a) Health & Environmental Tracker (HET)

The Health & Environmental Tracker HET (multimodal sensing, battery operated) testbed is focused on the evaluation of multimodal sensing technologies and relies on multiple low-power sensors, data correlation, novel circuits, wearability, etc. During Year 6, the ozone sensor work continued to make steady progress and the SVT is pleased to see initial work related to the reliability of this sensor. Detection of VOCs using ultrasonic transducers also seems to be a promising area, especially given the low detection limit (ppb), but additional work needs to be completed to define and optimize selectivity. In Year 6, ASSIST also successfully demonstrated the HET Gen 1 platform with a chest patch (PPG) paired with a wrist/watch based ozone and VOC sensors.

Work for HET Gen-2 has begun with the demonstration of a fluid extraction method using a zero-applied power method. This seems like a promising area to continue to explore. Additional work is necessary for the sensors required for HET Gen-2, which includes 3 sensors: lactate (sweat), glucose (Interstitial fluid) and uric acid (wound fluid). It was noted that HET Gen-3 will be focused on medication detection. The work that ASSIST has initiated in this area with UNC (Dr. Carpenter) to look into lisinopril would allow the Center to define the HET Gen-3 specs well in advance.

HET clinical validation is strategic for the future of ASSIST and the SVT strongly recommends that adequate resources be available to this effort to demonstrate a high level of capability in human use studies. Testing and validation will provide insight about performance, reliability, etc. that can impact how the specs for further HET generations are defined. For example, the mode of operation for HET Gen-1 involves a user with asthma that wears the device to continuously sense environmental exposure and physiological status. The progress made in HET Gen-1 should allow ASSIST to have a substantial clinical validation activity already in this area. In addition, since a large amount of data will be generated, the SVT strongly encourages ASSIST to proactively work on sensor data processing, storage, utilization and protection.

The SVT team further emphasizes the opportunity to further strengthen communication with the different research thrust areas and associated researchers and students. Close communication is

important to help guide their fundamental work and ensure proper quantitative specs to this HET tracker. As the number of sensors increases in this testbed, the SVT strongly encourages ASSIST to define a holistic methodology to look at reliability, reproducibility and repeatability of the different sensor modalities incorporated into the HET tracker. Furthermore, given the HET testbed being a platform for multi-modal sensing, the leadership is encouraged to explore opportunities to integrate promising sensors from other researchers/sources (external to the Center). The SVT team is also pleased to see the engagement of this testbed with small businesses and efforts to secure additional funding from I-Corps, DoD, FDA, etc.

Considering all the criteria above, the HET Testbed is considered a developing testbed and is evaluated as a **High-Quality Research Program**.

(b) Self-Powered Adaptive Low Power Platform (SAP)

The SVT is supportive of the approach the Center is taking in staging testbeds. The four-year plan anticipates more and more complex integration. Although the Team is committed to deliver a self-powered system, there is a risk that the Center may be overwhelmed by the complexity. As in the past the SVT would again like to recommend that in order to ensure functionality of the system, a battery-powered system is warranted. The platform should be flexible enough that demonstration can be run on batteries if not all parts are going to be available in time. All testbeds are then followed by a self-powered system. The Center is no more looking at a commercial, stand-alone product and then attempt to arbitrarily cut its power envelope. Nevertheless, the SVT would still like to encourage them to be more aggressive in their goals and significantly cut the power (10 or 100x). The reasoning is the same as in prior reports as it is possible that competition will force the Center to do so to ensure that they will retain the worldwide leadership. If the total power consumption is cut, the Center will also alleviate the burden on energy harvesting devices. On the other hand, there will be more pressure on the SoC (System-on-Chip) design. But it seems that there is more reserve available in the system design, especially if thrust II will be successful in driving down the power envelope. The Center hasn't presented any plans as to how they are going to analyze collected data and get desired information. During this year's review no data aggregator has been mentioned. While the power the cognitive radios are using is very small, it is the energy that is concerning the SVT. Large data and unresolved clock synchronization issues may require that even low-power radios consume an enormous amount of energy. The SVT recommends that the Center explores possibilities of including integrated energy storage devices in the SoC itself in addition to supercapacitors that are needed for power boosting. This should be considered within the reasonable size and weight of the wearable device. The majority of energy harvesting that is considered in the Center has uneven dynamic and access to energy storage would ensure that there is an ample amount of energy available upon request.

The only self-powered system currently under development is SAP1 for cardiovascular health monitoring. The system has been demonstrated during the poster session after failing during the main session. The powering of the system is either thermoelectric or piezoelectric or supercapacitor. The integration itself looks quite bulky and it will definitely not be well received by discriminating customers. We expect that the testbed integrator will explore options to

minimize the form factor that will better fit the wearable fabrics. As mentioned previously, the Center hasn't considered adding any integrated batteries. Last year, the SVT saw a major problem for the SAP was the electrode that was prone to failure with frequent washing of the textile carrier. This year this problem hasn't been mentioned. The printed wiring also seems more esthetic. The required compression of the textile is getting easy to use for an average user and is also not an eyesore anymore. The bulky SAP on the back may make the human subject uncomfortable and it will also require the mount prior to putting the shirt on. The SVT still thinks that collaboration with an established brand will help both in esthetic and practical look of the shirt.

The lifetime of the wearable system has also been improved. Apart from being the lowest power integrated heart health monitor in the market with 47 μ W, the main claim the Center has is the vigilant operation. As the garment is designed right now it looks way too uncomfortable to be used 24/7.

Response: *The textile garment demonstrated at the Year 6 site visit should not be interpreted as the ultimate implementation of the system from a wearability perspective. This garment was a proof-of-concept demonstration of what a wearable of this type is capable of at our current maturation level within the Center; an industrial version of this shirt will have different characteristics from a wearability perspective. Key breakthroughs in high sensitivity printable ECG electrodes, textile antennas, high performance thermoelectrics, and textile-integrated interconnects will lead to a 24/7 wearable garment that will vigilantly monitor the wearer's health in a completely comfortable form factor.*

As new HETs will be integrated into SAPs over the next four years it is becoming worrisome that form factors for SAP2 and SAP3 are unclear. It is hard to imagine that all the investment in textile electronics will be applicable for those two testbeds. The form factor may become too large due to more needed energy harvesters as well as microneedles and pumps to extract sweat and ISF. Like in previous site visits the team is still not completely confident that adequate sensors are going to be available for successful SAP2 and SAP3.

Response: *As part of the Center's convergence process for future engineered system iterations, we will carry forward the form factors of existing platforms toward the form factors of these newer systems. For instance, the SAP Gen 2 will be a combination of wrist-worn, HET Gen 1-based exposure tracker with the ECG shirt developed through SAP Gen 1; the SAP Gen 3 system will integrate harvesting modalities into the patch and textile bandage form factors of the HET Gen 2 for the diet management and wound care use cases, respectively. We will continue to develop sensing modalities for these platforms that are simultaneously sensitive and selective enough for accurate monitoring and low enough power to be operated through our harvesting modalities.*

While SAPs are the ultimate result for the Center, they are also a great conduit for the students. Working on testbeds, like SAPs, offers a student a clear vision what the outcome of their research is, and it amplifies their sense of importance for working on the project. It is also a very

valuable experience for those students that will decide to join the industry as they will learn so much about the product cycle.

The concern the SVT has is that SAP2 and SAP3 requirements haven't been communicated during the review.

Response: Below is a chart of platform specifications for the SAP Gen 2 system. The final version of the requirements and specifications of the SAP Gen 3 platform is still pending study results for the HET Gen 3 to ensure we're picking the right liquid sequestering modality for the use case.

SAP Gen 2 Testbed Specifications:

Embodiment	Wristband
Inputs	Gas sensors Accelerometer Ambient temperature Ambient rH PPG
Outputs	Ozone level VOC levels Accelerometer Ambient temperature Ambient rH HR / HRV
Operational Lifetime	Hardware: > One year Electrodes: > One week
Biocompatibility	Continuous use for operational lifetime without skin irritation, toxicity
User Interface	Smartphone-based aggregator w/GIS data Physician/patient portal
User Feedback	Aggregator feedback of monitored environmental and health factors
Total System Power	< 500 uW
System Power Source	Thermoelectric Harvesting Piezoelectric Harvesting

Embodiment	Chest Patch
Inputs	Accelerometer ECG leads PPG
Outputs	Accelerometer data ECG HR / HRV
Operational Lifetime	Hardware: > One year Electrodes: > One week
Biocompatibility	Continuous use for operational lifetime without skin irritation, toxicity
User Interface	Smartphone-based aggregator w/GIS data Physician/patient portal
User Feedback	Aggregator feedback of monitored heart rate information
Total System Power	< 200 uW
System Power Source	Thermoelectric Harvesting

It is of paramount importance that those requirements exist, that they are properly benchmarked against anticipated commercial product in five years. Those requirements will set up target goals for all four research thrusts. While the SVT members are seeing that there is much more top-down approach now in the Center than has been in the past, they were not presented what specification the system integrator has for SAP2 and SAP3. It is important that those specs are available soon so the Center can look for external solution if internal research won't be able to meet the needs.

Considering all the criteria above, this Testbed is considered an early testbed with satisfactory results and is evaluated as a **High-Quality Research Program**.

(5) University Education Program

High Quality University Education Program (Years 4-6)	Low Quality University Education Program (Years 4-6)
<u>Educational Hypothesis</u> : Translating core hypothesis into activities that are effectively developing the characteristics of a creative and innovative engineer with the capacity to function effectively in a globally connected, innovation driven economy	<u>Educational Hypothesis</u> : Little to no progress in forming core hypothesis; has not advanced understanding of the characteristics of an innovative engineer and/or the activities that will produce the desired outcome
<u>Industry Interaction</u> : Students are engaged in industrial practices, entrepreneurship and innovation training /experiences	<u>Industry Interaction</u> : Students rarely if ever engaged with industry and have little or no entrepreneurship training or understanding of innovation
<u>Assessment</u> : Evaluation plan defines measures of success in developing students who are effective in industry and more creative and innovative and assesses progress and impacts formatively and summatively through longitudinal data	<u>Assessment</u> : Evaluation/assessment plans poor or they do not exist, personnel involved lack appropriate background for the task
<u>University Curricula</u> : Important course materials derived from ERCs interdisciplinary and systems research continue to be integrated into courses, and if proposed some new degree programs and options in may be in early implementation phases	<u>University Curricula</u> : Few if any research results are being integrated into courses, little or no activity related to developing any proposed degree programs/options
<u>Undergraduate Involvement</u> : Supports academic year involvement of undergraduate students at a 2:1 ratio of graduate to undergraduate students. Minimum expenditure of \$42K from base budget supports a Research Experiences for	<u>Undergraduate Involvement</u> : ERC fails to provide ample opportunities for undergraduate involvement during the academic year and under funds or does not fund an REU program

Undergraduates (REU) program that provides ERC and non-ERC students with an ERC research experience and focuses on underrepresented groups	
<u>Cross-partner Educational Opportunities:</u> A partnership in education among the lead and domestic partner institutions that enables cross-listing of courses, visits, etc. to benefit the ERC students.	<u>Cross-partner Educational Opportunities:</u> Education activities between ERC partners are absent, or are not well coordinated, and are not impacting all the partner institutions
<u>Foreign Partners:</u> Foreign partners strengthen the educational experience for students through cross-institution exchanges of students and/or faculty	<u>Foreign Partners:</u> Foreign partner institutions are not engaged in cross-institutional student or faculty with the lead and domestic partner institutions

The ASSIST Education Program has a range of activities created to achieve their goals of training successful students and disseminating ASSIST research. They utilize an activities-based logic model to guide them through design and evaluation of the educational activities of the Center.

Stronger efforts to disseminate, track, and assess their curriculum are encouraged. Suggestions for dissemination of curriculum include the greater use of nanoHUB, the ASSIST website, Youtube, etc. allowing for ASSIST to track the access and/or use of the materials. A sense of belonging needs to be cultivated within the ASSIST students. If students feel strongly connected with ASSIST (and/or if the PI's encouraged connection), they would be more likely to complete the various surveys that ASSIST sends out. A clear indication of the lack of connection is the low number of survey responses to the Center satisfaction survey and, therefore, the SLC SWOT survey results were not solid enough to be confident that all student voices are being heard.

Per NSF, a highly effective evaluation plan defines measures of success in developing students who are effective in industry and more creative and innovative and assesses progress and impacts formatively and summatively through longitudinal data. **Formative data through satisfaction surveys have been collected but there is no evidence of summative data being collected.**

Response: *We are collecting longitudinal data on graduated ASSIST participants through a contract with Educational Program Support Services (EPSSO). We will review and update our evaluation plan in the coming year to ensure it is as complete and effective as possible.*

Although mentoring is recognized as a desired skill and the Fifth Year Site Review stressed the importance, there is no defined strategy for training of faculty and graduate student as mentors. As mentoring is an important part of any educational activity and can influence student success, a training program should be developed.

Through the Translational Engineering Skills Program (TESP), there is a definition of the skill set required to produce the students they envision, and a clear set of activities designed to meet this goal. During this reporting year, nine TESP activities were offered across the four partnering

institutions. Education and industry leaders developed some of these activities in-house while others leveraged outside expertise. Since students are leaving and joining ASSIST each year and are located at multiple institutions, online modules could be developed to further disseminate ASSIST curriculum. Continued efforts to publicize, deliver and assess TESP activities could benefit additional students. The graduate student workshop on metacognitive awareness of research writing delivered by an FIU faculty was a strong asset to the portfolio of TESP programs.

The Student Leadership Council (SLC) has been active during this report year with outreach and social activities. As mentioned above and in the Fifth Year Site Review, **the SLC should work on ways to ensure that Center students are well integrated and engaged with the SLC.**

Response: *The education team will continue working with the SLC to develop strategies for improved student engagement. While our SLC has been working diligently on this issue, it is not a trivial challenge.*

They should also work to diversify the members of the SLC. All members are Electrical Engineering graduate students, which provides a narrow perspective of what the ASSIST students' needs are. It was also noted that FIU did not have a representative on the Council and all NCSU SLC members are male. Post docs can be invited to professional development events but, since NSF does not consider them students, their feedback on activities should not be included with the student data.

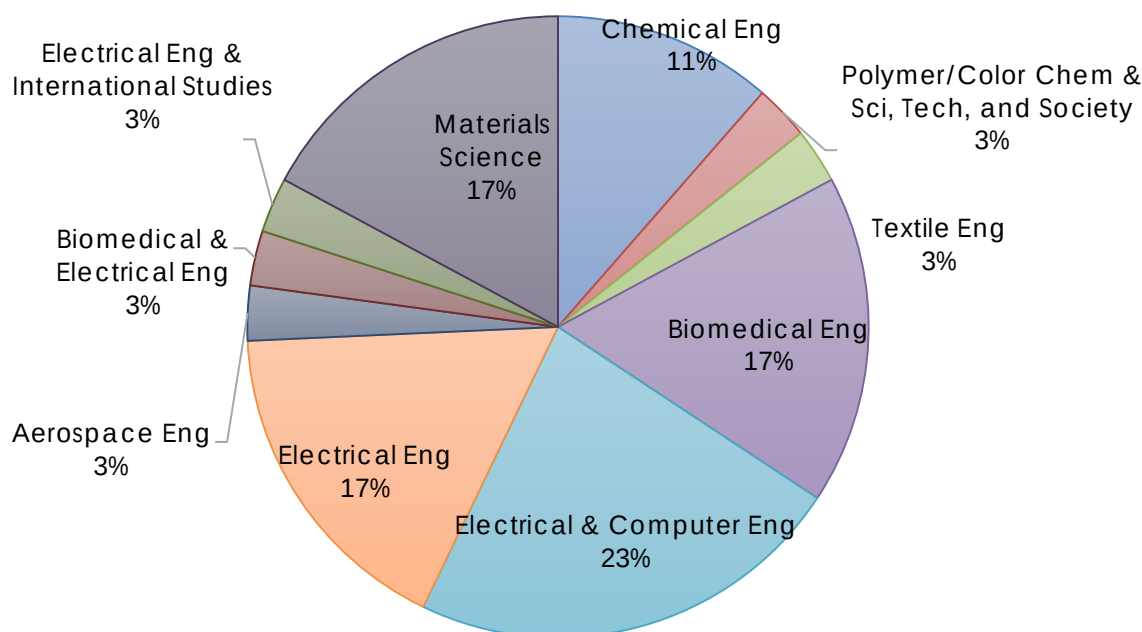
Similar to last year, students expressed a desire to have a stronger and more consistent and timely, on-boarding plan. On-boarding at ASSIST consists of notifying the Education Team of new students' arrival which students indicated was reliant upon their PI. Students did not see any formal orientation activities but did indicate that the weekly email notifying them of ASSIST activities was very helpful. There seems to be good interaction with the Industrial Liaison Officer (ILO) who offers students a variety of opportunities to interact with industry but students indicated that they wanted more interaction with employers, as well as ASSIST alumni, who could potentially hire them.

The REU program is well established at all of the partner institutions. ASSIST has an appropriate ratio of graduate/undergraduate students. Although the SLC survey had a low number of respondents, there was noted concern from the respondents and the students who participated in the 6th Year Review that students felt pressure to "commercialize" products they were working on in their research lab. They also felt that not all PI's "bought in" to the SLC and professional development programs created for the ASSIST students and thus PI's didn't support and/or encourage students to participate. This culture should be addressed such that students feel supported in the attendance of professional development events.

The majority of ASSIST students are electrical engineering students. As noted in the Fifth Year Site Review, as students graduate, **there is an opportunity to broaden the student base by recruiting students from additional departments to create more multidisciplinary teams.** Because working in multidisciplinary teams is a hallmark of industry positions and often leads to

new and impactful research, deliberate exposure to and practice working across disciplines is in the students' best interests and will maximize the success of the Center. NCSU ranks 1st in percentage of B.S. degrees awarded to women among top public colleges of engineering with more than 1,000 graduates according to an analysis by the Washington Post so there should be opportunities to recruit students from other departments such as Biomedical Engineering, Materials Science and Engineering, Textile Engineering, etc.

Response: *There are a few routes that ASSIST can and is taking to improve the multi-disciplinarity of its teams. Firstly, the Testbeds themselves are catalysts for students from different backgrounds working towards a common systems goal. Second, we will continue to recruit PIs from non-ECE backgrounds that will bring in students from multiple academic backgrounds. We will also use the undergraduate minor program as another route to improve discipline composition. Minor enrollment by major is shown below and indicates a good representation of different disciplines.*



Formal ways for students to communicate, visit and exchange with other students at different locations as well as foreign institutions will allow ASSIST students to function more effectively in a globally connected economy.

Considering the criteria above, the ASSIST University Program is evaluated as a fairly **High Quality University Program**. If the suggestions contained herein are sufficiently addressed, the ASSIST University Program will be a very **High Quality University Program**.

(6) Pre-College Education Program

High Quality Pre-College Education Program (Years 4-6)	Low Quality Pre-College Education Program (Years 4-6)
<u>Pre-college Partnerships</u> : Long-term partnerships with pre-college institutions (middle and high schools) in place, pre-college administrators committed	<u>Pre-college Partnerships</u> : Little or no partnerships established, either middle or high schools not involved, little or no administrator commitment
<u>RET</u> : ERCs Research Experiences for Teachers (RET) program, funded at a minimum of \$42K from the base budget, engages pre-college teachers from the partner schools in ERC labs	<u>RET</u> : No RET program or ERC faculty do not support the involvement of pre-college teachers in ERC labs
<u>Pre-college Curricula</u> : Developed pre-college course materials that include engineering concepts and experiences that are in use in partner schools	<u>Pre-College Curricula</u> : No impact on pre-college educational materials
<u>Assessment</u> : Assessment plans developed that are beginning to determine impact of program on increasing student enrollment in college-level engineering degree program	<u>Assessment</u> : Plans not effective for long-term follow-up and impact
<u>Diversity</u> : Program includes a broadly diverse group of pre-college students	<u>Diversity</u> : No commitment to diversity through the pre-college program
<u>Young Scholars</u> : Young Scholars research opportunity underway in the ERC laboratories, students receive effective mentoring and a certificate of completion	<u>Young Scholars</u> : Young Scholars Program not initiated or not effective
<u>Participation</u> : ERC faculty and students enthusiastically participate in pre-college activities as mentors, efforts are recognized and rewarded by their administrations	<u>Participation</u> : Faculty and students not engaged in the pre-college program or the university refuses to reward their involvement
<u>Mentoring</u> : Significant numbers of faculty and students are engaged in mentoring at all levels and rewarded for their efforts	<u>Mentoring</u> : Little or no commitment to mentoring

ASSIST incorporates an educational hypothesis (that of Social Constructivism), which defines the goals and guides the various activities of the Center. The two principal goals ASSIST thrives to achieve are producing successful next-generation workforce who are expected to be engaged in life-long learning and training students in ASSIST related research projects. The focus here has been to build on prior knowledge, create authentic knowledge, as well as emphasize professional development. Assessment plans, metrics of success, and overall logic model are in place and have been effective, where continuous refinement and revamping are routinely done.

In Year 6, ASSIST reported a steady growth in its four pre-college education programs, namely, the *Wearable Device Challenge* (WDC) competition, research experience for teachers (RET), young scholars (YS), and community engagement. The Center is encouraged to continue to be innovative and expand its current pre-college programs in order to continue the growth in expanding the next-generation workforce. Ten schools and twenty-four teams participated in the

2017 WDC competition at NC State. The Center hosts a 5-week workshop and visits to research facilities. The targeted skillset in the WDC program includes engineering design and professional preparation (such as oral communication and technical report writing). The Center has a plan to broaden the participation in this program in the coming years by allowing “remote entries” from partner institutions, which is commendable. The WDC program has been well advertised via workshops, local events, and conference presentations. However, the outcomes remain somewhat unclear. It would be helpful to conduct some research on how the WDC program has been used as a STEM recruiting venue. Any quantitative data in this regard would help assess the success of the program. Demographic information should be collected from the participants. Also, since RET participants could also compete in the WDC program, clearly, they have an edge over the other participants. Care must be taken to ensure a level playing field should there be a competition. Also, why focusing on *wearable devices* only? ASSIST’s involvement with the CATALYST Program in working with students with disabilities provided an opportunity to expand its diversity of impacted students. The SVT felt that there are opportunities to be innovative and branch out and incorporate some other ASSIST related components into such pre-college competition programs/activities.

Regarding RET, it has been reported that the participants, as part of their training, develop lesson plans for use in their own classroom activities. Some *Action Research* is carried out by the participants that helps evaluate the program success and, at the same time, find solutions to pressing issues. However, the Action Research is not comprehensive and the Center could further benefit from formalizing their efforts and closing the loop along this line. This type of research is rewarding and useful in the education community, given the fact that multiple universities are involved in the program and the subject matter is highly cross-disciplinary. Allowing and engaging the RET participants in some translational activities is a plus. There are opportunities to provide standard professional development activities across universities that could address implicit bias and stereotype threat in the classroom. During the Site Visit, a high-school teacher presented and shared her experience with the RET and the WDC program. That participants have access to various facilities and borrow hardware from the sponsoring University is commendable. However, the SVT felt that pairing up and/or broadening the participation of in-serve and pre-service teachers in a similar project and incorporating option for earning graduate-level extension credits, across all participating institutions, may be beneficial for the ASSIST RET program. A standard method of collecting information across universities about whether or not the trained teachers delivered the curriculum as well as obstacles and outcomes is needed.

Considering all the criteria above, the ASSIST Pre-College Education Program is evaluated as well thought-out and having potential to become a High-Quality Pre-College Education Program.

(7) Innovation Ecosystem

High Quality Innovation Ecosystem (Years 4-6)	Low Quality Innovation Ecosystem (Years 4-6)
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<u>Innovation Ecosystem</u> : Construct is strong with active member firms/practitioners partnership, strong benefits to member firms, translational research having an impact, and other partners devoted to innovation and entrepreneurship are effectively engaged	<u>Innovation Ecosystem</u> : No understanding of a Gen-3 innovation ecosystem, ERC has only a traditional ERC industrial membership construct
<u>Membership Agreement</u> : Center-wide membership agreement structures the industry collaboration program with clear statements of fees, benefits, and intellectual property policies that promote technology transfer	<u>Membership Agreement</u> : Membership agreement not in place; Center IP policies deter industry membership or technology transfer
<u>Membership</u> : Growing or stable group of members across sectors and throughout the supply chain appropriate for the ERC's vision. Key players are members.	<u>Membership</u> : Membership promise of proposal not fulfilled, many of those committed or promising to commit did not sign up, significant numbers of firms/agency are leaving, and/or major sectors are missing
<u>IAB</u> : Industrial Advisory Board (IAB) active and effective; SWOT process yielding cogent advice to the ERC	<u>IAB</u> : IAB rarely meets, SWOT process not in place or outcome ignored
<u>Industry Partnership</u> : Industrial collaboration has become a cooperative partnership that is integrated into the ERC's planning, research, and education activities	<u>Industry Partnership</u> : Industry involved only on a project-by-project basis, no collective, collaborative partnership
<u>Membership Fees</u> : Membership fees provide discretionary funds for the ERC and commensurate with typical investments in academic R&D for the sectors represented by the firms involved	<u>Membership Fees</u> : Low level of membership cash support for discretionary fund
<u>Technology Transfer</u> : Knowledge and technology transfer is impacting industry/practitioners	<u>Technology Transfer</u> : Little knowledge or technology transfer has occurred, the Center has had little impact on industry/practitioner
<u>Entrepreneurship</u> : State or local government, or other innovation/entrepreneurship partners are effectively engaged to help speed the innovation process	<u>Entrepreneurship</u> : Little or no engagement with innovation partners; neither they nor the ERC understand their role
<u>Small Firms and Translational Research</u> : Support to faculty to collaborate with small firms is effectively translating ERC research results into commercially viable products when member firms fail to license the ERC's IP. Strategy is supported by an effective conflict of interest policy.	<u>Small Firms and Translational Research</u> : Translational research with small firms unproductive, eliminated, or conflict ridden

The ASSIST Center has developed a strong ecosystem and culture of innovation, with very active industrial partners (both large and small) and advisory committees, as well as educational initiatives and resources for the students and PIs. During the site visit there are numerous

examples of a strong culture of interaction between the industrial members, Center leadership, PIs and students. Stakeholders from the medical and clinical advisory boards reported healthy engagement with leadership (and researchers) and are very involved in setting priorities and reviewing research funding. PIs and students are encouraged to work towards commercialization and are afforded opportunities to further their entrepreneurial education and experience (support for I-CORP, SBIR, patent filings, etc.). The ASSIST Center's investments in entrepreneurship and their innovation ecosystem are bearing fruit with more than 5 startup companies spinning out with ASSIST developed technologies and several technology licenses already completed. The Center's industrial participants and advisory groups reflect a healthy mix of large and small companies as well advisory and non-profit groups.

The Center has made good progress attracting more industrial (and advisory) members from the medical, clinical and pharma industries, but this effort should be strengthened further. The Center does not yet have a 'critical mass' of industry partners which can provide sustainable funding after graduation. The Center needs to further broaden its membership and should consider revising fee membership contracts in order to generate and maintain sufficient unrestricted/discretionary funds to become self-sustaining. Going forward the Center needs to focus on recruitment of industrial partners best aligned with the Center's plans for self sustainability.

The ASSIST Center has an opportunity to further strengthen their innovation ecosystem by identifying additional resources to support commercialization of products and by improving the visibility of the Center in the market. At present the Center appears to only have one advisor with expertise taking med-tech devices from concept through human or clinical trials to the market. There is also an opportunity to improve the visibility of the Center in the market for wearable med-tech devices. By investing in tradeshow, public relations, outreach, and social media, the brand/reputation of the Center could be further strengthened. Improving the visibility of the Center could help drive incoming inquiries and expand the potential sources of funding and commercialization for the Center.

Considering all the criteria above, the ASSIST Innovation Ecosystem is evaluated as a **High Quality Innovation Ecosystem**.

(8) Infrastructure

(a) Configuration & Leadership Effort

High Quality Configuration & Leadership Effort (Years 4-6)	Low Quality Configuration & Leadership Effort (Years 4-6)
<u>Institutional Configuration</u> : Well integrated institutional configuration among lead, core partner, and outreach institutions; partnership strong and effective	<u>Institutional Configuration</u> : Individual Center institutions operating mostly independently of each other

<u>Foreign Partnerships</u> : Foreign partners in place and funded by foreign funds or other non-NSF sources, effectively engaged in research and education, adding value to ERC	<u>Foreign Partnerships</u> : Proposed foreign partnerships not funded, or not effective in addressing ERC's research and education goals
<u>Center Director/Deputy Director</u> : Highly effective Center Director and Deputy Director, have implemented vision and are providing capable leadership for the ERC and the university	<u>Center Director/Deputy Director</u> : Center Director and/or Deputy Director have not translated vision into operation, leadership skills of one or both are not up to the task
<u>Leadership Team</u> : Other members of the leadership team (research thrusts, education, industrial collaboration, SLC, and administration) are cohesive and effective in planning and administrative aspects of the ERC	<u>Leadership Team</u> : Some or all of these leaders are not effective and there are no plans to replace them
<u>Research Team</u> : High quality integrated research team shares the vision, appropriate mix of expertise (faculty, practitioners, and students) to fulfill vision and systems goals	<u>Research Team</u> : Research team does not share the vision, is low quality, or does not have the mix of expertise necessary to fulfill the vision and systems goals, or operating independently
<u>Student Leadership Council</u> : Student Leadership Council (SLC) in place, is effectively leading student programs, SWOT process is impacting ERC, ERC leaders are receptive to the SLC's recommendations for improvement, SLC has adequate resources to achieve its goals	<u>Student Leadership Council</u> : Student Leadership Council is not effective, doesn't use SWOT analysis, ERC leaders not receptive to SLC recommendations

The Center is entering the more mature phase and its configuration and leadership are becoming better defined and less volatile. The institutions seem to have more confidence in their own abilities and are prepared to be flexible as the mission of the Center changes more towards the testbeds. The Center also added an administrative executive which also helped the Center in their diversity efforts.

The Center works on topics that are of great interest worldwide with many players in this field. The ambitious goal is very multidisciplinary and there are many excellent potential collaborators. The SVT understands that there needs to be willingness on both sides to engage. It would be good if the Center reports on failed efforts to engage some other leading teams that could benefit the Center. **Right now only Thrust 2 needs to rely heavily on external collaboration due to scarcity of available resources. We recommend that the Center explores more international collaboration as a better understanding of how other people are addressing the same problems can only benefit the Center, even if the collaboration is a mere exchange of best research practices, non-proprietary engineering approaches, as well as novel medical needs.**

Response: *The ASSIST team is actively collaborating with a number of international researchers. The Table below summarizes the international collaborations ASSIST had during Year 6. Some of these collaborations are significant. For example, this summer, the HET testbed leader Dr. Alper*

Bozkurt will spend two months at IMEC in Belgium. A C2C proposal has been submitted with Curam Center of Ireland. In a recent visit to Tyndall research center at Cork, Ireland, it was agreed to use Tyndall's thermoelectric materials deposited by electrochemical deposition in ASSIST's flexible thermoelectric devices.

PI	Institution	Country	Organization
Trolier-McKinstry	PSU	Korea	
Roundy	Utah	Netherlands	
Narayanan & Datta	PSU & Notre Dame	China	
Bozkurt	NCSU	Belgium	
Bozkurt	NCSU	England	
Velev	NCSU	Switzerland	
Bhansali	FIU	Switzerland	
Werner	PSU	China	
Misra + Pls	NCSU	Ireland	

The Center Director is getting more confident in leading such a broad multidisciplinary team. She is very open to inputs. This may be very positive in the pure research phase but it may become a liability if the IAB becomes more populated by companies that will drive their own agenda only (it is not clear whether the new HET3 target on medication compliance is the result of such influence). It seems that there is no mechanism in place that would prevent the Center from becoming too much involved in companies like health insurance ones that can abuse the products of this Center. Another worry is that both the director and the associate director are both materials and device experts. The outcome of the ERC is top-down system driven and the SVT had worries in the past that leader's expertise might not have been the most suitable for such a center. This fear has been mitigated in Year 5 by adding a system engineer whose work is showing up as both HET1 and SAP1 show signs of functionality. For the next four years the testbeds are going to become even more complex with SAP2 and SAP3 and their efficacy will be tested in human trials. **At this point, the leadership could explore an additional associate Center director that will be responsible for high-level trials and data analytics.**

Response: *This is a good suggestion. We are planning to revisit the organization chart of ASSIST to ensure that we have data expertise present and engaged in all aspects of the Center. This could come as a crosscutting effort or a focused Thrust on data. We will review this at the summer leadership retreat.*

The leadership on the thrust level is either good or excellent. As a result, there is strong outcome coming out from very well managed thrusts. On the other hand, the thrusts that are lagging behind should have a more decisive leadership. The Center emphasis for the last four years is more on testbeds. From the presented organizational chart, it looks like that the testbed integrators are on the same level as thrust leaders. **The SVT would like to recommend that all thrust leaders have a dotted line reporting to the lead integrator to ensure successful accomplishment of Center goals. The SVT also thinks that right now the fundamental research is avoided as there seems to be a fear that the output won't meet Center timeline. We still think that fundamental**

research is important to make developed platforms more broadly acceptable or in the case of unanticipated roadblocks.

Response: *We currently have the lead integrator working with all the PIs to ensure that the engineered systems are being integrated. We will further improve this process to ensure that both fundamental research and integration goals are being achieved, as both are critical to our success. Industry members have provided us possible ideas to achieve this.*

The advantage of the Center is that they don't have a need to recruit highly specialized skilled personnel as the project is not challenged on idea level but more on the executional level.

Therefore, the research team is sufficient. The turnover among students caused by graduation of the first class of graduate students is causing that the enthusiasm level is not as high as it was in the past. The students definitely don't lack excitement about the mission of the Center.

The student leadership council is active. They educate students on how to collaborate effectively, train them on how to be less fearful about potential research competition. The result of the SWOT survey, albeit lacking a sound representation, was helpful both for students themselves as well as for the SVT. It would be beneficial if a larger sample were available, which is a recurring concern for the SVT.

In the past we encouraged the management to involve more young/junior faculty in the new small and large projects under various testbeds and other activities of the Center, who are potentially more aggressive, forward-looking, and flexible, as opposed to well-established labs and PIs, who may just continue along their well-established research directions. **We still think that this effort lacks as the small seed grants from the Center will mean more to the junior faculty and the Center receives better return on investment.**

Response: *We will support junior faculty through seed grants but to ensure alignment we are generating a significantly more comprehensive RFP that will produce top down selection of projects and ensure that new PIs are well positioned for success.*

Considering all the criteria above, the ASSIST Configuration & Leadership Effort is evaluated as a **High Quality Configuration & Leadership Effort**.

(8) Infrastructure

(b) Culture of Inclusion & Diversity

High Quality Diversity Effort (Years 4-6)	Low Quality Diversity Effort (Years 4-6)
<u>Diversity Strategic Plan:</u> Strong strategic plan for diversity in place benchmarked against national engineering averages over the award period, results demonstrate a strong and	<u>Diversity Strategic Plan:</u> Ineffective strategic plan for diversity in place; no evidence of commitment to diversity. No partnership for diversity with administrators. Results demonstrate ineffective plan or effort

effective plan. Strong partnership for diversity with partner deans and department chairs	
<u>Minority Serving Institution Interactions:</u> In research and education, ERC involves at least one minority or female serving institution, a Louis Stokes Alliance for Minority Participation (LSAMP), and at least one other connection with an Alliance for Graduation Education of the Professoriate (AGEP), or at institutions that involve Native Americans, etc.	<u>Minority Serving Institution Interactions:</u> No effort or unsuccessful efforts to involve institutions / NSF diversity awardees that serve women and other underrepresented groups
<u>Leadership Diversity:</u> Team of leaders is diverse in gender, race, and ethnicity	<u>Leadership Diversity:</u> Little or no commitment to diversity at the leadership level
<u>Women Faculty Involvement:</u> A significant number of domestic women faculty involved, active recruitment continues	<u>Women Faculty Involvement:</u> No domestic women faculty, or a small number of women faculty involved since Center inception even though candidates available
<u>Underrepresented Minority Faculty Involvement:</u> A significant number of domestic underrepresented minority faculty involved and active recruitment continues	<u>Underrepresented Minority Faculty Involvement:</u> None or a small number of domestic underrepresented minority faculty involved even though candidates available
<u>Underrepresented Students:</u> Significant numbers of domestic graduate and undergraduate women and underrepresented minority students broadly involved in Center activities	<u>Underrepresented Students:</u> Few or no domestic women and underrepresented minority students appear to be involved in Center activities
<u>Persons with Disabilities:</u> Efforts are underway to increase the involvement of persons with disabilities at all levels and provide them with appropriate support/access to carry out their work	<u>Persons with Disabilities:</u> Little understanding of how to attract and recruit persons with disabilities to the ERC or if they are there, they have poor support and access to carry out their work

ASSIST has a Strategic Diversity & Inclusion Plan with strong and clear objectives:

- To improve the Center's diversity climate by enhancing the skills of the Center's faculty and students in mentoring students from all gender, racial, ethnic, cultural, and disability backgrounds.
- To increase the diversity of the Center's graduates and undergraduates through comprehensive, diversity-focused recruiting efforts.
- To work with deans and department heads to increase the diversity of the Center faculty through new faculty hires and collaborative projects.

Although mentoring was recognized as very important in the Fifth Year Site Review, there is no training of faculty and graduate student mentors. As mentoring is an important part of any educational activity and can influence student success, a training program should be developed.

A more accurate picture of the Center demographics should be obtained. Currently the Diversity Director relies on completion of student surveys as the way to compile demographics. Demographics should be tied to the Human Resources application system so that more reliable and complete data are collected.

The limited data (65% demographic data collected) provided does show an increase in gender on the Leadership team, faculty, and graduate students as well as an increase in underrepresented racial minorities on the Leadership team and undergraduate students, and an increase in Hispanics in the faculty and undergraduate students, there should be continued, focused and impactful efforts to increase diversity over the next year. It was noted during the Sixth Year Site Review visit, the Power Point presentation with photographs of leaders of each team revealed minimum gender and racial diversity on most teams.

Several of the partner universities have recently developed diversity training and strategies for hiring female faculty at their institutions. There should be opportunities for best practices to be shared across universities and a deliberate attempt at implementing those best practices with ASSIST at each school should be demonstrated.

Response: *The strategies that were shared by some of the leadership team with the SVT team are common practice across the partner universities and many major universities. Trainings for search committee members regarding bias prevention, procedures for mitigating bias, incentivized search processes for diversity hiring already exist. With that said, in order to demonstrate that this information is being disseminated across ASSIST institutions, information regarding faculty diversity best practices will be a part of the online COI toolkit. Currently, the toolkit has a section designated for this information, which contains articles and online resources, but a specific document will be created for opportunities and best practices at ASSIST schools for inclusion.*

The majority of ASSIST students are electrical engineering students. As noted in the Fifth Year Site Review, as students graduate, there is an opportunity to broaden the student base by recruiting students from additional departments to create more multidisciplinary teams. Because working in multidisciplinary teams is a hallmark of industry positions and often leads to new and impactful research, deliberate exposure to and practice working with other disciplines is in the students' best interests and will maximize the success of the Center. **NCSU ranks 1st in percentage of B.S. degrees awarded to women among top public colleges of engineering with more than 1,000 graduates according to an analysis by the Washington Post, so there should be opportunities to recruit students from other departments such as Biomedical Engineering, Materials Science and Engineering, Textile Engineering, etc. for REU opportunities, Capstone projects, and K-12 activities.**

Response: *The Center recognizes the opportunity discussed by the SVT, and embraces the idea that more can be done. A review of the current and future projects will determine where there may*

be opportunity to increase the participation of underrepresented students, including women in particular. This review will also include a review of funding available for supporting said students, as well as the possibility of providing opportunities for undergraduate research volunteers. NCSU's performance in the production of women engineering baccalaureates does provide an opportunity to tap into a large pool of women undergrads, as does the participation levels at our partner schools, however, due to rules regarding the use of funds for ERCs, participation of students from partner schools has its limitations as to when those students can be engaged. We will continue to look identify additional resources for increasing our engagement of partner institution students throughout the calendar year in order to maximize the opportunity at hand.

The Center has made some progress in terms of developing relationships with organizations that support women, Hispanics, and underrepresented racial minorities including AISES, NSBE, SWE, and SHPE as well as Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HSIs), and women's colleges. Diversity efforts have also included efforts of Center faculty doing outreach to persons with disabilities in the K-12 community. The CATALYST program led to award-winning research by a team of K-12 students with disabilities. The Center has a good partnership with NCSU Minority Engineering Program and several faculty and staff are heavily involved in the Louis Stokes Alliance for Minority Participation (LSAMP) program, which can help leverage the recruitment of underrepresented racial minority students. Demographics on K-12 activities should be collected as one way to measure diversity efforts.

At the Fifth Year Review, an online diversity and inclusion toolkit was discussed. This toolkit was envisioned to include educational materials, background, and training resources related to diversity and inclusion. Minimal efforts have been seen on this project.

Response: *The toolkit will be a great resource for Center personnel. The Center agrees with the SVT team that after completion, strong encouragement by the leadership team will be important for early adoption and success. Additionally, the leadership team will take into consideration the SVT recommendation for creating incentives, and will explore possible options. As mentioned during the site visit, a platform that will support evaluation activities is necessary, and the current WordPress platform does not seem to support the implementation needs. This same means of tracking users will also support the delivery of incentives. There is a possibility that tying evaluation submissions to incentives might address the issue, there is still the possibility of missing out on some data if the toolkit remains on an open platform like WordPress rather than a platform such as blackboard, Moodle, etc.*

Additionally, regardless of whether an ideal platform can be identified, the toolkit will launch, at least as a pilot, in Fall 2018 with the intention of engaging faculty, staff, and student members of the Center team.

Completion of this project, strong encouragement from Center leadership, and incentives should be used to create a high level of diversity and inclusion training and awareness among the Center personnel – faculty and students alike.

Considering all of the criteria above, the ASSIST Diversity Effort is evaluated as a **Medium Quality Diversity Strategy and Impact**.

(8) Infrastructure

(c) Management Effort

High Quality Management Effort (Years 4-6)	Low Quality Management Effort (Years 4-6)
<u>Management Systems</u> : Effective management systems, goals are set and met or revised, effective use of performance indicators to track and improve performance	<u>Management Systems</u> : Management systems weak, poor goal setting and delivery, management ignores performance indicators
<u>Use of Financial Resources</u> : Effective use of financial resources to achieve the ERC's goals, thrust and institution level budgets are appropriate for their roles in the ERC, timely allocation of funds, any annual residuals are below 20% of NSF support	<u>Use of Financial Resources</u> : Allocation of resources not commensurate with achieving the ERC's goals, long delays in allocation of funds, any annual residuals are significantly greater than 20% of NSF support
<u>Outside Input</u> : Effective incorporation of outside input in planning, project review, and assessment	<u>Outside Input</u> : Planning and project review are conducted mostly or exclusively within the ERC and minimal outside input or outside input is ignored
<u>Post-graduation</u> : By year 5, realistic and sound initial plan for financial self-sufficiency when NSF support ceases	<u>Post-graduation</u> : Weak plan for financial self-sufficiency when NSF support ceases

The ASSIST leadership team has developed a strong, well-integrated approach to managing the Center, research projects, PIs, students, member institutions, industrial partners, advisory board and university resources. The Center's management culture appears to be remarkably cohesive, with the leadership, PIs and industrial participants responding constructively and collaboratively to Center challenges, as well as questions from the site visit team. The ASSIST leadership team has established a well-defined solicitation process in which research awards are tied to testbeds and use-cases, which are defined with stakeholder/member company inputs. The Center has matured from a bottom-up research inspired opportunity set (in the early years) to holistic systems-level and use-case driven set of priorities which are defined and communicated through systems-level specifications. These systems specifications are then used to shape and direct the research activities and criteria for success. As part of this maturation the Center has increased the stakeholder input from the medical and clinical communities (voice-of-the-customer). Overall the ASSIST leadership team has done an excellent job building effective management processes and cultures.

As ASSIST moves into Year 7 of the Center, the leadership team is beginning to focus on preparing the Center for post-graduation sustainability. As part of this process, the management culture will need to become more market-facing. **For example, the leadership team should consider**

devoting more resources towards a market survey and business case analysis for sustainability of the Center going forward.

Response: *We agree that this would help us in our strategy for self-sufficiency. We will work with our IAB Chair, Anna Kravets, to explore routes in implementing a solid market survey and business case analysis. She has suggested that ASSIST should partner with a professional commercialization strategist to formulate these plans. We will explore these options as we begin Year 7.*

The goal of this effort is to define the opportunities to build Center of Excellence, with differentiation/value (relative to other centers/universities as well as commercial efforts), and ultimately create critical mass of partners & stakeholders who are sufficiently excited to financially support the Center. Instead of thinking in terms of use-cases and testbeds, management will need to identify key focus areas (like warrior-tech or clinical-trial monitoring) around which the Center can leverage their expertise to establish their differentiation/technology, expertise and value-add applications.

Furthermore, the leadership should work to improve the visibility of the Center in the market with more visible/public benchmarking and PR (public relations) relative to commercial products and academic projects. Investing in these efforts now will help develop the brand and reputation of the Center which will drive incoming inquiries around partnerships/collaboration and expand the potential sources of funding for sustainability. **The leadership should look at other graduated centers to identify key aspects which have positively or negatively impacted the sustainability if such centers are beyond graduation.**

Response: *We have evaluated the sustainability plans of five Centers before we put together ours. However, we will continue this effort in upcoming months.*

From an internal management perspective, the Center has the opportunity to creatively foster additional communication and collaboration between students, PIs and different disciplines as well as member institutions. The leadership team has implemented effective tools (weekly email newsletters, regular workshops, stakeholder communications) but can continue to improve their on-boarding process (for new students), interactions with industry (regular/formal project updates?) and continue to look for creative ways for students to gain exposure to complementary research efforts.

Considering all the criteria above, the ASSIST Management Effort is evaluated as a **High Quality Management Effort**.

(8) Infrastructure
(d) Resources & University Commitment

High Quality Resources & University Commitment (Years 4-6)	Low Quality Resources & University Commitment (Years 4-6)
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<u>Equipment/Facilities</u> : High quality experimental and enabling equipment/facilities; staff engineers in place to enable test beds to operate according to strategic plan	<u>Equipment/Facilities</u> : Experimental and/or enabling equipment/facilities lack critical components, are not state-of the art, or test bed development is not proceeding according to plan
<u>Communications Capability</u> : Headquarters and communications network facilitate interaction among students, faculty, industry/users and participating institutions	<u>Communications Capability</u> : Headquarters and communications network are effectively non-existent
<u>University Administration</u> : Effective partnership with university administration facilitating the success of the Center through policies that encourage its cross-disciplinary configuration, its diversity, mentoring, its partnership with industry and the innovation goals of a Gen-3 ERC; presidents, provosts, deans and department heads committed to success. Deans Council functioning effectively	<u>University Administration</u> : University administration does not facilitate the cross-disciplinary configuration, diversity, mentoring, or industrial partnership of the Center, university administrators not committed to Gen-3 ERC goals
<u>Funds</u> : Investment made by industry/users, university, and other non-NSF investors commensurate with their ability to contribute and benefit	<u>Funds</u> : Most or all sectors are below what would be expected

Significant infrastructure and major equipment exist at all partner institutions, demonstrating a strong support and commitment from the Center participants. Travel funds were available for many Center members to attend the site review visit, participate in the review presentations and meet with other team members in numerous formal and informal meetings. Some progress by the Center was reportedly limited by access to data handling and analysis resources. Data capabilities at NCSU were committed by University officials during a meeting with the SVT which will hopefully remove this roadblock.

Formal comments by senior university officials from all major partner institutions underscored the commitment of University Leadership. The positive impact of the Center on shaping the culture of the universities was highlighted. The NCSU leadership indicated that space and university funds to directly support the Center would continue for at least 5 years after graduation of the Center. The positive impact of the Center on shaping the culture of the universities was also highlighted by officials from each university. Communication at the Center leadership level appears to be very good through regular face-to-face meetings and electronic communication, but of course there always opportunities for further improvement. Polling of students indicated a relatively low interest in attending project reviews; however, virtually all student project leads were very actively engaged in regular project meetings via WebEx. **The WebEx project communication did not allow rapid exchange of comments so additional or alternate communication tools should be investigated.**

Response: *We would like to further explore the genesis of the concern with WebEx as it has been a workhorse platform for us. Once we do this and identify the concerns, we will take action to*

address them.

Specific plans and resources should be made available to assure adequate communication as new groups emerge that involve multiple sites (i.e., textile efforts).

Considering all the criteria above, the ASSIST Resources and University Commitment is evaluated as a **High Quality Resources and University Commitment.**



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July 2, 2018

Dr. Jonathan Horowitz
Assistant Vice Chancellor
Office of Research and Innovation
Poulton Innovation Center 212
Campus Box 7018
Raleigh, NC 27695

Dear Jon:

The College of Engineering (COE) has reviewed the progress and performance of Advanced Self-Powered Systems of Integrated Sensors and Technologies (ASSIST) Center, sponsored by the National Science Foundation (NSF). The review is based on the extensive Sixth Year NSF Site Visit and Review. A self-study report covering the last six years of operation was first submitted by the ASSIST to NSF. Then a Site Visit Team (SVT) spent three days at NCSU on May 15-17, 2018, listening to presentations by ASSIST and asking questions, both orally and in written form. In addition, the SVT met with the Chancellor, Provost, Dean, Department Heads and other administrative support personnel.

A summary report was generated by the SVT based on the site review and self-study. The ASSIST Center responded to comments and questions. We agree with the report that ASSIST has performed admirably in its primary mission as a research center. The NSF has fully committed to at least four more years of funding for the ASSIST Center at current levels of about \$4 M per year. Budget and sources of funding are adequate and are growing and a sustainability plan is in a place. Moreover, faculty and student interactions among colleges are strong and service provided to NC industry and government is highly valued. We agree with many of the suggestions to help strengthen ASSIST especially for increasing student diversity. For example, ASSIST has hired a diversity recruiter, supported in part by COE. In our opinion, ASSIST has satisfied all the established criteria to be considered a successful Center.

At this time, we recommend that ASSIST be continued as a Board of Governor's Center in the UNC System. The COE feels that the goals and important services of the Center cannot be provided by any other organization in the College or UNC system. ASSIST is an essential part of the national research program to improve health care.

Sincerely,

A handwritten signature in black ink, appearing to read "Louis" with a stylized flourish.

Louis Martin-Vega, Ph.D
Professor and Dean

Cc: Al Rebar, Vice-Chancellor for Research and Innovation
Larisa Slark, Senior Coordinator for Centers and Institutes, Office of Research and Innovation
John Gilligan, Executive Associate Dean, College of Engineering
Veena Misra, Executive Director of ASSIST
Dan Stancil, ECE Department Head



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MEMORANDUM

TO: W. Randolph Woodson
Chancellor
NC State University

FROM: Alan H. Rebar *Art Rebar*
Vice Chancellor for Research and Innovation
NC State University

SUBJECT: Recommendation to continue the NSF-funded ERC known as Advanced Self-Powered Systems of Integrated Sensors and Technologies (ASSIST) under Regulation 10.10.04

DATE: August 9, 2018

The National Science Foundation (NSF) completed a Year 6 review of the NSF-funded Engineering Research Center known as Advanced Self-Powered Systems of Integrated Sensors and Technologies (ASSIST) for the period 2012-2018.

The Report delivered by the Review Committee strongly supports continuation of ASSIST and NSF approved funding for an additional four years of activities. The Report highlights the effectiveness of operations within the Center and development of various testbeds that will enable the Center to achieve its mission. Early commercialization efforts have been successful and several spin-off companies have been established that utilize Center-developed technologies.

The Report includes a number of recommendations, including greater emphasis on industrial engagement and commitment with the goal of ensuring Center sustainability post-NSF funding. The recommendations of the Review Committee were accepted by the Center, as well as the College of Engineering, and implementation steps are underway.

The Office of Research and Innovation and the Provost endorse the request to continue ASSIST as a university Center as sanctioned by the Board of Trustees, and I request your approval of this recommendation.

AHR/mh

cc: Louis Martin-Vega, Dean, College of Engineering
John Gilligan, Executive Associate Dean
Veena Misra, Executive Director, ASSIST
Mladen Vouk, Associate Vice Chancellor, Research Development
Jonathan Horowitz, Assistant Vice Chancellor, Research Administration
Larisa Slark, Senior Administrative Coordinator – Centers and Institutes



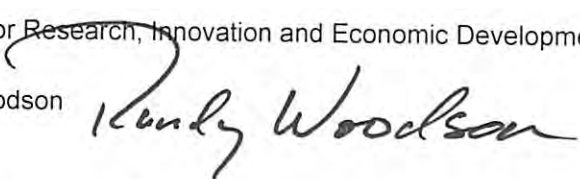
Office of the Chancellor

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MEMORANDUM

TO: Alan H. Rebar
Vice Chancellor for Research, Innovation and Economic Development

FROM: W. Randolph Woodson
Chancellor 

SUBJECT: Recommendation to continue the NSF-funded ERC known as Advanced Self-Powered Systems of Integrated Sensors and Technologies (ASSIST) under Regulation 10.10.04

DATE: August 13, 2018

In response to your Memorandum dated August 9, 2018, authorization is hereby granted to forward the request to continue the NSF-funded ERC known as Advanced Self-Powered Systems of Integrated Sensors and Technologies (ASSIST) to the Board of Trustees for approval.

WRW/mh

cc: Louis Martin-Vega, Dean, College of Engineering
John Gilligan, Executive Associate Dean
Veena Misra, Executive Director, ASSIST
Mladen Vouk, Associate Vice Chancellor, Research Development
Jonathan Horowitz, Assistant Vice Chancellor, Research Administration
Larisa Slark, Senior Administrative Coordinator – Centers and Institutes

CMAST

**Center for Marine Science and Technology
North Carolina State University
5-Year External Review
March 29, 2018**

External Review Team

Louis E. Burnett
Professor Emeritus
Grice Marine Laboratory
College of Charleston

Ruth Francis-Floyd
Professor and Extension Veterinarian
Department of Large Animal Clinical Sciences
College of Veterinary Medicine and
Program in Fisheries and Aquatic Sciences,
School of Forest Resources and Conservation
University of Florida

Martin H. Posey
Professor of Biology and Marine Biology
Director, Center for Marine Science
University of North Carolina Wilmington

This review was conducted as a part of the periodic review of Centers & Institutes at North Carolina State University. Members of the external review team were invited to review the programs and facilities of CMAST by CMAST Director David Eggleston. The review team received a self-evaluation of CMAST prior to the visit and visited the CMAST campus on January 17-19, 2018.

The review team met with Jon Horowitz, Assistant Vice Chancellor for Research, members of the CMAST faculty and staff, students, and a variety of stakeholders.

This report outlines the findings of the external review team associated with the various aspects of the center and its program that were made available to us. We provide our opinions on the **strengths**, the **opportunities**, and the **challenges** of CMAST. And we make a number of **recommendations**.

Executive Summary

The Center for Marine Science and Technology continues to fulfill its mission to NCSU and should be continued. CMAST has taken a giant step in enhancing all of its programs with the presence of housing on its campus. This transformational step will facilitate the growth and enhancement of many of its programs, but other measures must be taken to continue this momentum. More resident faculty must be hired to fulfill the original mission of the center and greater “ownership” is required by the colleges involved in CMAST. The College of Natural Resources should participate in CMAST as its participation will enhance many of the educational and research activities. There are critical infrastructural needs associated with facility maintenance that must be met. Distance learning should be “normalized” to make CMAST more effective as an educational resource for NCSU students and for students within the coastal region. The current leadership of CMAST is superb, but the establishment and the appointment of an Associate Director must be considered to ensure that the center meets its future challenges. Greater local autonomy in budget decisions will be required to allow CMAST to thrive.

Strengths

The North Carolina State University Center for Marine Science and Technology (CMAST) provides an important and unique contribution to NCSU, to the UNC system broadly, and to the state of North Carolina. Among the unique aspects of this center are its support of coastal outreach and engagement programs (a specific mission of NCSU through both its Sea Grant and Land Grant missions), unique integration of its veterinary program with other coastal and marine disciplines, regional service, education programs, collaboration and complementary expertise with other units, geographic strength, and close association with the regional community college. CMAST is complementary to other units in the state; including other NCSU units (as evidenced by department chair input), other marine labs, as well as state and federal agencies; and has a unique mission relative to these other entities. This complementary expertise is exemplified by the significant collaborations with researchers at other federal, state, and UNC system laboratories.

North Carolina State University has a long history of outreach, engagement, and regional service. CMAST serves as a nexus for this engagement along the central North Carolina coast and, through close collaborations with other laboratories, beyond this area. Research at CMAST provides theoretical and applied expertise for problems of significant coastal concern, including aquaculture, fisheries, seafood development and safety, impacts of coastal development, and health of key coastal species. CMAST hosts one of the coastal offices for NC Sea Grant as well as various extension and community college representatives. The importance of this expertise for regional managers and industry was not only indicated in the self-study document but also through the enthusiastic support voiced during the review team's meeting with stakeholders.

Among the several factors contributing to this strength is the location of the CMAST facility near other academic and agency labs, including the UNC Chapel Hill Institute for Marine Sciences, Duke University Marine Laboratory, Carteret Community College (which has a thriving applied aquaculture program), as well as offices for the NC Division of Marine Fisheries, the NC Division of Coastal Management, and the NOAA Southeast Fisheries Science Center. The IMS and Duke Marine Labs have complementary expertise and missions that together with CMAST form a strong research capacity along the central North Carolina coast. Proximity to state and federal agencies promotes interactions and aids CMAST's ability to quickly provide needed input on developing issues. The central North Carolina coast is an area with a long coastal economic and cultural tradition, ranging from fisheries and tourism to boat building, and the concentration of coastal and marine units builds upon and serves this longstanding emphasis.

A particular strength of the CMAST location that may be overlooked is its presence on the Carteret Community College campus. Carteret Community College has strong programs serving regional industries such as fisheries and aquaculture and the close relationship between CMAST and CCC provides an opportunity for CCC students that is rare in other locations. Collaboration between universities and community colleges aids in providing applied learning opportunities to students who may not otherwise have that chance while also exposing community college students to university activities and possible later university enrollment.

Another strength of CMAST unique within North Carolina and the surrounding region is its veterinary school presence. The veterinary program at CMAST not only represents one of only a few locations nationwide where veterinary students can gain hands-on experience with marine organisms, but also represents one of only a few locations nationwide where veterinary scientists collaborate closely with marine scientists to address issues of ocean health. This provides an opportunity for application of targeted expertise for examination of the health of endangered and threatened species, aquarium communities, and fisheries' organisms. Veterinary school expertise is currently a critical component of the North Carolina marine mammal stranding program as well as certain species management efforts and, as described below under opportunities, provides considerable potential for further contributions to coastal issues.

CMAST also provides a strong regional service (and service extending beyond the region) through its K-12 programs. There was significant recognition and support for the opportunities and impacts provided by these programs voiced at the stakeholders' meeting. The K-12 programs supported through CMAST provide a chance for student applied learning and involvement in a county that is transforming economically, providing critical opportunities for enthusiastic students. The current base of programs also provides important opportunities for further programmatic efforts.

Among the several other strengths provided by the CMAST facility and broader CMAST program are:

- A facility that can serve as a base for coastal work conducted by NCSU and other UNC system faculty.
- A growing undergraduate program offering an immersion and applied learning experience at the coast.
- A nexus for professional and community contacts.
- Versatile laboratories and support facilities.
- Dedicated and enthusiastic researchers, both resident and transient, who are leaders within their various areas of expertise.
- A dedicated and highly professional staff and excellent administrative leadership.
- Housing for students and visiting researchers (something not provided at all marine laboratories).
- Interdisciplinary support within NCSU and among outside collaborators.
- A strong core of graduate students.
- Opportunities for growth in collaborations regionally.
- A recognized reputation within North Carolina and beyond.

Lastly, one of the great strengths of CMAST, in our opinion, is the leadership and those who work there. The faculty and staff seemed to be highly engaged and to care deeply about the center. Dave Eggleston, as the Director of CMAST, has done a marvelous job of watching over the facility, engaging with the local communities, and engaging with the main campus. The establishment of significant housing facilities at CMAST was probably one of the most transformational events on the CMAST campus in recent years, allowing individuals and especially students to make use of CMAST.

Opportunities

Significant opportunities exist for growth of CMAST programs in research, teaching and service. Formal engagement of the College of Natural Resources, addition of faculty to create critical mass, and enhancement of existing programs all offer opportunities for growth of CMAST programs.

College of Natural Resources

The College of Natural Resources (CNR) includes the following relevant program areas:

- Fisheries, Wildlife and Conservation Biology
- Natural Resources
- Environmental Science
- Environmental Technology and Management
- Parks, Recreation and Tourism

Engagement of these programs with existing CMAST teaching, research and service-oriented programs should enhance all participating units. The fisheries program, in particular, is a natural fit with the marine science programs represented at CMAST. Development of field-based learning opportunities, or research-based activity if new faculty were hired, could address questions in applied fisheries ecology and coastal sciences.

CNR also has what appears to be a more mature distance education program than the three colleges currently engaged in CMAST. It offers online graduate certificate programs for working professionals and several online Masters programs. Limited access to course work offered online was seen as a major weakness by CMAST faculty and students. Engagement with CNR could address this concern. With an active distance education program, it is assumed that faculty and students in CNR are comfortable working with this format for instruction. In addition, CNR graduate students working from CMAST might not face the same challenges reported by students in the 3 colleges currently engaged in the center. CNR graduate students would have online access to courses in their degree program, minimizing the need for travel to main campus.

Veterinary/Aquatic Animal Health Program

The presence of a veterinary/aquatic animal health program is unique. The current situation, however, lacks a critical mass of faculty and staff (one full-time faculty member, no permanent laboratory staff). Currently, opportunities to bring in significant extramural funding appear limited by the breadth of (clinical) work already in progress. The addition of permanent laboratory staff could facilitate the research effort, as off-campus faculty members have to travel more. Having staff available to keep research activity in progress can significantly increase the productivity of faculty when they are not on-site.

The addition of veterinary faculty could not only enhance research opportunities but could increase the opportunity to provide clinical or diagnostic support to local industries if this were identified as a priority. During the stakeholder meeting, the need for support of shellfish industries was mentioned. Shellfish pathology is highly specialized and CMAST can provide critical support to the state in this area. The diagnostic needs of aquaculture businesses in general (finfish and shellfish) are different from the current emphasis on marine mammal stranding

response and aquarium medicine. At the stakeholder meeting, there was discussion of the current need to use expertise outside of North Carolina for diagnostic support of aquaculture businesses in the region. Recent changes in federal regulations are requiring aquaculture businesses to maintain a “veterinary-client-patient” relationship with a properly trained aquaculture veterinarian to be able to buy medicated feeds, get health certificates, etc. CMAST is well positioned to provide this support to North Carolina aquaculture if desired, especially through closer integration with other NCSU aquaculture support units and collaborations with the Carteret Community College Aquaculture program. Service to aquaculture industries is different from the service currently offered, which is focused on zoo and aquarium medicine, but they complement each other. Increased clinical and diagnostic support to aquaculture industries would increase learning opportunities for resident and veterinary student training, as well as offering the opportunity to improve animal health training for students in aquaculture programs.

There may be related opportunities to provide diagnostic and health management support to laboratories in the area that maintain aquatic animals (e.g., zebrafish) for research. Ideally this should be “fee for service” based work.

Distance Education Programs

As alluded to above in the discussion about the involvement of CNR, the development of stronger distance education programs would enhance CMAST value and engagement. Currently, students and faculty travel to main campus to sit in on classes or to teach. Similar programs with geographically distant faculty and students at the University of Florida have benefited tremendously from the “normalization” of distance learning. In this situation, full-time graduate students located at off-site facilities may never have to travel to main campus to take a class.

The development of online course-work (graduate certificates or non-thesis masters programs) for working professionals can also be leveraged into a substantial revenue stream. Such course-work could serve the seafood industry, and if aquaculture were incorporated into the CMAST program, it could serve aquaculture clientele as well as veterinarians interested in providing professional service to those industries. The excellent seafood technology program could provide required training for FDA seafood inspectors, creating a new revenue stream.

Existing field-based undergraduate programs could be enhanced by the availability of online course-work which could precede the field experience at CMAST or reinforce it after the student returns to the main campus. Some online coursework could provide collaborative learning opportunities for undergraduates at other UNC institutions, especially if included as part of the UNC system-level online program, as well as for advanced community college students.

Since the CNR is not currently part of CMAST, it seems unlikely that field training for their students (both undergraduate and graduate) is provided there. Skill sets such as driving trucks with trailers and operating small boats safely (possibly with some sort of Coast Guard certification) is often expected of agency (state or federal) employers hiring recent graduates. CMAST could be developed as an ideal location for students to receive this training and certification. This would require changes in the way equipment is currently managed as well as the addition of a staff member of with responsibility related to equipment management and maintenance.

Undergraduate Education

Currently, field courses offered at CMAST appear to be running at about 100% capacity during the Spring semester; CMAST could likely offer a Fall semester if certain bottlenecks can be overcome. A key bottleneck is the lack of flexibility to substitute many of CMAST courses into a particular degree curriculum, especially in the marine science undergraduate program. A marine-science minor based on the Semester@CMAS Program would also help achieve 100% capacity in Spring and Fall semesters. Lastly, additional faculty based at CMAST would be necessary to provide the instructional support for a Fall semester, and could reduce the need for part-time instructors during the Spring semester. The Semester@CMAS program is advertised in all marine-related undergraduate courses at NCSU, as well as via undergraduate coordinators in three colleges (COS, CNR, and CALS), via the university newspaper and radio station, and via CMAST newsletters and web-site (<https://cmast.ncsu.edu/programs-cmast/semester-cmast/>). Improved visibility (and undergraduate advisement) is needed to enhance student participation and engagement. The recent availability of housing creates a significant opportunity to build these valuable programs.

CMAS is well-positioned to leverage the existing undergraduate summer fellowship program (currently limited to 3-4 students annually) into a highly competitive and federally funded NSF-REU program (Research Experience for Undergraduates). The recent availability of housing for students makes this much more possible than it would have been in the past. This could be an important asset for CMAST, but it will require more resident faculty members and a commitment to increasing student diversity.

Students on the main campus should be able to access faculty and courses available through CMAST. The summer semester and spring field semester are certainly helping with this. As undergraduate participation grows there is likely to be an opportunity to add a fall semester for students at CMAST.

Graduate Education

Currently, the only source of support for graduate students working and resident at CMAST is grants. Other sources of funding would allow the center an opportunity to develop a critical mass of graduate students. The need for distance education has already been mentioned. There may be opportunities to develop partnerships with Carteret Community College, where graduate student support could be provided by CCC in exchange for teaching responsibilities and this should be pursued.

Support for exemplary graduate student candidates from main campus (i.e., fellowships or similar programs) would enhance the ability to recruit outstanding graduate students at times when grant funding was not immediately available.

The development of a NSF-REU program (mentioned above) could enhance the recruitment of very high-quality graduate students for training at CMAST. Successful REU students may want to return to CMAST for their graduate work. This is also a way to increase diversity in the graduate student population.

Opportunities to “exchange” graduate students among sister institutions in the vicinity of CMAST could be pursued. Increased interactions among students would enhance individual training but would also enhance interaction and communication between units. CMAST students could benefit from earlier communication and interaction with their peers. Furthermore, one institution might offer an experience relevant to a particular student’s study program that they cannot get at CMAST. One example mentioned by students was the need for boat training (also mentioned below). UNC Wilmington was specifically mentioned as an institution with which students would like to interact more. Opportunities for graduate students to take course-work at regional institutions appeared limited at this time. Efforts to facilitate such exchanges would enhance the graduate student experience and further decrease the need to commute to the main campus.

Opportunities to secure industry support for graduate students should be explored. Seafood technology might be an area where there is sufficient industry support for a graduate student or post-doc stationed at CMAST.

There may be opportunities to develop shortened but significant learning opportunities at CMAST for graduate students based on main campus. Currently this is being done effectively for veterinary students by offering “selectives” several times per year. In the veterinary curriculum a “selective” is an intensive educational program (probably 1-3 credit hours) that is condensed into a one- or two-week period. This would be hard to do during the regular academic calendar for most students, but there may be opportunities to develop such experiences in the summer. This type of format also works well to serve working professionals who cannot take a semester long course, but who could participate in a one-week training session that served as professional development in their discipline. Such programs could be collaborative and draw on neighboring institutions and likely being attractive to graduate students at several UNC institutions.

Partnerships

A number of partnership opportunities may exist. The State Department of Agriculture is commodity-driven, but a partnership with CMAST could enhance efforts to develop diagnostic or veterinary-related support for aquaculture industries (mentioned above). There might also be a potential partnership with the seafood technology lab as the NC Dept. of Agriculture does not test for food safety. Food/seafood safety is obviously important to NC consumers. Enhancement of the already strong relation with the N.C. Division of Marine Fisheries is also an opportunity.

K-12 Education and Community Involvement

The local extension service is housed on the 3rd floor of the CMAST building. Interactions with CMAST faculty seemed limited. Although CMAST has very strong outreach programs, it does not seem to have a formal extension function. A directed effort to engage the NCSU Extension Service in CMAST research, teaching and outreach could be a source of further support for CMAST from main campus. It seems that the major extension presence that is already in the building should be capitalized on as an asset. The NC Sea Grant Program is located on the first floor of the CMAST building, and there are numerous collaborations between NC Sea Grant staff and CMAST Faculty, especially in the areas of aquaculture and seafood technology/business development.

Challenges

In this section of the report, we describe some of the greater challenges that we noted in our visit. The challenges are described with some appropriate background and without necessarily offering our opinions on how to meet the challenges as these recommendations may appear elsewhere in the report.

Critical Mass

Despite significant strengths in a number of areas, CMAST is presented with a number of challenges that must be met if it is to thrive as an important center at NCSU. CMAST serves a large community of scientists and students at NCSU as well as a number of important stakeholders, especially stakeholders in the coastal community. In our experience, one of the most difficult things to achieve in a center of this type is the establishment of an identity with some clear “ownership” by a number of entities within the home institution. Ownership of academic programs is most easily recognized at the departmental level where faculty members report to a department head and where these faculty have responsibilities to specific populations of students. When two or more departments are involved in a single program, ownership becomes less clear and leadership becomes critical. This is quite often difficult to sustain over time with the coming and going of critical faculty members and department heads. When the center is remote from the main campus, the challenges become magnified.

As a center, CMAST is “owned” by multiple colleges and multiple departments within the colleges. So great attention is required to ensure that CMAST functions as a true center. Otherwise, the entity is just a building where faculty and students can go and do their research on a short-term or even a long-term basis and the formal structure of a center is not required. The codicil that established CMAST as a center in August 2000 clearly had a grand vision for a significant presence of NCSU on the North Carolina coast that serves a broad community of faculty with interests in marine sciences and policy. Quoting directly from this document, “The center provides a scientific and educational structure in which faculty from throughout the university can develop new knowledge, teach and train students, and apply knowledge that enables citizens of coastal North Carolina to improve the quality of their lives and to enhance the wellbeing of the coastal environment and the utilization of coastal resources.” The codicil further elaborates the importance of partnerships - “CMAST is the nexus of a partnership that includes Carteret Community College, the UNC-CH Institute of Marine Sciences, the Duke University Marine Laboratories, the North Carolina Division of Marine Fisheries, and the National Oceanic and Atmospheric Administration, all of which have significant education and research facilities in the Morehead and Beaufort area.”

Despite some of the obvious successes of CMAST, in our opinion, for CMAST to reach its potential, there must be a greater investment of personnel. The most critical need is for resident faculty. The fulfillment of the “promise of the center” as elaborated in the previous paragraph requires more faculty invested in the center. The recent actions to hire two new resident faculty members is clearly a step in the right direction, but we believe the hiring of more residential faculty is required to form a critical mass of faculty. Indeed, this vision of establishing a critical mass of faculty was clearly recognized as important when the vision for CMAST was created.

As a “Center,” CMAST is more than just a building where people from different places can gather to accomplish some specific tasks. As a “Center,” CMAST is an entity recognized mostly for the people who populate it. As such, having a critical mass of resident faculty is probably the most important single thing responsible for CMAST being a recognizable and cohesive unit. So-called rotating faculty are clearly important in the identity of CMAST, but without a strong core of residential faculty, CMAST cannot live up to its potential.

Integration with main campus

Related to the above section on a critical mass of faculty is the integration of this remote center with the main campus. Even with a greater number of faculty resident to CMAST in place, there is a constant need for input and engagement of faculty on the main campus in fulfillment of the mission of the center. This is no easy task and Director Dave Eggleston has done a masterful job in tying CMAST to the main campus and *vice versa*.

In our interview with faculty and some departmental heads from the main campus, we were pleased to hear that “ownership” of CMAST was something taken very seriously. Faculty and department heads had clearly understood and given thought to how the main campus integrated to CMAST. There appeared to be recognition of the critical mass issue cited above. In particular, department heads from each of the three colleges recognized the challenges of placing residential faculty at CMAST but understood its importance. Indeed, the department chairs can take advantage of having dedicated space at CMAST in support of a faculty FTE without giving up space on the main campus.

The integration of CMAST with the main campus can only happen with the support of department heads, but ownership must extend to the levels of the deans of the colleges. In our view, faculty welcome and even expect the interest and engagement of the deans of the colleges. We suggest that a more obvious engagement of the deans will greatly improve nearly all aspects of the running of this center remote from the main campus. In addition, it would seem that the College of Natural Resources is an entity that can benefit from an association with CMAST and this is discussed more extensively above.

Communication and Connectivity

In an age where communication has become easier through electronic media, the mechanisms of communication have become more diverse and continue to evolve at a rapid pace. There are several challenges associated with CMAST that we would like to highlight. The challenges involve general communication with the main campus, instructional communication, communication with other academic institutions in North Carolina, and communication with stakeholders. Here, we confine communication to those in the electronic form. Communication in other forms are addressed elsewhere.

A recent IT upgrade at CMAST was very useful and important and these kinds of upgrades should keep up with the main campus. This is especially important as CMAST facilitates all kinds of exchanges with the outside world and more closely tie the center to the main campus. Communication associated with classrooms and meeting rooms will undoubtedly evolve rapidly as the technology continues to change. We note, however, that the current communication infrastructure is not highly efficient. Indeed, our own attempts at communicating with different

groups in our interviews revealed some short-comings (e.g., poor connections, people talking over one another, lack of efficient ways of including more than a few people in the conversation). We realize that some of these limitations are not uncommon, but we note especially that these limitations can influence a remote campus more than the main campus. For example, in our interviews with the students, it was pointed out that some faculty on the main campus were reluctant or refused to allow courses to proceed using remote procedures. As practicing faculty members ourselves, we recognize that it is challenging enough to teach any course, but communication barriers that include students remotely can surely be addressed.

The same kind of enhanced connectivity is highly important in allowing faculty to collaborate with other scientists on the main campus and at other institutions. While there is no good substitute for face-to-face meetings, much can be done to stimulate the writing of grants, the analysis of data, and the formation and nurturing of partnerships with appropriate connectivity.

Administrative Connectivity

A special challenge is the overall administration of CMAST and connectivity with the main campus. Ultimately, the success of CMAST lies in the hands of the people who run it on a daily basis. Virtually all of the points of the strategic plan revolve around robust interactions of CMAST with the leadership and the faculty on the main campus. While interactions of CMAST with other entities (e.g., institutions and different stakeholders) are essential, ownership of CMAST must emanate from the main campus; some ownership issues have already been discussed.

In our opinion, CMAST has had excellent leadership with Dave Eggleston as the director. Dave is a leader with vision, energy, and good interpersonal skills. There are two significant challenges, however. The first will be to continue this kind of energetic leadership well into the future. And the second challenge will be to visualize what happens when a new generation of leaders step into place. These are not just questions for university administrators, but especially for the faculty served by the leadership. Faculty understand well what it takes to be successful in this kind of position where a remote campus is involved.

Our strong recommendation, emphasized here because of its importance, and provided in more detail below under “Recommendations,” is the establishment of an Associate Director to handle many of the day-to-day activities at CMAST. This will provide increased opportunities for the Director to serve critical liaison functions with constituencies at the main Raleigh campus.

Infrastructure Maintenance and Upgrades

One of the greatest challenges of operating a facility that is remote from the main campus is one of general structural maintenance. This review team is experienced with this and we know it to be a challenge even when the facility is not very remote and less than 8 miles from the main campus. CMAST is a substantial facility and has one primary individual charged with maintenance. However, there is reliance on the physical plant on the main campus for routine repairs, maintenance, and upgrades. CMAST appears to suffer from the “out of sight, out of mind” syndrome with regard to maintenance issues. A building in a coastal environment has special needs, especially because of the salt air and storm threats, and these needs must be addressed on a routine basis and not just when there is an emergency.

Funding Model

The scientists working at CMAST find their academic homes in different departments and in different colleges. Support of research through research grants is obviously an important mechanism to maintain a healthy and stimulated research environment and a healthy and stimulated teaching and learning environment. The needs of the faculty and the students at CMAST and the facility itself are many and a serious challenge is providing a mechanism to be responsive to changing needs and repair and replacement of essential infrastructure. This is especially important because of the remoteness of CMAST. The best example we can think of is the repair of a non-functional ice machine. Clearly, the laboratory director must have a reliable mechanism or mechanisms to deal with this kind of issue without having to beg for such items each time a critical need occurs. This is a significant challenge that can be met in a variety of ways, but clearly an efficient way to consider is the sharing of indirect costs from grants. This should be considered. In general, we recommend greater local autonomy in budget decisions and approvals.

Diversity

A chronic struggle at perhaps most academic institutions is to develop and sustain a population of faculty and students that is diverse in every sense of the word. This is perhaps most important in a setting that serves students. CMAST needs to find ways to increase the diversity of both its faculty and its student populations. There is no magic bullet for this, but opportunities may exist through some of the CMAST outreach programs and its association with the Carteret Community College. Undergraduate research programs are also a good way to enhance diversity.

Recommendations

Faculty, Program Leadership and Administration

1. Complete the original target of 9 resident faculty members/researchers (3 from each College).
2. Invite the College of Natural Resources to participate in CMAST.
3. Engage the deans of the CMAST-related colleges to more fully support and “take ownership” of CMAST, especially through faculty hires and the sharing of indirect costs.
4. Make a specific plan for each residential faculty member to engage in appropriate activities associated with her/his home department to achieve tenure and promotion. This plan should be developed through the appropriate department head.
5. Continue and grow interactions with other coastal research and education units as appropriate, including collaborations with the several NC system labs
6. Establish a position of Associate Director of CMAST that is resident at CMAST. The Associate Director would handle most of the day-to-day issues as CMAST. This will allow the Director to more fully be involved in addressing the goals of CMAST as outlined in the strategic plan and initiate and nurture critical marine science discussions occurring on the main campus (see recommendations #1, #2, and #3). Director involvement would be particularly appropriate for efforts that involve outreach and engagement with the external units currently in touch with CMAST.
7. Provide greater local autonomy in budget decisions and approvals.

Student Programs

8. Improve the course offerings at CMAST for students, especially in the fall semester. This will require mechanisms to entice faculty on the main campus to offer courses online.
9. Enhance undergraduate opportunities at CMAST. This can be done by partnering with Carteret Community College. CMAST should also consider applying to the Research Experiences for Undergraduates (REU) program at NSF. REU programs are prestigious but require a critical mass of faculty members (see #1 above). REU program are a great way to enhance diversity.
10. Improve diversity within the CMAST community of faculty, students, and staff.

Responses to 5-Year, CMAST External Review Report

Dr. David B. Eggleston, CMAST Director, eggleston@ncsu.edu

May 7, 2018

I. Overall Impressions

The CMAST Faculty, Staff and Students were very impressed with the attention to detail provided by the CMAST External Review Team (ERT). Moreover, the collegial nature of the ERT facilitated very honest and frank discussions with the different CMAST stakeholders. We are also grateful for the excellent overall review by the ERT that recognized the leadership and numerous unique strengths of CMAST, as well as potential opportunities to strengthen and grow CMAST programs. The ERT report made seven recommendations regarding “Faculty, Program Leadership and Administration”, and three recommendations regarding “Student Programs”. Director David Eggleston solicited input from CMAST Faculty and Staff on the ERT Report, and this response integrates their feedback.

II. General Responses

(1) Veterinary Medicine Program. --- The characterization of the marine health program by the ERT as emphasizing marine mammal strandings and aquarium medicine did not recognize the full scope of activities that also include (i) veterinary input on research conducted by multiple laboratories, including on invertebrates, fish, birds, sea turtles, and marine mammals, and on protected species, invasive species, and aquaculture species. In addition, the program includes (ii) clinical medicine with sea turtle strandings (more so than marine mammals), (iii) some clinical support of aquaculture teaching and research facilities (local, regional and national), and (iv) performing pre-shipment exams and signing international health certificates for shipping animals internationally.

We agree with the ERT that: (i) greater support of aquaculture industries would be a considerable benefit to the region and align with the CMAST mission, and (ii) that current capacity is already full and will require additional faculty and staff to expand any further. CMAST, in collaboration with NC Sea Grant, has been making the case to a Shellfish Aquaculture Working group that is part of an initiative by the UNC Collaboratory (<https://collaboratory.unc.edu/>) and NC Coastal Federation for legislative support for a shellfish pathologist to meet the growing need of the aquaculture industry in NC.

(2) College of Agriculture and Life Sciences (CALS). --- The discussion of the relationship between Fisheries and the College of Natural Resources (CNR) in the ERT Report was incorrect. Most fisheries faculty at NCSU are in the Fisheries, Wildlife & Conservation Biology (FWCB) Program, and housed within CALS. It seems the review team thought FWCB and fisheries were only in CNR. Additionally, about half of activity on an average day at CMAST is fisheries-related based on personnel numbers in the building. Moreover, of the three Colleges involved in CMAST, CALS continues to make some of the largest investments, which include three tenure track faculty and associated staff. This is significant in that the only other full-time faculty member at CMAST is in College of Veterinary Medicine (CVM). The College of Sciences (COS) does not have a full-time, tenure-track faculty member based at CMAST.

(3) The Science House at CMAST. – The ERT report failed to recognize the significant impact that *The Science House at CMAST* is having locally, regionally and nationally in terms of K-12 STEM Programming. The Science House, based in the College of Sciences, trains hundreds of teachers and students on an annual basis and hosts a number of STEM-related programs including numerous professional development training programs held at CMAST and in the surrounding K-12 schools. Youth programs include monthly Teen Science Cafes, Sea Wolf 4H Club meetings, Sea Scouts, and middle school after school enrichment and summer camps. The Science House Director serves CMAST as a representative to the STEM education community through participation in marine science and STEM education professional organizations, community organizations, civic clubs such as Rotary International and the Carteret County Chamber of Commerce, STEM East, NCMSEP, South East Area Education Association, NC Science Teachers Association, SciREN, Mid-Atlantic Marine Educators, Albemarle-Pamlico National Estuary Partnership and local NCSU Alumni Events. Currently The Science House is not funded and relies on grant funding and workshop fees to provide its services.

(4) CMAST Facilities. – Over the past five years, CMAST Programs have been growing and will continue to grow. Given the salt-air and tropical storm environment of CMAST, and the effect this environment has on our physical infrastructure, it is important that NC State Facilities develops a planned maintenance and replacement program for our physical infrastructure (e.g., HVAC, Fume Hoods, Electrical, Water, etc.) and executes such as plan. For example, there should be no less than a seven year period allowed for replacement of our HVAC Chillers and no less than five years between replacement of our roof top Fume Hoods. We must continue the program for protection of our building's envelope. The spraying of our exterior walls every three to five years should be placed in a repeated work order program. There are safety concerns related to our building's fire alarm equipment in that we need to have faster repair responses from alarm technicians based on main campus. Lastly, we need to review the terms of our partnership maintenance agreement with Carteret Community College (CCC). This agreement is over eighteen years old, and a complete review and possible renegotiation is needed. Some concerns include: (i) proper security protection from CCC's security department, especially on weekends and holidays, (ii) lack of properly trained CCC technicians needed to provide the quality of maintenance and repairs to CMAST building equipment, (iii) day-to-day housekeeping needs from CCC staff, and (iv) better upkeep of the grounds at CMAST.

III. Specific Responses to 10 Recommendations.

Faculty, Program Leadership and Administration

1. Complete the original target of 9 resident faculty members/researchers (3 from each College).

In the original Codicil for CMAST (8/11/2000), there was a commitment to the UNC Board of Governors and NC State Faculty that each of the three Colleges involved in creating CMAST (COS, CVM and CALS) would provide three faculty. Effective August 2018, CALS will have invested in three tenure-track faculty, and CVM one tenure-track faculty member. COS has not provided any tenure-track, CMAST-based faculty. The CMAST Director, Dr. D. Eggleston, is a faculty member in COS, and rotates between main campus and CMAST. CMAST has submitted several proposals for new faculty via the Chancellor's Faculty Excellence (CFE), cluster hire process, as well as via CALS-based competitions for new faculty. The most recent CALS-based competition requested a (i) *Quantitative Fisheries Scientist* and (ii) *Molecular & Environmental Toxicologist* as part of the Agri-Medicine Institute---the former faculty request was awarded.

Future directions in this regard will involve working with relevant faculty and department heads to make the case and receive support for CMAST-based faculty as part of departmental strategic plans and hiring. CMAST will also compete in future CFE competitions, as well as work with our stakeholders (e.g., seafood industry, fisheries and aquaculture, NC Aquarium, etc.) to identify leveraging opportunities that could cost-share new faculty at CMAST with relevant Colleges and Departments.

2. Invite the College of Natural Resources to participate in CMAST.

CMAST Director David Eggleston has engaged the Dean of CNR, as well as the Department Head of CNR's Department of Forestry and Environmental Resources (FER) for over three years in making the case that CNR's presence at CMAST would benefit the research, teaching and extension mission of both CNR and FER, while simultaneously meeting strategic gaps in programming at CMAST. In fact, CNR Dean Mary Watzin has expressed interest in having a presence at CMAST, and participated in CMAST Administrative Committee meetings in 2016 and 2017. Moreover, over half of the undergraduates each year in our Semester@CMAST Program are Environmental Sciences majors in CNR. Despite these efforts, CNR/FER is not investing in CMAST. CMAST will emphasize strategic faculty hires as described in #1 above for COS, CVM and CNR.

3. Engage the deans of the CMAST-related colleges to more fully support and "take ownership" of CMAST, especially through faculty hires and the sharing of indirect costs.

As described above, the Dean of CALS, Dr. Rich Linton, and the Departments of (i) Applied Ecology and (ii) Food, Bioprocessing and Nutrition Sciences have invested in two new faculty positions at CMAST during 2018. In terms of the other CMAST-related Colleges, D. Eggleston and C. Harms will host CVM Dean Paul Lunn and Department of Clinical Sciences Head, Dr. Lizette Hardie on May 30, 2018 at CMAST to discuss strategic planning for CVM and CMAST. We are planning a similar strategic planning day at CMAST with COS Dean Dr. Chris McGahan and the Head of the Department of marine, Earth and Atmospheric sciences, Dr. Jay Levine. All relevant CMAST Deans (COS, CVM and CALS), as well as the Vice Chancellor for ORIED (Dr. Al Rebar), will meet on June 29, 2018 to discuss this ERT Report and plan for increased College "ownership" of CMAST.

4. Make a specific plan for each residential faculty member to engage in appropriate activities associated with her/his home department to achieve tenure and promotion. This plan should be developed through the appropriate department head.

Tenure for individual faculty at CMAST resides in their home Departments and, although a given Department Head may or may not reach out to the CMAST Director for their assessment of a given faculty member during promotion and tenure decisions, only the voting faculty in a given department make final recommendations regarding tenure and promotion. Nevertheless, it makes sense for a Department Head to share the relevant Statement of Mutual Expectations of a given faculty member with the CMAST Director so that the latter can more effectively mentor that faculty member who is located off-campus.

5. Continue and grow interactions with other coastal research and education units as appropriate, including collaborations with the several NC system labs.

CMAST faculty are actively engaged with the other academic marine science programs in NC, as well as state and federal agencies. In fact, CMAST faculty have more collaborative grants with our academic and state/federal partners than they do with NC State-based faculty. CMAST Faculty also have numerous formal partnerships with state and federal agencies that provide financial resources to CMAST programs. One area of improvement would be to increase communications and joint programs among UNC-System and Duke University Marine Science programs. The mechanism for fostering communication used to be in the form of the Duke-UNC Oceanographic Consortium (DUNCOC), which was tied to joint use and maintenance of the Research Vessel (RV) Cape Hatteras. Once the RV Cape Hatteras was de-commissioned, it formally dissolved DUNCOC. Marine science lab and program directors have been meeting to reformulate a NC Marine Sciences Consortium and, in an effort to jump-start this consortium, held a scientific conference for NC-based, marine science graduate students during Spring 2017.

6. Establish a position of Associate Director of CMAST that is resident at CMAST. The Associate Director would handle most of the day-to-day issues as CMAST. This will allow the Director to more fully be involved in addressing the goals of CMAST as outlined in the strategic plan and initiate and nurture critical marine science discussions occurring on the main campus (see recommendations #1, #2, and #3). Director involvement would be particularly appropriate for efforts that involve outreach and engagement with the external units currently in touch with CMAST.

As Director, I greatly appreciate the concern by the ERT that I might be working too much☺. When I negotiated to become CMAST Director in 2006, it was agreed that it was in the best interest of all for me to maintain my research program. To do this, the CMAST Administrative Committee in 2006 agreed to provide 1.0 FTE Research Technician support so that I could effectively meet the demands of Administration, Teaching, Research and Extension. During the economic recession and related budget cuts of 2008-2011, this FTE was systematically reduced from 1.0 FTE to ~ 0.5 FTE. Rather than hire an Associate Director for CMAST, I suggest increasing the Research Associate FTE back to 1.0 FTE and have this position reside at CMAST to assist with day-to-day research and facility needs.

7. Provide greater local autonomy in budget decisions and approvals.

I agree 100%. CMAST must refine its financial structure so that it can capture F&A from the respective Colleges where a given faculty member generates their F&A, and then have the ability to carry over F&A to pay for emergency, one-time expenses (e.g., ice maker), as well as increase the operating budget as the programs grow.

Student Programs

8. Improve the course offerings at CMAST for students, especially in the fall semester. This will require mechanisms to entice faculty on the main campus to offer courses online.

The current Semester at CMAST (S@C) program is offered every Spring with a capacity of 15 undergraduate students. This program is funded by the Provost with a commitment through Spring 2022. The S@C program has been a major success, with all 15 students taking a unique, stand-alone curriculum based at CMAST, and conducting intensive research and internships. Many of the students each Spring want to continue in the Fall and take a new set of courses, and there is demand by main campus students for a Fall version of S@C. Moreover, some of our part-time instructors for Spring would be willing to teach a different course in fall, however, we

would need new faculty to be able to offer a full curriculum of new courses in Fall. Increased capacity for on-line courses for Fall would facilitate offering a Fall version of the S@C Program. If necessary, undergraduate students can take GER courses at the adjacent Carteret Community College.

9. Enhance undergraduate opportunities at CMAST. This can be done by partnering with Carteret Community College. CMAST should also consider applying to the Research Experiences for Undergraduates (REU) program at NSF. REU programs are prestigious but require a critical mass of faculty members (see #1 above). REU program are a great way to enhance diversity.

As mentioned above, NCSU undergraduate students can take GER courses at the adjacent Carteret Community College. During Spring 2018, we cross-listed our NCSU Marine Mammal course with the CCC, and had 6 CCC students successfully complete this course along with 14 NCSU undergraduates. We envision additional cross-listing opportunities that could help feed transfer students to NC State from CCC. CMAST would likely be very competitive for an NSF REU program based on our very strong (i) track record with the CMAST Summer Fellows program and Semester@CMAST program, as well as (ii) availability of on-site housing. As the ERT recognized, hosting an REU Program will bring new resources and prestige, but will require additional faculty to help anchor such a program (see #1).

10. Improve diversity within the CMAST community of faculty, students, and staff.

An REU program would help with increasing diversity at CMAST by recruiting students from across the nation. Recruiting minority faculty would enhance our diversity. CMAST has made significant progress in this regard during 2018. For example, our Semester@CMAST program enrolled one female African American student, and one female Middle Eastern student for Spring 2018. Eggleston has a female African American PhD student in his research program, and she regularly engages with on-campus diversity initiatives. Lastly, the two new faculty that are arriving at CMAST in 2018 are from China and Pakistan.



MEMORANDUM

TO: W. Randolph Woodson
Chancellor
NC State University

FROM: Alan H. Rebar *Alt Rebar*
Vice Chancellor for Research and Innovation
NC State University

SUBJECT: Recommendation to continue the Center for Marine Science and Technology (CMAST) under Regulation 10.10.04

DATE: August 9, 2018

In accordance with Regulation 10.10.04, the Office of Research, Innovation and Economic Development completed a Periodic review of the Center for Marine Science and Technology (CMAST) for the period 2012-2017.

The Report delivered by the Review Committee strongly supports continuation of the Center. In particular CMAST was cited for its coastal outreach and engagement programs, its highly-regarded marine mammal veterinary program as well as the Center's complementarity and collaborations with other marine science centers along the NC coast. The Review Committee underlined further the significance of CMAST's location adjacent to Carteret Community College and its support of College programs that serve regional industries such as fisheries and aquaculture.

The Report includes a number of recommendations, including the expansion of NC State faculty presence at CMAST as well as the inclusion of faculty from the College of Natural Resources. The recommendations of the Review Committee were accepted by the Center, and implementation steps are underway.

The Office of Research and Innovation and the Provost endorse the request to continue CMAST as a university Center as sanctioned by the Board of Trustees, and I request your approval of this recommendation.

AHR/mh

cc: David Eggleston, Director, CMAST
Mladen Vouk, Associate Vice Chancellor, Research Development
Jonathan Horowitz, Assistant Vice Chancellor, Research Administration
Larisa Slark, Senior Administrative Coordinator – Centers and Institutes



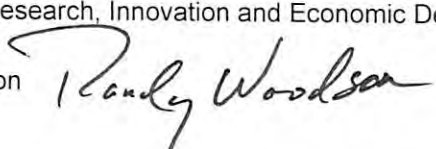
Office of the Chancellor

ncsu.edu/chancellor

Campus Box 7001
Holladay Hall, Suite A
Raleigh, NC 27695-7001
P: 919.515.2191

MEMORANDUM

TO: Alan H. Rebar
Vice Chancellor for Research, Innovation and Economic Development

FROM: W. Randolph Woodson 
Chancellor

SUBJECT: Recommendation to continue the Center for Marine Science and Technology (CMAST)
under Regulation 10.10.04

DATE: August 13, 2018

In response to your Memorandum dated August 9, 2018, authorization is hereby granted to forward the request to continue the Center for Marine Science and Technology (CMAST) to the Board of Trustees for approval.

WRW/mh

cc: David Eggleston, Director, CMAST
Mladen Vouk, Associate Vice Chancellor, Research Development
Jonathan Horowitz, Assistant Vice Chancellor, Research Administration
Larisa Slark, Senior Administrative Coordinator – Centers and Institutes

Designation of Time Limited Option for Distinguished Professorships

Background: Donors who endow a distinguished professorship at NC State University may elect to pursue matching funds available through the state's Distinguished Professors Endowment Trust Fund (DPETF). In accordance with state statutes, as well as University of North Carolina system and NC State University policies, the NC State University Board of Trustees (BoT) is authorized to designate that endowed distinguished professorships seeking DPETF matching funds may be time limited.

We request this designation from the BoT when a donor agreement indicates intent that a distinguished professorship be awarded, or potentially awarded, at a rank other than professor (i.e. assistant, associate professor) and/or for a period other than an individual's full career.

This designation provides the university with the maximum flexibility in awarding the distinguished professorship over time. Still, the overwhelming majority of NC State's distinguished professorships are offered to professors for the duration of their career at NC State.

Recommended Action: We request designation of the following distinguished professorship which may be time-limited:

1. Bayer CropScience Distinguished Professorship in Soybean Breeding, College of Agriculture and Life Sciences, \$500K endowment
2. Braswell Family Distinguished Professorship in Commercial Layer Management, Physiology or Nutrition, College of Agriculture and Life Sciences, \$1M endowment
3. John D. and Nell R. Leazar Distinguished Professorship in Horticultural Science #1, College of Agriculture and Life Sciences, \$2M endowment
4. Prestage Family Distinguished Professor in Turkey Physiology/Nutrition/Immunology, College of Agriculture and Life Sciences, \$2M endowment
5. William White, Jr. Sturgeon Aquaculture Distinguished Professor in Biological and Agricultural Engineering, College of Agriculture and Life Sciences, \$2.5M endowment
6. Christopher W. Clark Distinguished Professorship in Engineering, College of Engineering, \$500K endowment
7. Lynn T. Clark Distinguished Professorship in Business Management, Poole College of Management, \$500K endowment
8. Jimmy D. Clark Distinguished Professorship in Civil, Construction and Environmental Engineering, College of Engineering, \$500K endowment
9. S. Frank and Doris Culberson Distinguished Professor in Chemical and Biomolecular Engineering #1, College of Engineering, \$1M endowment
10. S. Frank and Doris Culberson Distinguished Professor in Chemical and Biomolecular Engineering #2, College of Engineering, \$500K endowment

11. William T. Kretzer Distinguished Professorship in Humanities, College of Humanities and Social Sciences, \$500K endowment
12. Goodnight Innovation Distinguished Chair #1, College of Sciences, \$2.667M endowment
13. Goodnight Innovation Distinguished Chair #2, College of Sciences, \$2.667M endowment
14. LeRoy B. Martin, Jr. Distinguished Professorship, College of Sciences, \$1M endowment
15. Goodnight Distinguished Professorship in Advanced Analytics #1, Office of the Provost, \$1.5M endowment
16. Goodnight Distinguished Professorship in Advanced Analytics #2, Office of the Provost, \$1.5M endowment
17. Goodnight Distinguished Professorship in Statistics, College of Sciences, \$1.5M endowment
18. Governor Robert W. Scott Distinguished Professorship in Chemistry, College of Sciences, \$1M endowment

Policy References:

[UNC Policy 600.2.3 - Distinguished Professors Endowment Trust Fund](#)

[NCSU Policy 01.05.01 – Board of Trustees Bylaws](#)

[NCSU Regulation 05.20.17 – Professorships of Distinction](#)

Conferral of Academic Tenure:

The information regarding conferral of academic tenure is included in the Closed Session Materials – Tab 7.6A.

REQUESTED ACTION ITEMS

NC State University
Department of Athletics (Baseball)
PROPOSED Bonus Grid for Board of Trustees

2018-19 Bonus Structure					
	Head Coach	Assistant Coaches		Directors	
ACADEMIC <i>(earn highest in each category)</i>					
Federal Graduation Rate					
Single Year FGR of 70% - 79%	10,000	2,500	2,500	1,250	1,250
Single Year FGR of 80% - 89%	15,000	5,000	5,000	2,500	2,500
Single Year FGR of 90% - 99%	20,000	7,500	7,500	3,750	3,750
Single Year FGR of 100%	25,000	10,000	10,000	5,000	5,000
Graduation Success Rate					
Four Year GSR of 70% - 79%	10,000	2,500	2,500	1,250	1,250
Four Year GSR of 80% - 89%	15,000	5,000	5,000	2,500	2,500
Four Year GSR of 90% - 99%	20,000	7,500	7,500	3,750	3,750
Four Year GSR of 100%	25,000	10,000	10,000	5,000	5,000
Academic Progress Rate					
Single Year APR of 970-979	10,000	2,500	2,500	1,250	1,250
Single Year APR of 980-989	15,000	5,000	5,000	2,500	2,500
Single Year APR of 990-999	20,000	7,500	7,500	3,750	3,750
Single Year APR of 1,000	25,000	10,000	10,000	5,000	5,000
Academic Bonus Maximum	75,000	30,000	30,000	15,000	15,000
COMPETITIVE <i>(earn highest in each category)</i>					
ACC Regular Season					
ACC Atlantic Division Champions	10,000	2,500	2,500	1,250	1,250
ACC Tournament					
ACC Tournament Champions	20,000	5,000	5,000	2,500	2,500
NCAA Competition					
Regional Appearance (NCAA Bid)	10,000	5,000	5,000	2,500	2,500
Super Regional Appearance	20,000	10,000	10,000	5,000	5,000
CWS Appearance	40,000	15,000	15,000	7,500	7,500
CWS Runner Up	75,000	20,000	20,000	10,000	10,000
CWS Champions	100,000	25,000	25,000	12,500	12,500
Final Ranking					
Top 25	10,000	2,500	2,500	1,250	1,250
Top 10	20,000	5,000	5,000	2,500	2,500
Coach of the Year					
<i>(may be independently earned)</i>					
ACC	10,000				
National	20,000				
Competitive Bonus Maximum	180,000	37,500	37,500	18,750	18,750

REPORTS

ENROLLMENT 2025

Board of Trustees Enrollment Update

Presented by Louis Hunt

2025 Enrollment Plan Goals



- ☒ Enhance student success
- ☒ Enhance diversity
- ☒ Establish manageable growth pattern by improving planning process to reduce “volatility” in enrollment growth
- ☒ Ensure access for North Carolinians to unique programs in UNC system, while emphasizing competitive excellence
- ☒ Increase global engagement

2025 Enrollment Plan Goals

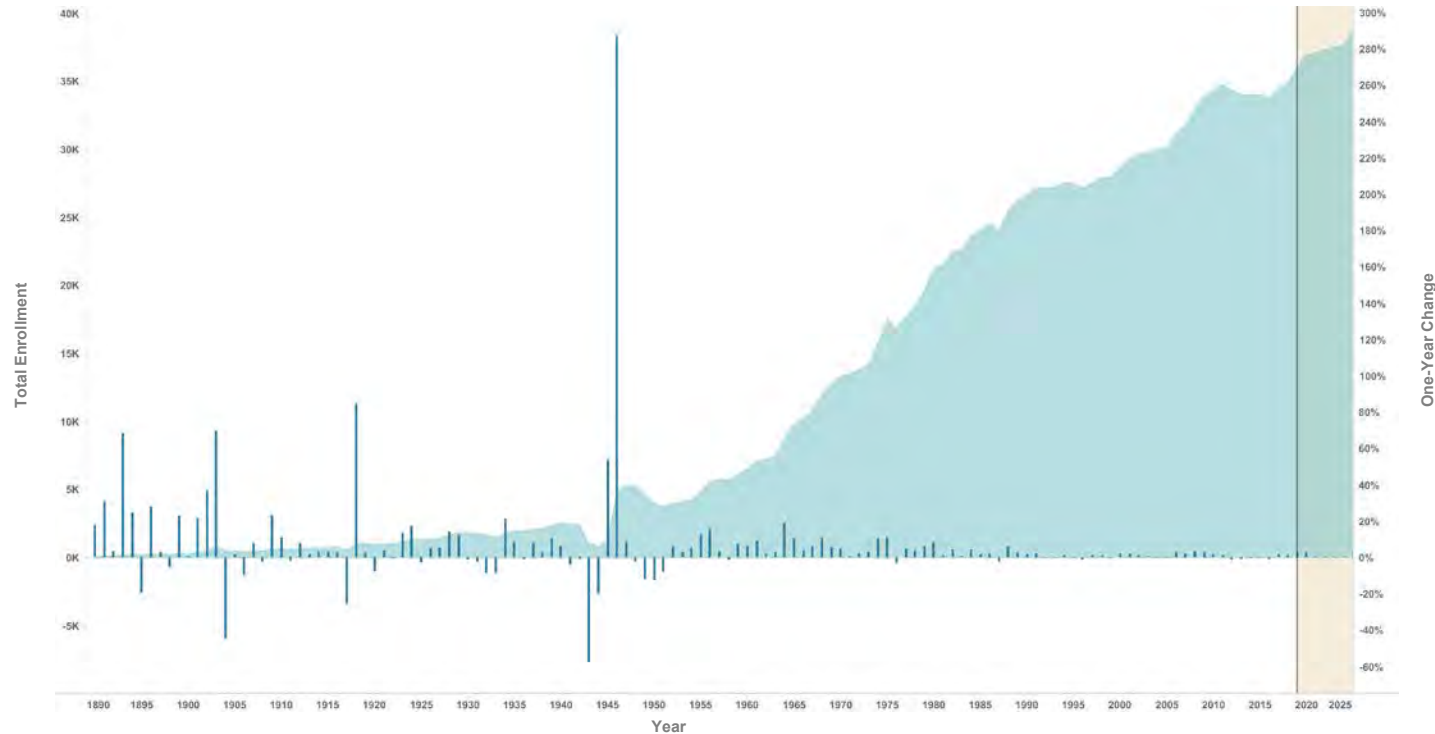
NEW		TOTAL	
+ 8.00%	Freshmen	+ 11.7%	Undergraduate
+ 51.8%	Transfers	+ 141.3%	Certificates
+ 30.4%	Master's	+ 25.2%	Master's
+ 51.8%	Doctoral	+ 28.4%	Doctoral
0%	DVM	+ 1.00%	DVM

+13.8%

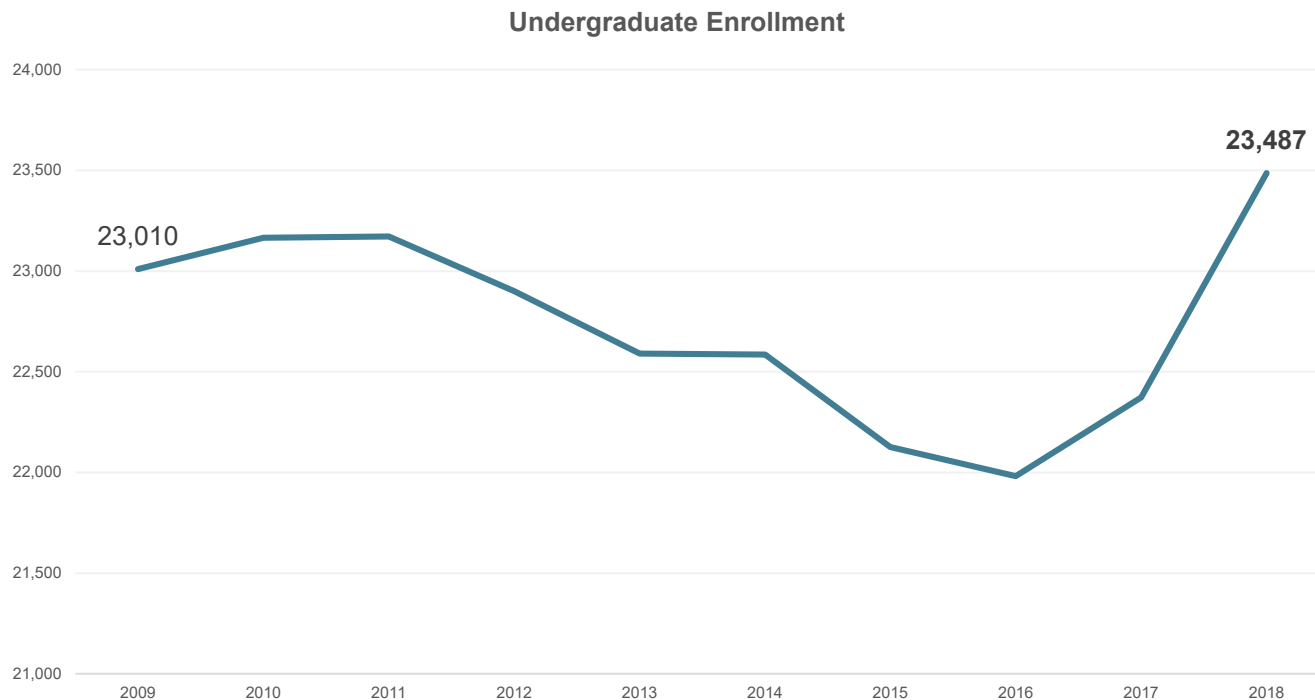
Total Enrollment Growth

2025 Enrollment Plan Goals

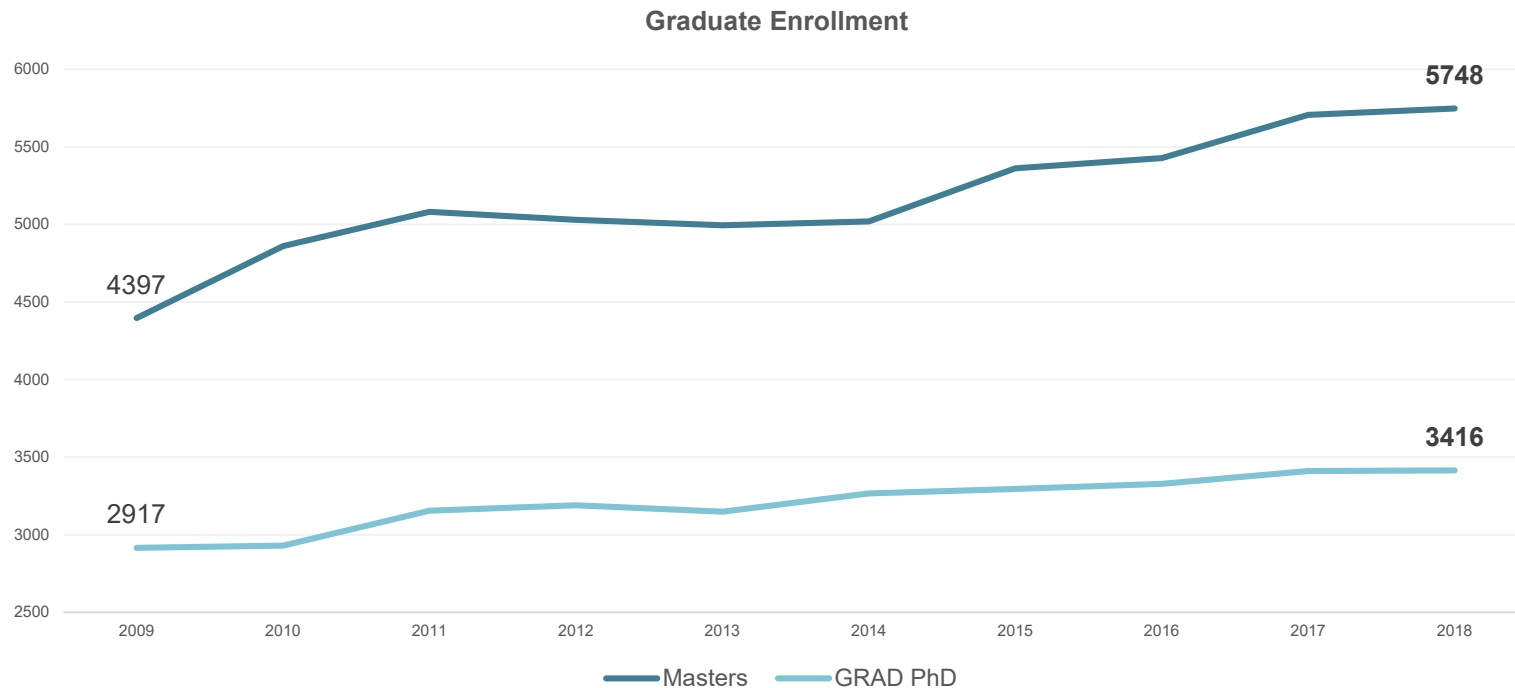
Enrollment History 1885 - 2025



Undergraduate Enrollment Trend

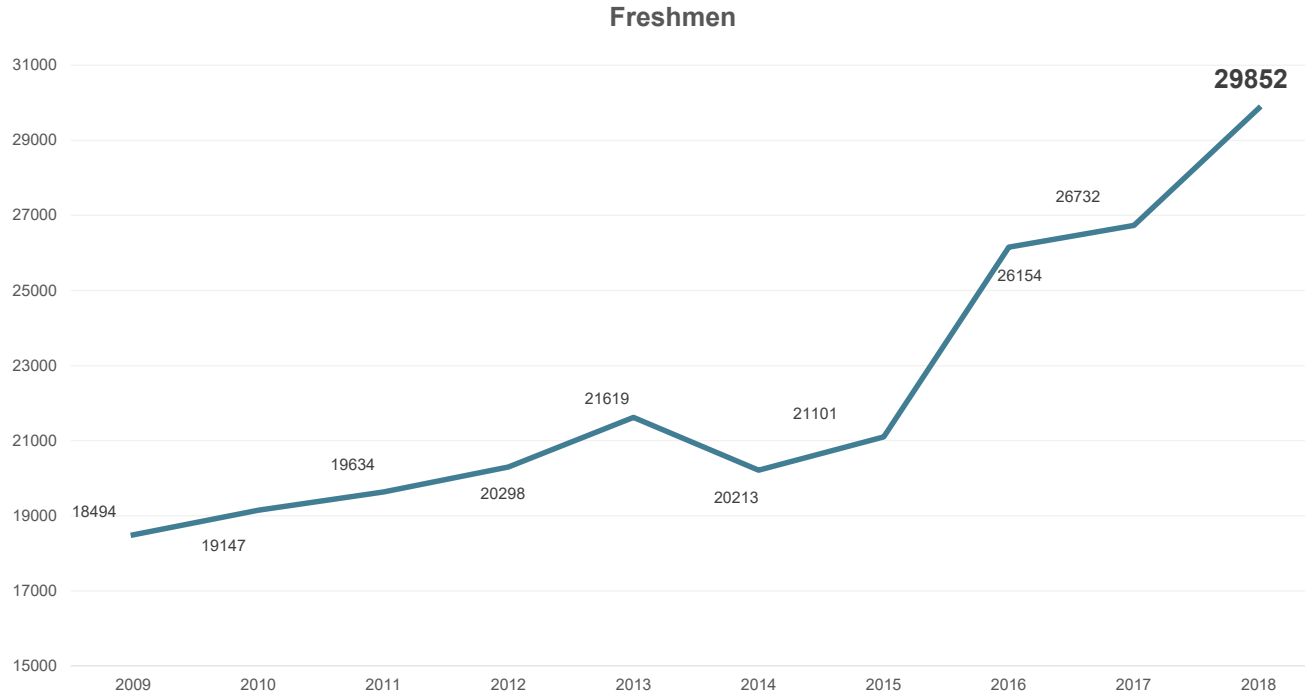


Graduate Enrollment Trend



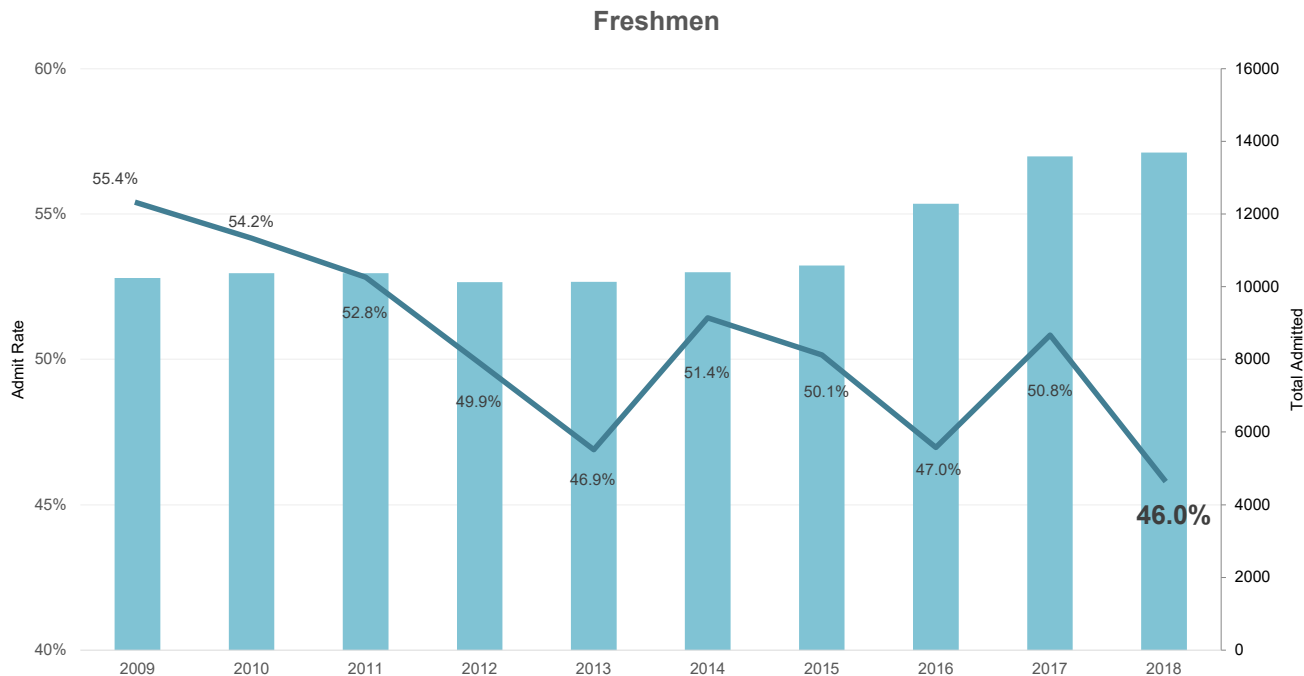
Undergraduate Enrollment Funnel

Applications - Freshmen



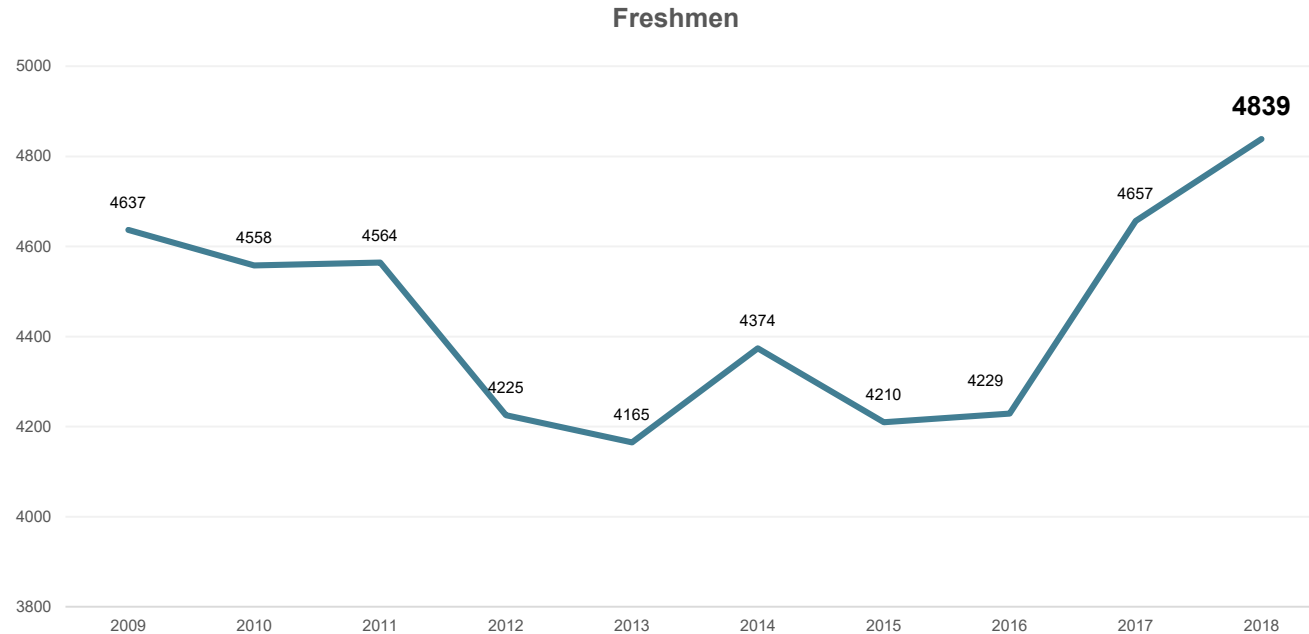
Undergraduate Enrollment Funnel

Admitted - Freshmen



Undergraduate Enrollment Funnel

Enrolled - Freshmen



Academic Profile

Enrolled - Freshmen

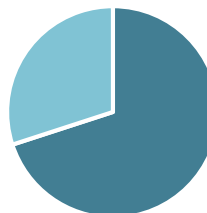
29.3 average ACT	77% Top 20% of HS Class	Middle 50% Ranges of High School Academics	Fall 2018 Mid 50% Range	Average	Fall 2013 Mid 50% Range	Average
1320 average SAT	48% Top 10% of HS Class	Weighted GPA	4.39 – 4.86	4.59	4.22 – 4.67	4.44
4.59 average GPA (weighted)	3.76 average GPA (unweighted)	Unweighted GPA	3.63 – 3.94	3.76	3.5 – 3.88	3.68
		Rank in class	4.8% – 19.2%	13.8%	4.7% – 17.6%	12.7%
		SAT Evidence-Based Reading & Writing and Math	1260 – 1380	1320	1180 – 1310	1240
		ACT Composite	27 – 32	29	26 – 30	28

Demographic Trends

Enrolled - Freshmen



49% Female



30% Non-White students

716

Students from outside North Carolina

1176

Different high schools represented

1328

Students from rural North Carolina counties

562

First generation college-bound students

260

Black or African American

285

Hispanic

363

Asian

188

Multiracial

17

Native American

5

Hawaiian / Pacific Islander

159

Non-Resident Alien

167

Unreported

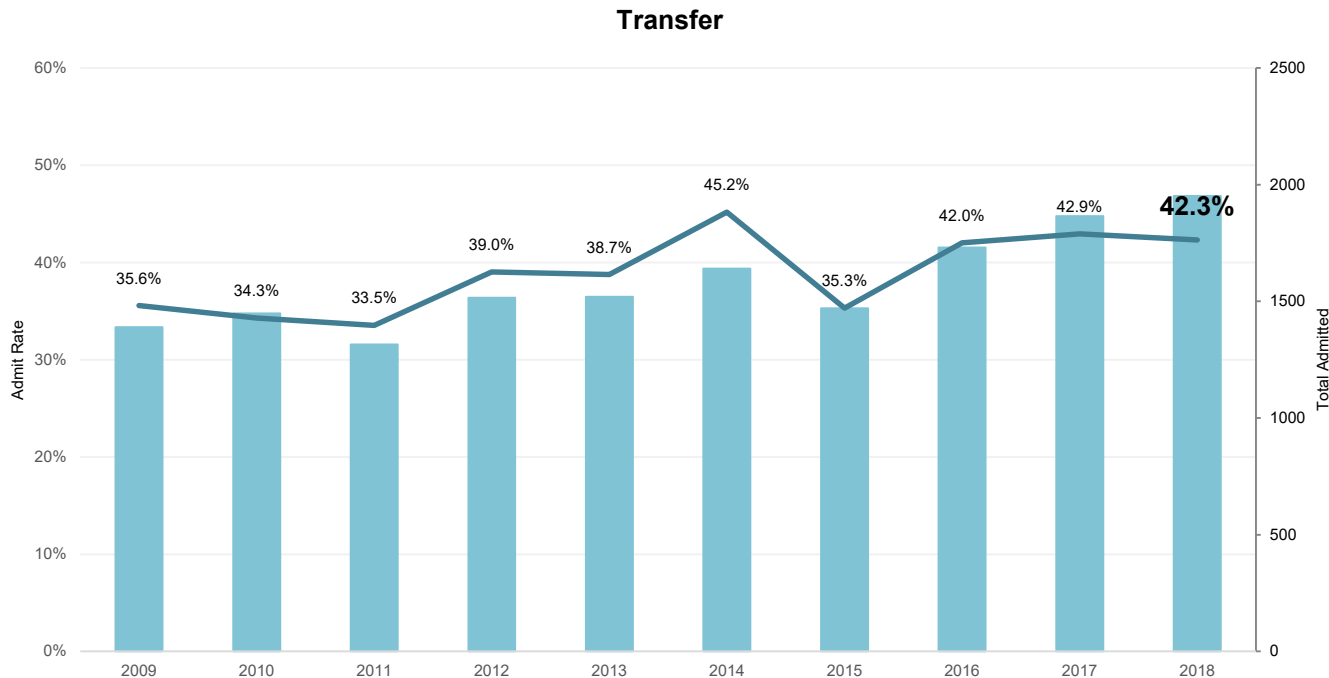
Undergraduate Enrollment Funnel

Applications - Transfer



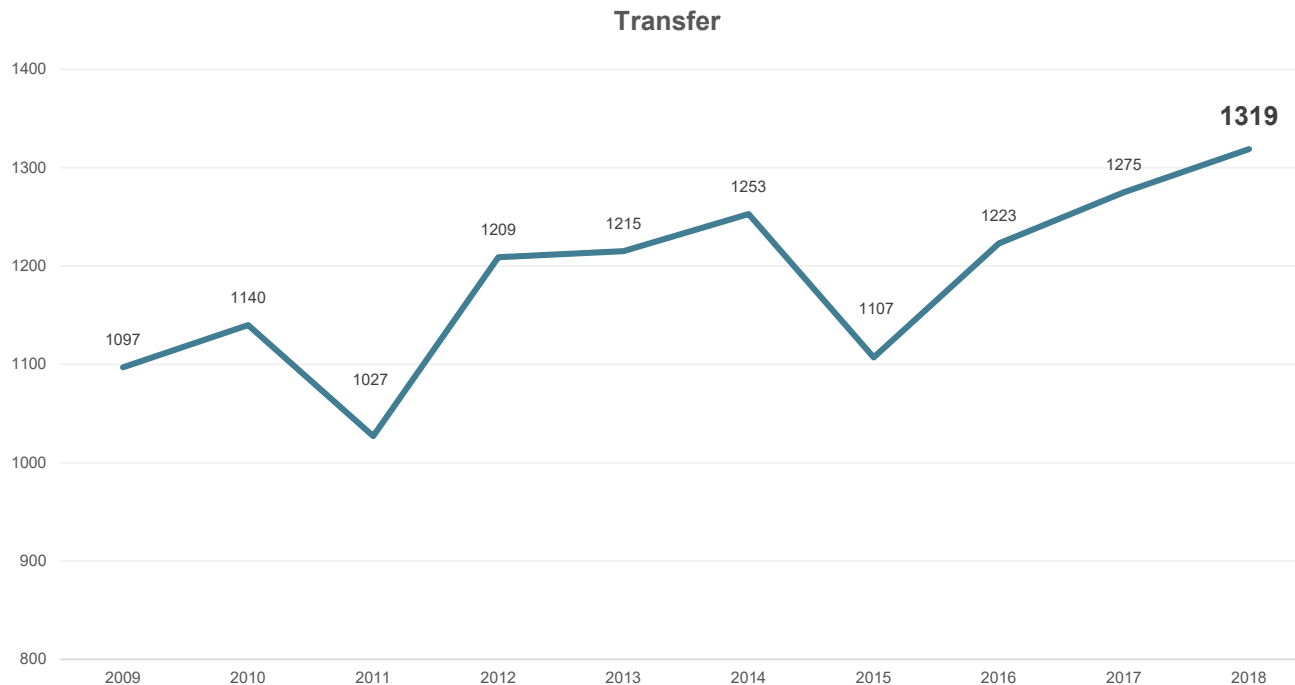
Undergraduate Enrollment Funnel

Admitted - Transfer



Undergraduate Enrollment Funnel

Enrolled - Transfer



Academic Profile

Enrolled - Transfer

3.44
average GPA

Average GPA by College

3.29	Agriculture & Life Sciences
3.29	Design
3.33	Education
3.64	Engineering
3.36	Humanities & Social Sciences
3.56	Management
3.29	Natural Resources
3.45	Sciences
3.24	Textiles

Top 10 Programs

Business Administration
 Psychology
 Animal Science
 Communication
 Biological Sciences
 Computer Science
 Mechanical Engineering
 Political Science
 Accounting
 Electrical Engineering

Demographic Trends

Enrolled - Transfer



56%

Students from
NC Community
Colleges



36%

Non-White



48%

Female

139

Students from outside
North Carolina

270

Different transfer schools
represented

347

Students from rural
North Carolina counties

341

First generation
college-bound students

69

Black or African
American

124

Hispanic

95

Asian

50

Multiracial

5

Native American

1

Hawaiian /
Pacific Islander

74

Non-Resident Alien

51

Unreported

Military | Veteran

52

Served in the
Military

7

Active Duty

21

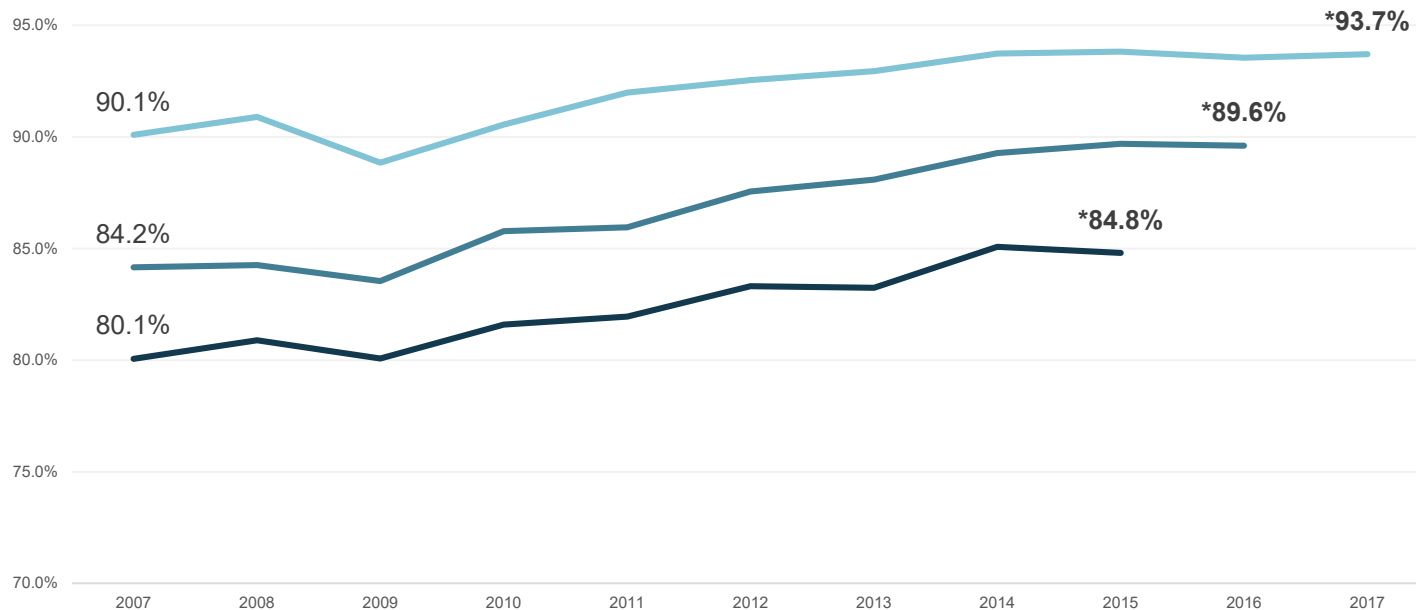
Dependents

Student Success

Retention

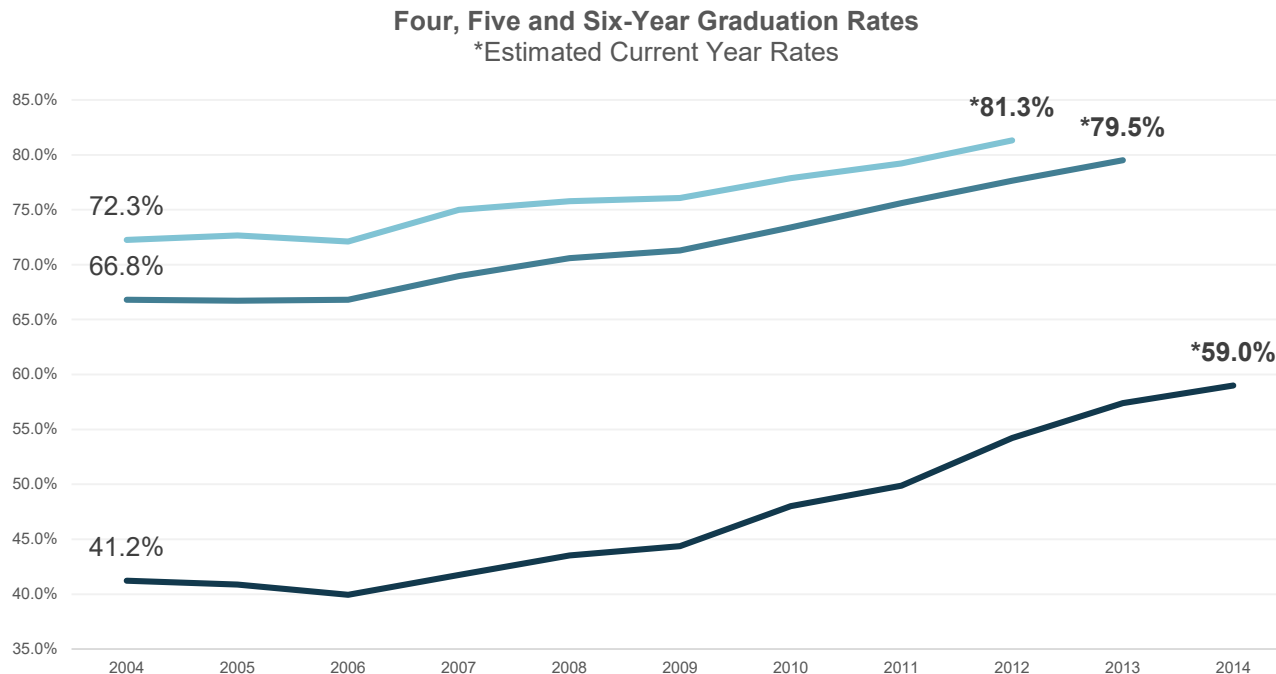
One, Two and Three-Year Retention Rates

*Estimated Current Year Rates



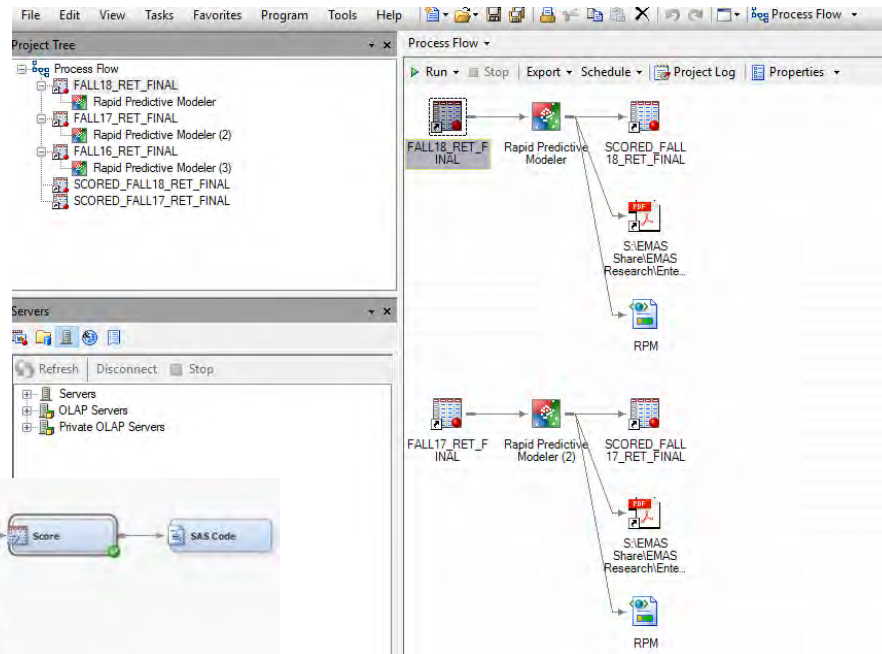
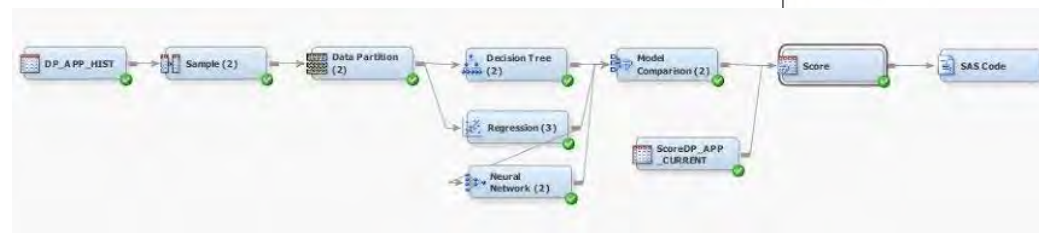
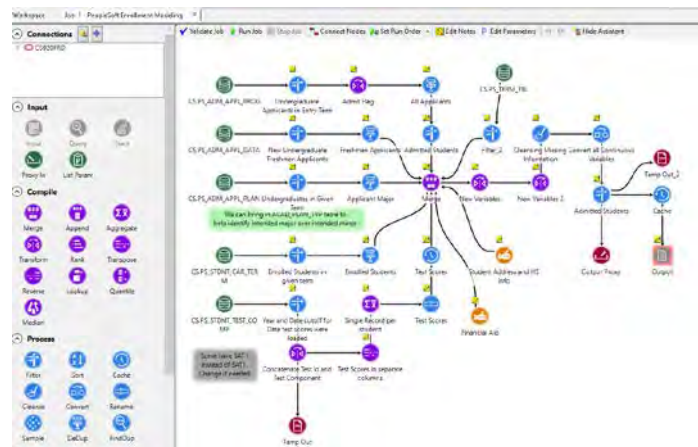
Student Success

Graduation



Efforts to Shape the Class and Enhance Student Success

Predictive Modeling



Efforts to Shape the Class and Enhance Student Success

Native Education Forum



Efforts to Shape the Class and Enhance Student Success

Emerging Scholars Academy



Efforts to Shape the Class and Enhance Student Success

Emerging Scholars Academy



Efforts to Shape the Class and Enhance Student Success

Emerging Scholars Academy



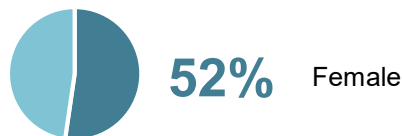
Efforts to Shape the Class and Enhance Student Success

Goodnight Scholars Program

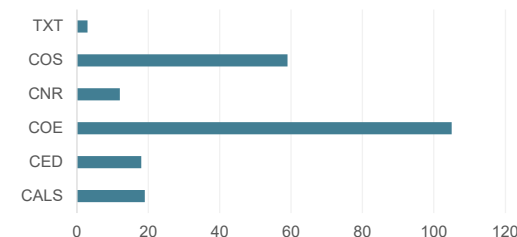


Efforts to Shape the Class and Enhance Student Success

Goodnight Scholars Program



Goodnight Scholars by College



49 Students with 4.0 GPAs for Fall 2017

46 Students with 4.0 GPAs for Spring 2018

12 Class of 2018 Valedictorians

136
Student programs and workshops offered in 2017-18

216 Total Goodnight Scholars

22 Black or African American

6 Hispanic

22 Asian

132 White

27 Multiracial

2 Native American

5 Unreported

\$121,050
Enrichment grants awarded

1 Udall Scholarship recipient

1 Gilman Scholarship recipient

1 NSF GRFP recipient

Efforts to Shape the Class and Enhance Student Success

Spring Connection

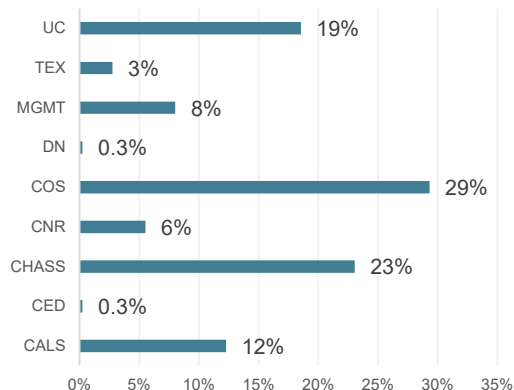


147 males
30.7 average total complete hours
2.78 average GPA

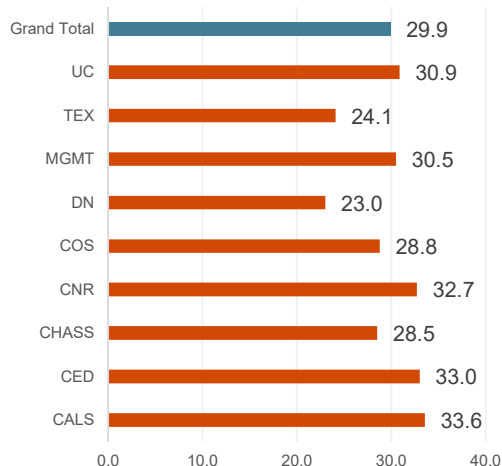


252 females
29.5 average total complete hours
3.07 average GPA

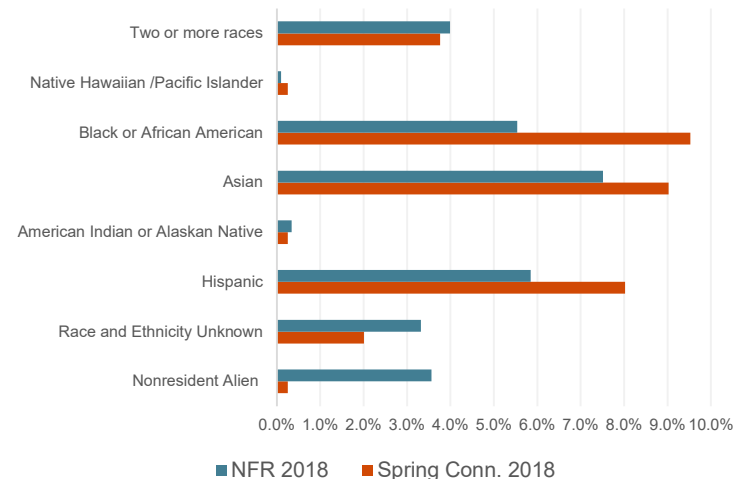
Spring Connection 2018 by College



Spring Connection 2018 by College
 Average of Total Completed Hours at End of Term

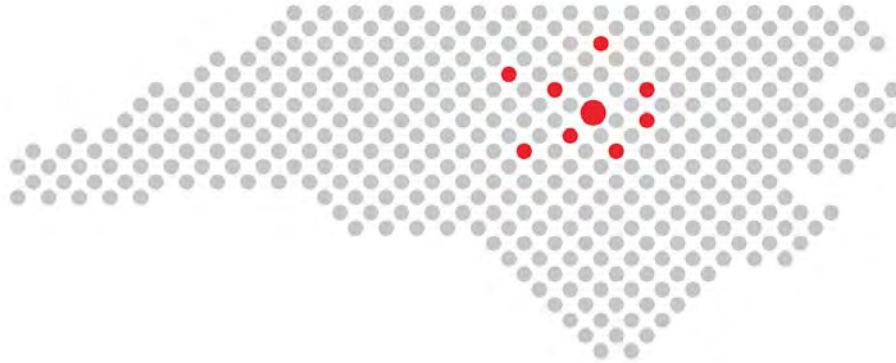


Spring Connection 2018 by Race



Efforts to Shape the Class and Enhance Student Success

Community College Collaboration (C3)



Efforts to Shape the Class and Enhance Student Success

Recruitment and Slate

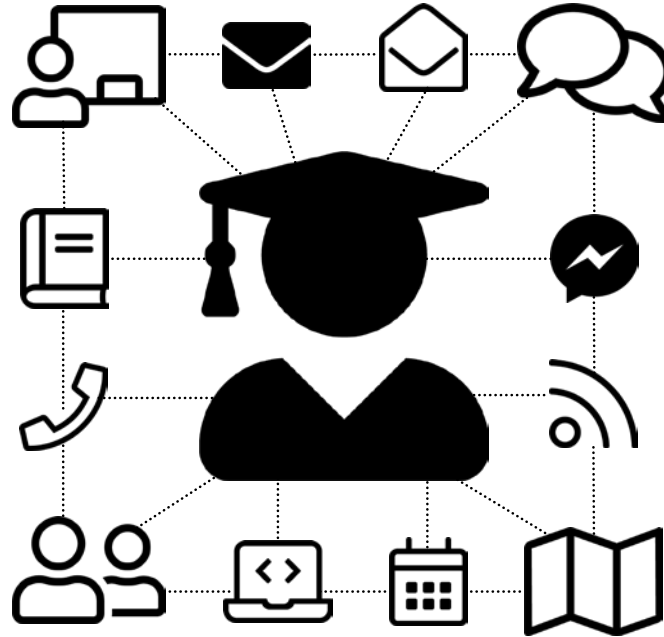


Recruitment and Slate



Efforts to Shape the Class and Enhance Student Success

Recruitment and Slate



ldhunt@ncsu.edu

QUESTIONS?

NC STATE



2018 UNC System-Wide Employee Engagement Survey

Marie Williams, Associate Vice Chancellor for Human Resources

Nancy Whelchel, Ph.D., Director for Survey Research, Office of Institutional Research and Planning

The Employee Engagement Survey (EES) is a 5-year initiative of the UNC System Office (UNC-SO) in support of its Strategic Plan goal of “excellent and diverse institutions” through a focus on human capital and is designed to:

- Establish baseline metrics related to employee engagement for all UNC system institutions to use in concert with other human capital metrics (e.g., turnover, performance management, professional development, promotion)
- Allow campus leaders to address those areas in which employee engagement challenges may exist and to recognize those areas that are successfully fostering employee engagement
- Assist the UNC-SO in advocating for improvements to human resources policies at the statewide level

In addition to this executive summary report, an overview of the survey results and proposed action plan will be discussed during the Board of Trustees University Affairs committee meeting.

Survey Administration and Questionnaire

The survey administration and reports on results are provided by ModernThink (a vendor contracted by UNC-SO). To administer the survey, NC State established an EES Advisory Committee tasked to implement and provide oversight for this university-wide project. The ESS was administered to all full-time permanent employees during spring 2018 (January 29-February 19), and will be administered again in spring 2020 and 2022. The ESS questionnaire was comprised of the following elements:

- Agreement with 60 “belief statements” grouped into 15 core dimensions
- A gauge of employee satisfaction with system benefit offerings
- Most likely reasons for leaving NC State
- Open-ended comments to ascertain what is working well at NC State and to provide employees with an opportunity to suggest improvements
- Employee information (i.e., demographics, job characteristics, college/division)

Survey Results: Quick Take-Aways

The results of the EES indicate that NC State did well in relation to the other system institutions:

- NC State’s overall response rate of 54% (4,633 of 8,538) exceeded the UNC-SO target response goal of 50%
- NC State employees gave consistently more favorable ratings than the UNC system overall
- For none of the 15 core survey dimensions did NC State’s overall rating fall into the “poor” or “warrants attention” category established by the UNC-SO
- Areas rated relatively less favorably by NC State employees are also rated less favorably by the system overall and by other institutions participating in the Great Colleges to Work for survey

Core Dimensions

- NC State employees overall gave more favorable ratings than the UNC system overall on 14 of the 15 core dimensions, most notably for
 - o Senior leadership (6 percentage points higher)
 - o Facilities (5 percentage points higher)
 - o Faculty, administration and staff relations (4 percentage points higher)
 - o Policies, resources and efficiency (4 percentage points higher)
- Compared to all 4-year public institutions participating in the 2017 Great Colleges to Work For survey (benchmark on which UNC-SO is focusing), NC State's overall ratings are
 - o Within +/- 2 percentage points on 8 of the 15 core dimensions
 - o Notably lower for
 - Shared governance (7 percentage points lower)
 - Compensation, benefits and work/life balance (6 percentage points lower)
 - Respect and appreciation (5 percentage points lower)
 - Collaboration (4 percentage points lower)
 - Communication (4 percentage points lower)
 - Professional development (4 percentage points lower)

Belief Statements

- NC State's overall belief statement ratings are 3 or more percentage points more favorable than the UNC system overall on 30 of the 60 belief statements
- 75% or more of NC State employees gave a favorable response (i.e., "agree" or "strongly agree") to 13 of the 60 belief statements. Items most favorably rated are:
 - o I understand how my job contributes to this institution's mission (90% "agree" or "strongly agree")
 - o This institution actively contributes to the community (86%)
 - o I am given the responsibility and freedom to do my job (84%)
 - o I have a good relationship with my supervisory/department chair (84%)
 - o I am proud to be part of this institution (84%)
 - o This institution takes reasonable steps to provide a safe and secure environment for the campus (84%)
 - o My supervisor/department chair supports my efforts to balance my work and personal life (82%)
- NC State's overall favorable ratings are lower than those for the UNC system overall on only 2 of the 60 belief statements
 - o This institution's culture is special - - something you don't find just anywhere (56% "strongly agree" or "agree" vs 59% UNC System)
 - o Teaching is appropriately recognized in the evaluation and promotion process (57% vs 60% UNC System)
- 20% or more of NC State employees gave an unfavorable rating (i.e., responded "disagree" or "strongly disagree") to 6 of the 60 belief statements
 - o I am paid fairly for my work (34% "disagree" or "strongly disagree")
 - o My department has adequate faculty/staff to achieve our goals (33%)
 - o Our recognition and awards programs are meaningful to me (29%)
 - o Issues of low performance are addressed in my department (24%)
 - o Promotions in my department are based on a person's ability (23%)
 - o Changes that affect me are discussed prior to being implemented (22%)

- I am regularly recognized for my contributions (20%)

Benefits

- While 11% of NC State employees indicate they are “dissatisfied” or “very dissatisfied” with their benefits overall, 13% are “very satisfied” and 53% “satisfied”
- NC State employees are most likely to be “very dissatisfied” or “dissatisfied” with medical insurance (27%) and dental insurance (22%)

Reasons for Leaving

- 64% of NC State employees say they would consider leaving their current position for “a better or more competitive salary,” and 41% would consider doing so for “better opportunities for career advancement”
- NC State employees are least likely to say they would consider leaving their current position for “better job security/stability” (10%) or a “better supervisory relationship” (10%)

Employee Engagement Survey: Action Plan Focus Areas

As part of this system-wide engagement survey project, each institution is required by the UNC-SO to develop and implement a high-level action plan to address key focus areas of the EES that require further attention and/or improvement. NC State’s action plan will adhere to these guiding principles:

- Focus on NC State’s mission, vision, values
- Align survey focus areas with NC State’s Strategic Plan and the UNC Strategic Plan
- Celebrate and build upon our strengths
- Address opportunities for further improvement
- Institution and colleges/divisions to each develop 2-4 survey focus areas each with multiple specific strategies (including current initiatives) and metrics (i.e., survey belief statements)

We have therefore identified the following four (4) University-level Strategic Focus Areas. (Note that listed below is just one example of several suggested initiatives and relevant metrics for each focus area.)

- **Diversity and inclusion (*opportunity for improvements*)**
 - Strategic initiative: Enhance commitment to a diverse and inclusive university
 - Metric: “This institution places sufficient emphasis on having diverse faculty, administration, and staff.”
 - Initiative: Provide support, training and toolkits for development of unit/department level Diversity Action Plans
- **Institutional Pride and Employee Recognition (*opportunity for improvements*)**
 - Strategic initiative: Enhance institutional pride
 - Metric: “Our recognition and awards programs are meaningful to me.”
 - Initiative: Enhance the University’s employee recognition programs and develop informal “peer to peer” recognition programs
- **Policies, Resources and Efficiency (*opportunity for improvements*)**
 - Strategic initiative: The effectiveness of administrative processes
 - Metric: “I can count on people to cooperate across departments.”

- Initiative: Promote a culture of collaboration across divisions to achieve university objectives
- **Professional Development: Leadership and Performance Management (*celebration of strength*)**
 - Strategic initiative: Create a culture of continuing professional development for faculty and staff
 - Metric: “I have a good relationship with my supervisor/department chair.”
 - Initiative: Enhance and provide ongoing leadership, management and supervisory training for department heads, unit heads and supervisors.

NC State’s Employee Engagement Survey Advisory Committee will:

- Develop the University’s 2018 ESS action plan and metrics
- Collaborate and consult with College/Administrative Unit leaders to develop their college/unit level action plans and metrics
- Track action plan initiatives to monitor progress on metrics over time (e.g., 2018 – 2020)
- Provide periodic updates to Chancellor’s Cabinet, Board of Trustees and UNC-SO

Employee Engagement Survey: Next Steps and Timeline

NC State ESS Presentations:

- Chancellor’s Cabinet (June 26, 2018 and August 14, 2018)
- Council of Deans (July 12, 2018)
- Faculty Senate (August 28, 2018)
- Staff Senate (September 5, 2018)
- Administrative Leadership Meeting (September 18, 2018)
- Board of Trustees (September 21, 2018)
- Meetings with Colleges and Administrative Units (by request)

College/Unit Level Reports on Results:

- Colleges and Administrative Units have been provided with detailed results for their employees
- Senior leadership are tasked by sharing their results with leadership teams and employees (*by October 18*)

Communications/Public Relations (upcoming)

- Project webpage
- Chancellor’s announcement to faculty and staff
- Various media (e.g., Bulletin, newsletters)

Note: The UNC-System Office is planning on presenting the ESS system-wide and institutional-level findings to the Board of Governors at their October meeting. The System Office has indicated that it will share this information with campuses prior to its presentation at the BOG meeting this fall.

*THE OFFICE OF THE STUDENT BODY PRESIDENT
NC STATE UNIVERSITY
STUDENT GOVERNMENT
98TH SESSION
BOARD OF TRUSTEES REPORT NO. 1*

AS OF AUGUST 24, 2018

PACK Meal Share Program

Recognizing the scope of food insecurity on campus, Student Government led the way in advocating for a student-to-student meal sharing program and is pleased to announce a new partnership with University Dining for students facing short-term food insecurity. Through the donation of guest meals from student meal plans, a pool of meals has been established for students who find themselves temporarily without food options. These meals can be added to a student ID card to allow entry into Fountain, Clark, and Case (breakfast and lunch only) Dining Halls, creating easy and discrete access to meals at no cost.

Expanding Vegetarian and Vegan Options and Reducing Cost on Campus

Over the course of the summer, Student Government worked alongside Campus Enterprises to eliminate the additional cost associated with substituting vegetarian options for entrees with meat. These changes went into effect at the beginning of the Fall 2018 semester.

Student Wellness Department

To address Student Health concerns from a holistic, wellness perspective, Student Government has created an executive department on Student Wellness. This department will serve as Student Government's principle advocate on topics concerning Student Wellness such as emotional, physical, social, financial, and environmental wellness. The addition of this department is the ninth executive department (Athletics, Communications, Diversity Outreach, Government Relations, Graduate Student Relations, Sustainability, Traditions, and University Affairs).

Interfaith Spaces

During the spring semester students shared a need for on campus interfaith spaces that catered to prayer needs in locations convenient to the average student. Through partnerships with Campus Enterprises, Student Government helped establish a recurring reservation in a Talley Student Union conference room and privacy glass was installed to meet this need.

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STUDENT GOVERNMENT
98TH SESSION

Tab 7.4C
Page 2

Respect The Pack

Student Government's annual program celebrating diversity and equality on campus saw a new theme: Respect the Pack through **Equity** and **Inclusion**. Diversity Outreach Co-Directors Sam Chan and Shelsey Hall planned and coordinated the event which included performances from student organizations, speeches from the Student Body President, Student Body Vice President, and



Chancellor, tabling from relevant campus partners, and the signing of the Respect the Pack banner. The event was held in the Talley atrium and saw over 300 students in attendance.

Talley Student Union Voting Location + Voter Engagement

In partnership with many committed campus partners, Student Government participated in the successful efforts to secure Talley Student Union as a one stop, early voting location. Government Affairs Director Andrew McDonald is co-chairing a non-partisan committee of faculty, staff, and students focused on registering students to vote, increasing student voter turnout, and encouraging civic engagement among NC State Students.

2018-2019 Student Body Officers:

Jess Errico, Student Body President; Meredith Spence Beaulieu, Student Body Vice President; Adam Schmidt, Student Senate President; Jodi Svetaketu, Student Body Chief Justice; and Molly Mueller, Student Body Treasurer

Executive Branch Goals:

We feel that it is critical that our goals in office be a reflection of actual student concerns on campus. We've been listening to students and leaning heavily on our team to determine the best ways that we can make changes on campus through professionalism, advocacy, communication, and kinship. This includes initiatives and programs pertaining to diversity and inclusion, affordability, housing and campus life, academics, transportation, student health, and sustainability. For detailed information see <https://orgs.ncsu.edu/student-govt/>.

Purpose

The FY 2018-19 Faculty Salary Ranges were approved by Chancellor Woodson on August 29th and are being presented to the Board of Trustees as an information item.

The ranges are established for tenured/tenure-track faculty positions based on current market data to allow the university to attract and retain highly qualified faculty talent. The ranges form a basis for sound and equitable compensation decisions to facilitate appropriate stewardship of financial resources.

Source Data

- 2018 College and University Professional Association for Human Resources (CUPA-HR) Salary Survey
- 2018 Oklahoma State University Faculty Salary Survey
- Primary Data Cut: Carnegie Classification – Research University, Very High (RUVH)

Methodology

- **The methodology used this year has been in place since FY 2016-17.**
- To determine the appropriate market reference rate (MRR), the 4-digit discipline (CIP) code by rank for each faculty member is aligned with the faculty member's department or tenure home. To ensure the most appropriate match was used, University Human Resources confirmed the CIP code assignments with Deans.

Key Takeaways

Of the 213 faculty salary ranges:

- 92 ranges (43%) showed less than 1.9% change
- 78 ranges (37%) saw an *increase* between 2 – 4.9%
- 12 ranges (6%) saw a *decrease* between 2 – 4.9%
- The remaining 31 ranges (14%) saw an increase/decrease of between 5 – 8.4%
 - The largest increase was 8.4% and occurred in two ranges:
 - College of Humanities and Social Sciences: Interdisciplinary Studies, Associate Professor - range increased by 8.4% (0 employees below minimum)
 - College of Sciences: Statistics, Professor - range also increased by 8.4% (6 employees out of 14 now below minimum)
 - The largest decrease was in the Poole College of Management. The Business Management Assistant Professor range decreased by 7.9%

As of 07/30/2018, the tenured / tenure-track faculty count was 1,483.

- 225 faculty (15.2%) are below the minimum
- 682 faculty (45.9%) are between the minimum and the market reference rate
- 576 faculty (38.8%) are between the market reference rate and the maximum

College/Division	Discipline	Rank	FY 2018-19 Faculty Salary Ranges (9-month Salary Basis)			FY 2017-18 Faculty Salary Ranges (9-month Salary Basis)			Market Difference 2017-18 vs. 2018-19
			Minimum	Market Reference	Maximum	Minimum	Market Reference	Maximum	
College of Agriculture and Life Sciences	Agricultural & Extension Education	Professor	\$93,413	\$116,767	\$233,533	\$92,256	\$115,320	\$230,640	1.3%
		Associate Professor	\$72,058	\$90,073	\$157,627	\$67,502	\$84,377	\$147,660	6.8%
		Assistant Professor	\$64,774	\$80,968	\$121,452	\$61,178	\$76,473	\$114,709	5.9%
College of Agriculture and Life Sciences	Agriculture & Resource Economics	Professor	\$108,169	\$135,211	\$270,422	\$110,458	\$138,073	\$276,146	-2.1%
		Associate Professor	\$84,202	\$105,253	\$184,192	\$81,882	\$102,352	\$179,116	2.8%
		Assistant Professor	\$71,152	\$88,941	\$133,411	\$70,977	\$88,721	\$133,081	0.2%
College of Agriculture and Life Sciences	Animal Sciences	Professor	\$94,931	\$118,663	\$237,326	\$94,652	\$118,316	\$236,631	0.3%
		Associate Professor	\$73,285	\$91,606	\$160,310	\$72,171	\$90,214	\$157,874	1.5%
		Assistant Professor	\$63,821	\$79,776	\$119,665	\$62,906	\$78,632	\$117,949	1.5%
College of Agriculture and Life Sciences	Applied Ecology	Professor	\$120,497	\$150,621	\$301,242	\$112,065	\$140,081	\$280,163	7.5%
		Associate Professor	\$81,484	\$101,854	\$178,245	\$79,480	\$99,350	\$173,863	2.5%
		Assistant Professor	\$66,020	\$82,525	\$123,788	\$64,510	\$80,637	\$120,956	2.3%
College of Agriculture and Life Sciences	Biochemistry	Professor	\$121,140	\$151,425	\$302,851	\$117,836	\$147,295	\$294,590	2.8%
		Associate Professor	\$77,726	\$97,157	\$170,025	\$75,277	\$94,096	\$164,668	3.3%
		Assistant Professor	\$66,381	\$82,977	\$124,465	\$65,295	\$81,619	\$122,428	1.7%
College of Agriculture and Life Sciences	Biological & Agricultural Engineering	Professor	\$103,689	\$129,612	\$259,224	\$104,473	\$130,591	\$261,182	-0.7%
		Associate Professor	\$81,150	\$101,438	\$177,517	\$80,792	\$100,990	\$176,733	0.4%
		Assistant Professor	\$68,583	\$85,729	\$128,594	\$67,656	\$84,570	\$126,855	1.4%
College of Agriculture and Life Sciences	Crop Science	Professor	\$92,624	\$115,780	\$231,560	\$90,765	\$113,457	\$226,913	2.0%
		Associate Professor	\$70,829	\$88,536	\$154,939	\$69,348	\$86,685	\$151,698	2.1%
		Assistant Professor	\$61,719	\$77,149	\$115,723	\$62,301	\$77,876	\$116,814	-0.9%
College of Agriculture and Life Sciences	Entomology	Professor	\$95,377	\$119,221	\$238,442	\$92,530	\$115,663	\$231,325	3.1%
		Associate Professor	\$71,031	\$88,788	\$155,380	\$69,950	\$87,438	\$153,016	1.5%
		Assistant Professor	\$62,591	\$78,238	\$117,358	\$62,517	\$78,146	\$117,219	0.1%
College of Agriculture and Life Sciences	Food Science	Professor	\$104,671	\$130,838	\$261,677	\$102,692	\$128,365	\$256,730	1.9%
		Associate Professor	\$70,141	\$87,677	\$153,434	\$70,947	\$88,684	\$155,196	-1.1%
		Assistant Professor	\$63,532	\$79,415	\$119,123	\$63,102	\$78,877	\$118,316	0.7%
College of Agriculture and Life Sciences	Horticulture Science	Professor	\$92,624	\$115,780	\$231,560	\$90,765	\$113,457	\$226,913	2.0%
		Associate Professor	\$70,829	\$88,536	\$154,939	\$69,348	\$86,685	\$151,698	2.1%
		Assistant Professor	\$61,719	\$77,149	\$115,723	\$62,301	\$77,876	\$116,814	-0.9%
College of Agriculture and Life Sciences	Plant Biology	Professor	\$97,839	\$122,298	\$244,597	\$92,291	\$115,364	\$230,729	6.0%
		Associate Professor	\$74,918	\$93,647	\$163,883	\$70,112	\$87,640	\$153,369	6.9%
		Assistant Professor	\$64,491	\$80,614	\$120,921	\$63,719	\$79,649	\$119,474	1.2%
College of Agriculture and Life Sciences	Plant Pathology	Professor	\$92,624	\$115,780	\$231,560	\$90,765	\$113,457	\$226,913	2.0%
		Associate Professor	\$70,829	\$88,536	\$154,939	\$69,348	\$86,685	\$151,698	2.1%
		Assistant Professor	\$61,719	\$77,149	\$115,723	\$62,301	\$77,876	\$116,814	-0.9%
College of Agriculture and Life Sciences	Poultry Science	Professor	\$94,931	\$118,663	\$237,326	\$94,652	\$118,316	\$236,631	0.3%
		Associate Professor	\$73,285	\$91,606	\$160,310	\$72,171	\$90,214	\$157,874	1.5%
		Assistant Professor	\$63,821	\$79,776	\$119,665	\$62,906	\$78,632	\$117,949	1.5%
College of Agriculture and Life Sciences	Soil Science	Professor	\$99,032	\$123,790	\$247,580	\$94,790	\$118,488	\$236,975	4.5%
		Associate Professor	\$68,798	\$85,998	\$150,496	\$68,312	\$85,390	\$149,432	0.7%
		Assistant Professor	\$61,500	\$76,875	\$115,313	\$61,954	\$77,443	\$116,164	-0.7%

College/Division	Discipline	Rank	FY 2018-19 Faculty Salary Ranges (9-month Salary Basis)			FY 2017-18 Faculty Salary Ranges (9-month Salary Basis)			Market Difference 2017-18 vs. 2018-19
			Minimum	Market Reference	Maximum	Minimum	Market Reference	Maximum	
College of Agriculture and Life Sciences	Youth, Family & Community Sciences	Professor	\$100,709	\$125,886	\$251,773	\$104,169	\$130,211	\$260,422	-3.3%
		Associate Professor	\$71,808	\$89,760	\$157,079	\$69,149	\$86,436	\$151,264	3.8%
		Assistant Professor	\$59,645	\$74,556	\$111,834	\$60,744	\$75,930	\$113,895	-1.8%
College of Design	Design	Professor	\$94,926	\$118,657	\$237,314	\$91,304	\$114,130	\$228,259	4.0%
		Associate Professor	\$71,367	\$89,209	\$156,116	\$67,701	\$84,626	\$148,095	5.4%
		Assistant Professor	\$57,710	\$72,138	\$108,207	\$55,385	\$69,231	\$103,847	4.2%
College of Education	Teacher Education & Learning Sciences (TELS)	Professor	\$92,210	\$115,263	\$230,526	\$88,909	\$111,137	\$222,273	3.7%
		Associate Professor	\$68,274	\$85,342	\$149,349	\$66,222	\$82,777	\$144,860	3.1%
		Assistant Professor	\$56,110	\$70,137	\$105,206	\$55,931	\$69,913	\$104,870	0.3%
College of Education	Education Leadership & Policy / Adult & Higher Education	Professor	\$94,204	\$117,755	\$235,510	\$96,447	\$120,559	\$241,118	-2.3%
		Associate Professor	\$71,036	\$88,795	\$155,391	\$70,264	\$87,830	\$153,703	1.1%
		Assistant Professor	\$58,608	\$73,260	\$109,890	\$58,178	\$72,723	\$109,085	0.7%
College of Education	Math, Science, & Technology Education	Professor	\$89,771	\$112,214	\$224,428	\$93,441	\$116,801	\$233,601	-3.9%
		Associate Professor	\$65,595	\$81,994	\$143,490	\$66,378	\$82,973	\$145,202	-1.2%
		Assistant Professor	\$56,984	\$71,229	\$106,844	\$58,184	\$72,729	\$109,094	-2.1%
College of Engineering	Biomedical	Professor	\$138,744	\$173,431	\$346,861	\$130,995	\$163,743	\$327,487	5.9%
		Associate Professor	\$91,190	\$113,988	\$199,479	\$89,302	\$111,628	\$195,349	2.1%
		Assistant Professor	\$75,384	\$94,229	\$141,344	\$74,226	\$92,783	\$139,174	1.6%
College of Engineering	Chemical & Biomolecular	Professor	\$131,057	\$163,821	\$327,642	\$127,430	\$159,287	\$318,574	2.8%
		Associate Professor	\$90,550	\$113,187	\$198,078	\$86,970	\$108,712	\$190,246	4.1%
		Assistant Professor	\$76,734	\$95,917	\$143,875	\$75,065	\$93,832	\$140,747	2.2%
College of Engineering	Civil, Construction & Environmental	Professor	\$119,856	\$149,820	\$299,640	\$116,094	\$145,118	\$290,236	3.2%
		Associate Professor	\$86,572	\$108,214	\$189,375	\$85,424	\$106,780	\$186,865	1.3%
		Assistant Professor	\$73,956	\$92,445	\$138,667	\$73,361	\$91,701	\$137,552	0.8%
College of Engineering	Computer Science	Professor	\$133,091	\$166,364	\$332,727	\$127,329	\$159,162	\$318,324	4.5%
		Associate Professor	\$94,783	\$118,478	\$207,337	\$94,091	\$117,614	\$205,824	0.7%
		Assistant Professor	\$82,352	\$102,940	\$154,410	\$79,795	\$99,744	\$149,615	3.2%
College of Engineering	Electrical & Computer	Professor	\$129,380	\$161,725	\$323,450	\$126,674	\$158,343	\$316,686	2.1%
		Associate Professor	\$91,384	\$114,230	\$199,903	\$89,543	\$111,929	\$195,875	2.1%
		Assistant Professor	\$77,933	\$97,416	\$146,124	\$76,632	\$95,790	\$143,685	1.7%
College of Engineering	Industrial	Professor	\$128,183	\$160,229	\$320,457	\$125,161	\$156,451	\$312,902	2.4%
		Associate Professor	\$87,480	\$109,351	\$191,363	\$84,520	\$105,651	\$184,889	3.5%
		Assistant Professor	\$75,648	\$94,560	\$141,841	\$74,525	\$93,156	\$139,733	1.5%
College of Engineering	Materials	Professor	\$141,703	\$177,128	\$354,257	\$131,929	\$164,911	\$329,823	7.4%
		Associate Professor	\$95,149	\$118,936	\$208,138	\$90,527	\$113,159	\$198,029	5.1%
		Assistant Professor	\$77,538	\$96,923	\$145,384	\$73,068	\$91,335	\$137,002	6.1%
College of Engineering	Mechanical & Aerospace	Professor	\$133,667	\$167,084	\$334,168	\$126,547	\$158,183	\$316,367	5.6%
		Associate Professor	\$92,921	\$116,152	\$203,266	\$88,382	\$110,478	\$193,336	5.1%
		Assistant Professor	\$74,313	\$92,892	\$139,338	\$73,266	\$91,583	\$137,374	1.4%
College of Engineering	Nuclear	Professor	\$142,545	\$178,181	\$356,362	\$136,670	\$170,837	\$341,674	4.3%
		Associate Professor	\$92,879	\$116,098	\$203,172	\$92,252	\$115,315	\$201,802	0.7%
		Assistant Professor	\$80,417	\$100,521	\$150,781	\$75,551	\$94,438	\$141,657	6.4%

College/Division	Discipline	Rank	FY 2018-19 Faculty Salary Ranges (9-month Salary Basis)			FY 2017-18 Faculty Salary Ranges (9-month Salary Basis)			Market Difference 2017-18 vs. 2018-19
			Minimum	Market Reference	Maximum	Minimum	Market Reference	Maximum	
College of Humanities and Social Sciences	Anthropology	Professor	\$110,124	\$137,654	\$275,309	\$106,555	\$133,194	\$266,388	3.3%
		Associate Professor	\$71,711	\$89,639	\$156,868	\$69,286	\$86,607	\$151,563	3.5%
		Assistant Professor	\$60,481	\$75,601	\$113,402	\$59,316	\$74,146	\$111,218	2.0%
College of Humanities and Social Sciences	Communication	Professor	\$100,677	\$125,846	\$251,692	\$98,074	\$122,592	\$245,184	2.7%
		Associate Professor	\$69,115	\$86,394	\$151,190	\$66,931	\$83,664	\$146,412	3.3%
		Assistant Professor	\$57,426	\$71,783	\$107,674	\$57,171	\$71,464	\$107,196	0.4%
College of Humanities and Social Sciences	English	Professor	\$94,241	\$117,801	\$235,602	\$97,745	\$122,181	\$244,363	-3.6%
		Associate Professor	\$66,961	\$83,701	\$146,478	\$66,904	\$83,630	\$146,352	0.1%
		Assistant Professor	\$55,267	\$69,084	\$103,626	\$55,605	\$69,506	\$104,259	-0.6%
College of Humanities and Social Sciences	Foreign Languages & Literatures	Professor	\$93,641	\$117,052	\$234,103	\$94,923	\$118,654	\$237,308	-1.4%
		Associate Professor	\$63,624	\$79,530	\$139,178	\$63,888	\$79,860	\$139,755	-0.4%
		Assistant Professor	\$53,698	\$67,123	\$100,684	\$53,511	\$66,889	\$100,333	0.3%
College of Humanities and Social Sciences	History	Professor	\$99,055	\$123,819	\$247,639	\$93,861	\$117,326	\$234,652	5.5%
		Associate Professor	\$68,590	\$85,737	\$150,041	\$65,440	\$81,800	\$143,150	4.8%
		Assistant Professor	\$56,066	\$70,082	\$105,123	\$54,449	\$68,061	\$102,092	3.0%
College of Humanities and Social Sciences	Interdisciplinary Studies	Professor	\$96,102	\$120,128	\$240,255	\$95,757	\$119,696	\$239,393	0.4%
		Associate Professor	\$68,605	\$85,757	\$150,074	\$63,294	\$79,118	\$138,456	8.4%
		Assistant Professor	\$51,294	\$64,117	\$96,176	\$51,210	\$64,012	\$96,019	0.2%
College of Humanities and Social Sciences	Philosophy & Religious Studies	Professor	\$101,914	\$127,393	\$254,785	\$99,237	\$124,047	\$248,094	2.7%
		Associate Professor	\$67,595	\$84,493	\$147,864	\$65,524	\$81,905	\$143,334	3.2%
		Assistant Professor	\$55,957	\$69,946	\$104,919	\$54,888	\$68,610	\$102,916	1.9%
College of Humanities and Social Sciences	Political Science	Professor	\$111,796	\$139,745	\$279,491	\$107,035	\$133,794	\$267,588	4.4%
		Associate Professor	\$75,269	\$94,087	\$164,652	\$72,549	\$90,686	\$158,701	3.7%
		Assistant Professor	\$62,027	\$77,533	\$116,300	\$60,574	\$75,718	\$113,577	2.4%
College of Humanities and Social Sciences	Public Administration	Professor	\$118,024	\$147,531	\$295,061	\$118,117	\$147,646	\$295,292	-0.1%
		Associate Professor	\$83,218	\$104,022	\$182,039	\$78,621	\$98,276	\$171,983	5.8%
		Assistant Professor	\$67,790	\$84,737	\$127,106	\$68,308	\$85,385	\$128,078	-0.8%
College of Humanities and Social Sciences	Psychology	Professor	\$112,425	\$140,531	\$281,063	\$109,089	\$136,361	\$272,722	3.1%
		Associate Professor	\$75,187	\$93,984	\$164,472	\$72,808	\$91,010	\$159,267	3.3%
		Assistant Professor	\$64,787	\$80,984	\$121,476	\$63,094	\$78,868	\$118,301	2.7%
College of Humanities and Social Sciences	Social Work	Professor	\$100,359	\$125,449	\$250,897	\$105,880	\$132,350	\$264,700	-5.2%
		Associate Professor	\$70,084	\$87,606	\$153,310	\$70,164	\$87,705	\$153,483	-0.1%
		Assistant Professor	\$59,692	\$74,615	\$111,922	\$58,863	\$73,579	\$110,369	1.4%
College of Humanities and Social Sciences	Sociology	Professor	\$110,124	\$137,654	\$275,309	\$106,555	\$133,194	\$266,388	3.3%
		Associate Professor	\$71,711	\$89,639	\$156,868	\$69,286	\$86,607	\$151,563	3.5%
		Assistant Professor	\$60,481	\$75,601	\$113,402	\$59,316	\$74,146	\$111,218	2.0%
Poole College of Management	Accounting	Professor	\$179,935	\$224,918	\$449,837	\$172,071	\$215,089	\$430,177	4.6%
		Associate Professor	\$147,120	\$183,900	\$321,825	\$139,357	\$174,197	\$304,844	5.6%
		Assistant Professor	\$150,829	\$188,537	\$282,805	\$146,169	\$182,711	\$274,066	3.2%
Poole College of Management	Business Management	Professor	\$176,829	\$221,037	\$442,074	\$168,865	\$211,081	\$422,162	4.7%
		Associate Professor	\$130,710	\$163,388	\$285,929	\$134,306	\$167,882	\$293,793	-2.7%
		Assistant Professor	\$122,233	\$152,792	\$229,187	\$132,722	\$165,902	\$248,854	-7.9%

College/Division	Discipline	Rank	FY 2018-19 Faculty Salary Ranges (9-month Salary Basis)			FY 2017-18 Faculty Salary Ranges (9-month Salary Basis)			Market Difference 2017-18 vs. 2018-19
			Minimum	Market Reference	Maximum	Minimum	Market Reference	Maximum	
Poole College of Management	Economics	Professor	\$122,730	\$153,412	\$306,824	\$114,766	\$143,457	\$286,914	6.9%
		Associate Professor	\$100,176	\$125,220	\$219,134	\$95,729	\$119,661	\$209,407	4.6%
		Assistant Professor	\$88,664	\$110,829	\$166,244	\$87,381	\$109,226	\$163,839	1.5%
Poole College of Management	Entrepreneurship	Professor	\$183,722	\$229,653	\$459,305	\$180,473	\$225,592	\$451,184	1.8%
		Associate Professor	\$117,650	\$147,063	\$257,360	\$115,570	\$144,462	\$252,809	1.8%
		Assistant Professor	\$119,229	\$149,036	\$223,554	\$117,120	\$146,401	\$219,601	1.8%
Poole College of Management	Finance	Professor	\$186,812	\$233,514	\$467,029	\$177,433	\$221,791	\$443,581	5.3%
		Associate Professor	\$153,586	\$191,983	\$335,970	\$146,156	\$182,695	\$319,716	5.1%
		Assistant Professor	\$153,787	\$192,234	\$288,351	\$149,646	\$187,058	\$280,587	2.8%
Poole College of Management	Human Resources Management	Professor	\$147,278	\$184,098	\$368,195	\$154,262	\$192,827	\$385,654	-4.5%
		Associate Professor	\$114,861	\$143,576	\$251,257	\$106,238	\$132,798	\$232,396	8.1%
		Assistant Professor	\$112,052	\$140,065	\$210,097	\$117,776	\$147,221	\$220,831	-4.9%
Poole College of Management	Management Information Systems	Professor	\$152,103	\$190,129	\$380,258	\$151,348	\$189,185	\$378,369	0.5%
		Associate Professor	\$117,959	\$147,449	\$258,036	\$115,878	\$144,848	\$253,483	1.8%
		Assistant Professor	\$114,160	\$142,700	\$214,051	\$115,283	\$144,103	\$216,155	-1.0%
Poole College of Management	Marketing	Professor	\$167,414	\$209,267	\$418,534	\$161,748	\$202,185	\$404,371	3.5%
		Associate Professor	\$126,506	\$158,132	\$276,731	\$123,150	\$153,937	\$269,390	2.7%
		Assistant Professor	\$120,526	\$150,658	\$225,986	\$116,063	\$145,078	\$217,617	3.8%
Poole College of Management	Operations Management	Professor	\$176,829	\$221,037	\$442,074	\$173,909	\$217,386	\$434,773	1.7%
		Associate Professor	\$130,710	\$163,388	\$285,929	\$128,435	\$160,544	\$280,951	1.8%
		Assistant Professor	\$122,233	\$152,792	\$229,187	\$120,715	\$150,894	\$226,341	1.3%
Poole College of Management	Organizational Behavior	Professor	\$147,278	\$184,098	\$368,195	\$154,262	\$192,827	\$385,654	-4.5%
		Associate Professor	\$114,861	\$143,576	\$251,257	\$106,238	\$132,798	\$232,396	8.1%
		Assistant Professor	\$112,052	\$140,065	\$210,097	\$117,776	\$147,221	\$220,831	-4.9%
College of Natural Resources	Forest Biomaterials	Professor	\$91,095	\$113,868	\$227,737	\$89,551	\$111,939	\$223,878	1.7%
		Associate Professor	\$71,354	\$89,193	\$156,087	\$69,209	\$86,511	\$151,394	3.1%
		Assistant Professor	\$62,012	\$77,515	\$116,272	\$61,185	\$76,481	\$114,722	1.4%
College of Natural Resources	Forestry & Environmental Resources	Professor	\$100,098	\$125,123	\$250,246	\$95,738	\$119,672	\$239,344	4.6%
		Associate Professor	\$73,152	\$91,440	\$160,020	\$71,080	\$88,851	\$155,488	2.9%
		Assistant Professor	\$63,179	\$78,974	\$118,461	\$61,282	\$76,603	\$114,904	3.1%
College of Natural Resources	Parks, Recreation, and Tourism Mgmt	Professor	\$102,854	\$128,567	\$257,135	\$101,035	\$126,294	\$252,588	1.8%
		Associate Professor	\$70,826	\$88,532	\$154,932	\$69,574	\$86,967	\$152,192	1.8%
		Assistant Professor	\$59,829	\$74,786	\$112,179	\$58,771	\$73,464	\$110,195	1.8%
College of Sciences	Applied Mathematics	Professor	\$119,940	\$149,925	\$299,850	\$117,819	\$147,274	\$294,548	1.8%
		Associate Professor	\$76,810	\$96,012	\$168,022	\$75,452	\$94,315	\$165,051	1.8%
		Assistant Professor	\$75,749	\$94,687	\$142,030	\$74,410	\$93,013	\$139,519	1.8%
College of Sciences	Atmospheric Sciences	Professor	\$117,173	\$146,466	\$292,932	\$114,317	\$142,896	\$285,792	2.5%
		Associate Professor	\$85,683	\$107,104	\$187,432	\$81,618	\$102,023	\$178,540	5.0%
		Assistant Professor	\$71,363	\$89,204	\$133,806	\$68,524	\$85,655	\$128,482	4.1%
College of Sciences	Biological Sciences	Professor	\$109,262	\$136,577	\$273,154	\$111,115	\$138,894	\$277,788	-1.7%
		Associate Professor	\$75,483	\$94,353	\$165,118	\$74,804	\$93,505	\$163,633	0.9%
		Assistant Professor	\$64,347	\$80,434	\$120,651	\$64,842	\$81,053	\$121,579	-0.8%

College/Division	Discipline	Rank	FY 2018-19 Faculty Salary Ranges (9-month Salary Basis)			FY 2017-18 Faculty Salary Ranges (9-month Salary Basis)			Market Difference 2017-18 vs. 2018-19
			Minimum	Market Reference	Maximum	Minimum	Market Reference	Maximum	
College of Sciences	Biology	Professor	\$109,262	\$136,577	\$273,154	\$111,115	\$138,894	\$277,788	-1.7%
		Associate Professor	\$75,483	\$94,353	\$165,118	\$74,804	\$93,505	\$163,633	0.9%
		Assistant Professor	\$64,347	\$80,434	\$120,651	\$64,842	\$81,053	\$121,579	-0.8%
College of Sciences	Chemistry	Professor	\$120,357	\$150,447	\$300,893	\$114,504	\$143,130	\$286,260	5.1%
		Associate Professor	\$77,091	\$96,363	\$168,636	\$74,937	\$93,672	\$163,926	2.9%
		Assistant Professor	\$66,135	\$82,668	\$124,002	\$63,871	\$79,838	\$119,757	3.5%
College of Sciences	Genetics	Professor	\$114,243	\$142,804	\$285,608	\$115,791	\$144,739	\$289,477	-1.3%
		Associate Professor	\$84,715	\$105,893	\$185,313	\$82,951	\$103,688	\$181,455	2.1%
		Assistant Professor	\$68,012	\$85,015	\$127,522	\$67,359	\$84,198	\$126,297	1.0%
College of Sciences	Geology & Earth Sciences	Professor	\$107,585	\$134,481	\$268,963	\$100,912	\$126,140	\$252,281	6.6%
		Associate Professor	\$76,264	\$95,330	\$166,827	\$73,132	\$91,415	\$159,976	4.3%
		Assistant Professor	\$64,215	\$80,269	\$120,403	\$63,213	\$79,017	\$118,525	1.6%
College of Sciences	Marine and Oceanographic Sciences	Professor	\$120,497	\$150,621	\$301,242	\$112,065	\$140,081	\$280,163	7.5%
		Associate Professor	\$81,483	\$101,854	\$178,245	\$79,480	\$99,350	\$173,863	2.5%
		Assistant Professor	\$66,021	\$82,526	\$123,789	\$64,510	\$80,637	\$120,956	2.3%
College of Sciences	Mathematics	Professor	\$104,119	\$130,149	\$260,299	\$104,156	\$130,195	\$260,389	0.0%
		Associate Professor	\$73,160	\$91,450	\$160,037	\$72,693	\$90,866	\$159,016	0.6%
		Assistant Professor	\$63,501	\$79,377	\$119,065	\$64,851	\$81,064	\$121,596	-2.1%
College of Sciences	Microbiology	Professor	\$119,855	\$149,819	\$299,637	\$116,041	\$145,051	\$290,101	3.3%
		Associate Professor	\$79,128	\$98,910	\$173,092	\$78,712	\$98,390	\$172,183	0.5%
		Assistant Professor	\$65,443	\$81,803	\$122,705	\$64,060	\$80,075	\$120,112	2.2%
College of Sciences	Physics	Professor	\$108,543	\$135,679	\$271,358	\$104,007	\$130,009	\$260,018	4.4%
		Associate Professor	\$76,881	\$96,101	\$168,177	\$74,299	\$92,874	\$162,530	3.5%
		Assistant Professor	\$66,690	\$83,363	\$125,045	\$65,058	\$81,322	\$121,983	2.5%
College of Sciences	Statistics	Professor	\$122,115	\$152,644	\$305,288	\$112,658	\$140,823	\$281,646	8.4%
		Associate Professor	\$81,082	\$101,352	\$177,366	\$77,092	\$96,365	\$168,639	5.2%
		Assistant Professor	\$71,712	\$89,639	\$134,459	\$70,538	\$88,172	\$132,258	1.7%
College of Sciences	Toxicology	Professor	\$124,854	\$156,068	\$312,135	\$121,034	\$151,292	\$302,584	3.2%
		Associate Professor	\$83,108	\$103,885	\$181,799	\$81,765	\$102,206	\$178,861	1.6%
		Assistant Professor	\$64,705	\$80,882	\$121,322	\$62,442	\$78,052	\$117,078	3.6%
College of Textiles	Apparel / Textiles	Professor	\$92,763	\$115,954	\$231,909	\$91,123	\$113,904	\$227,808	1.8%
		Associate Professor	\$68,868	\$86,085	\$150,649	\$67,651	\$84,563	\$147,986	1.8%
		Assistant Professor	\$59,238	\$74,047	\$111,071	\$58,191	\$72,738	\$109,107	1.8%
College of Textiles	Textile Sciences & Engineering	Professor	\$119,329	\$149,161	\$298,322	\$117,219	\$146,524	\$293,047	1.8%
		Associate Professor	\$91,701	\$114,626	\$200,596	\$90,079	\$112,599	\$197,049	1.8%
		Assistant Professor	\$66,363	\$82,954	\$124,431	\$65,190	\$81,487	\$122,231	1.8%
College of Veterinary Medicine	Veterinary Medicine	Professor	\$110,752	\$138,440	\$276,881	\$103,281	\$129,102	\$258,203	7.2%
		Associate Professor	\$86,416	\$108,020	\$189,036	\$82,747	\$103,434	\$181,009	4.4%
		Assistant Professor	\$73,706	\$92,133	\$138,200	\$73,950	\$92,438	\$138,657	-0.3%
Division of Academic & Student Affairs	Music	Professor	\$84,084	\$105,104	\$210,209	\$83,448	\$104,310	\$208,621	0.8%
		Associate Professor	\$62,729	\$78,411	\$137,220	\$61,798	\$77,248	\$135,184	1.5%
		Assistant Professor	\$50,612	\$63,265	\$94,898	\$51,464	\$64,330	\$96,496	-1.7%

College/Division	Discipline	Rank	FY 2018-19 Faculty Salary Ranges (9-month Salary Basis)			FY 2017-18 Faculty Salary Ranges (9-month Salary Basis)			Market Difference 2017-18 vs. 2018-19
			Minimum	Market Reference	Maximum	Minimum	Market Reference	Maximum	
Division of Academic & Student Affairs	Health & Exercise Science	Professor	\$99,012	\$123,765	\$247,531	\$96,857	\$121,071	\$242,142	2.2%
		Associate Professor	\$72,573	\$90,717	\$158,754	\$71,331	\$89,164	\$156,037	1.7%
		Assistant Professor	\$61,697	\$77,121	\$115,681	\$60,466	\$75,582	\$113,374	2.0%

TOPIC OF INTEREST/ COMMITTEE DISCUSSION



Promotion and Tenure Process at NC State

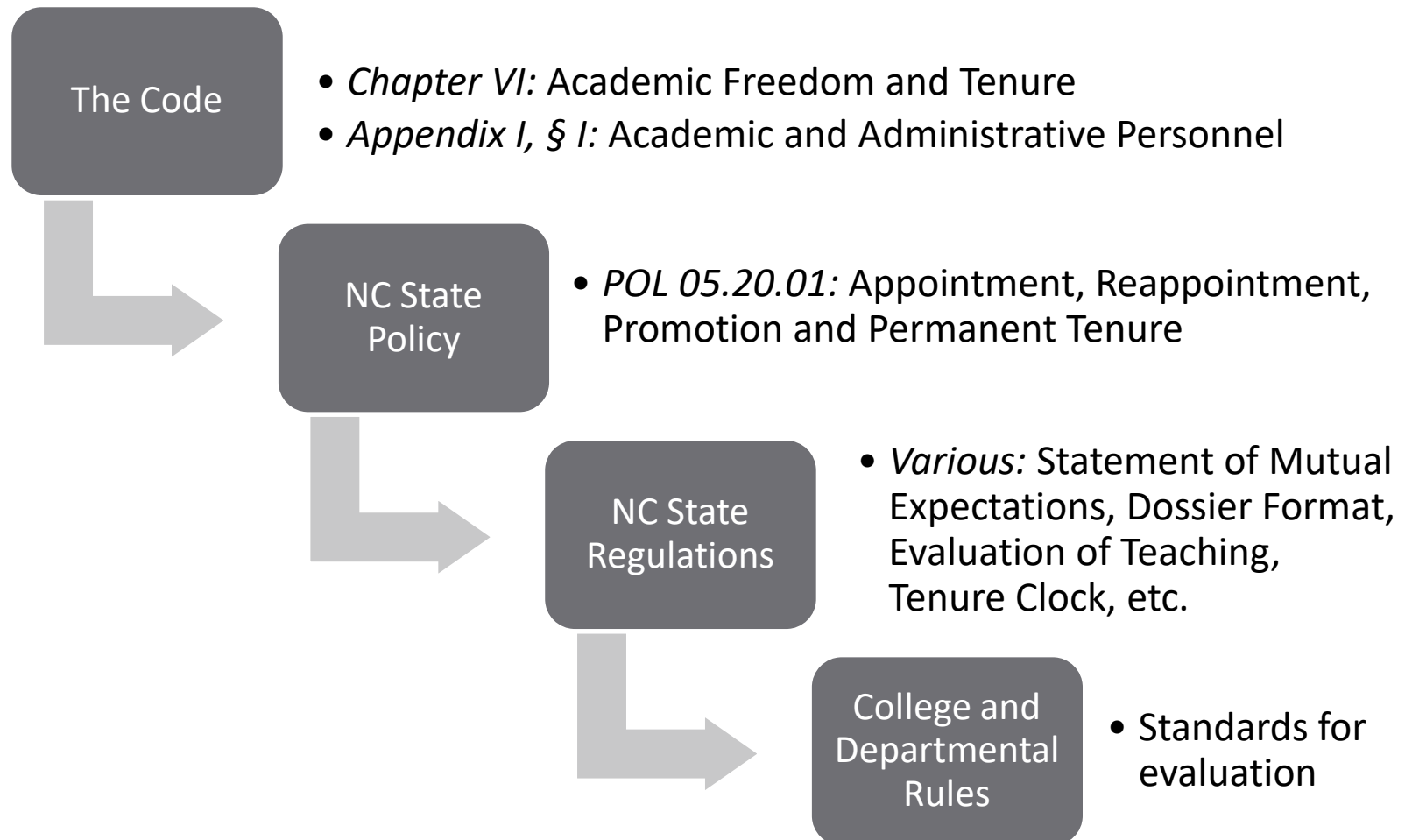
BOT University Affairs Committee • September 20, 2018

Warwick Arden, Executive Vice Chancellor and Provost

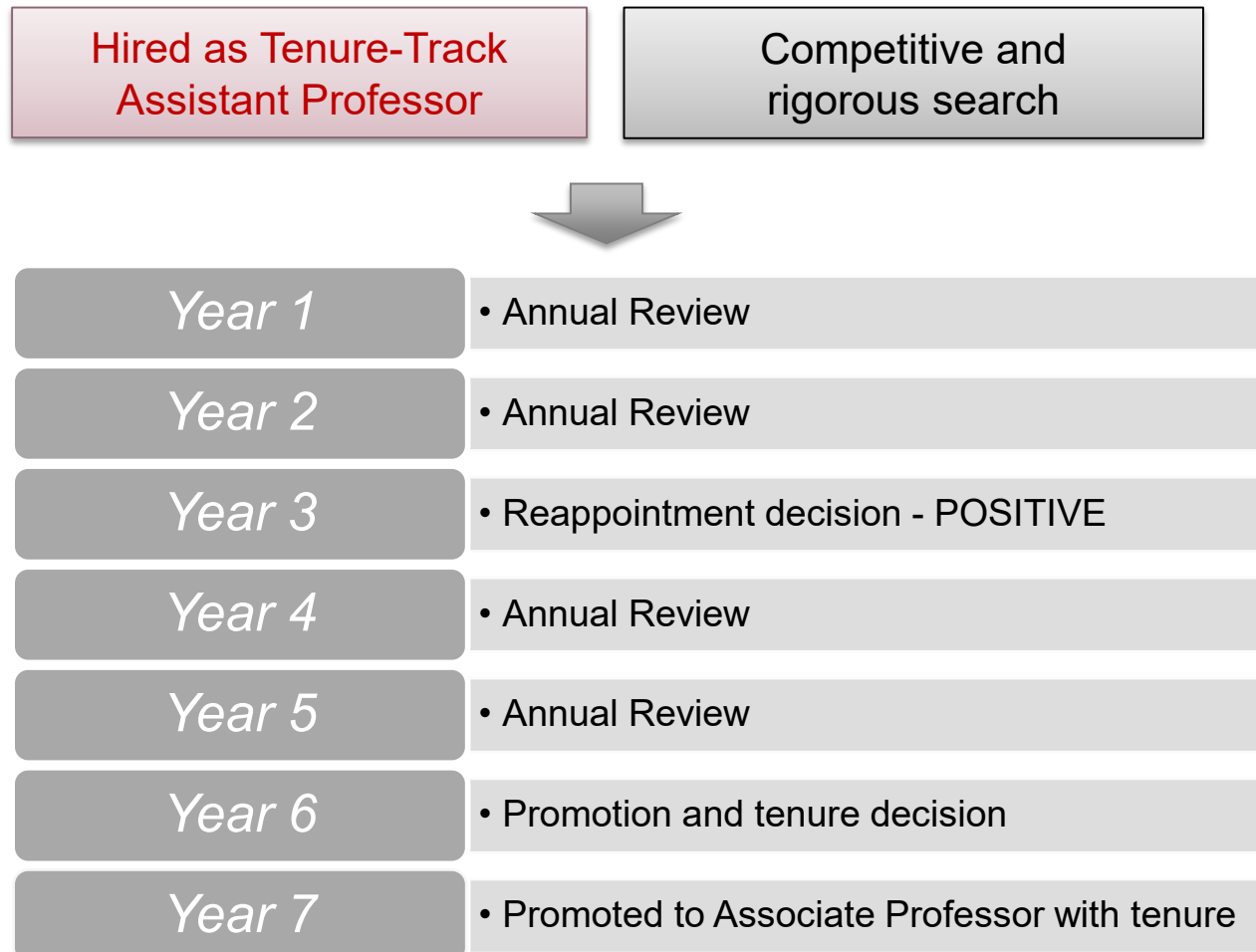
Why Tenure?

- Tenure lets faculty be stakeholders and participants in enhancing the success and reputation of the university.
- Tenure supports robust idea exchange, debates, innovation and risk-taking.
- Tenure does not protect faculty from sanctions for reasons of incompetence, neglect of duty or significant misconduct.

Tenure Policy, Regulations and Rules



Tenure-Track Faculty Life Cycle



Tenure Review Process

Dossier contents

Provided by candidate

- Introduction: SME/SFR, CV, candidate's statement
- Teaching and mentoring of undergraduate and graduate students
- Scholarship in the realms of faculty responsibility
- Extension and engagement with constituencies outside the university
- Technological and managerial innovation
- Service to the university and professional societies

External evaluations

- Letters of evaluation by at least 5 accomplished scholars who are not part of the NC State community
- Requests for evaluation coordinated by department

Department-level Review: Departmental Voting Faculty, Department Head

College-level Review: College RPT Committee, Dean

University-level Review: Provost, University RPT Committee (procedures only), Chancellor

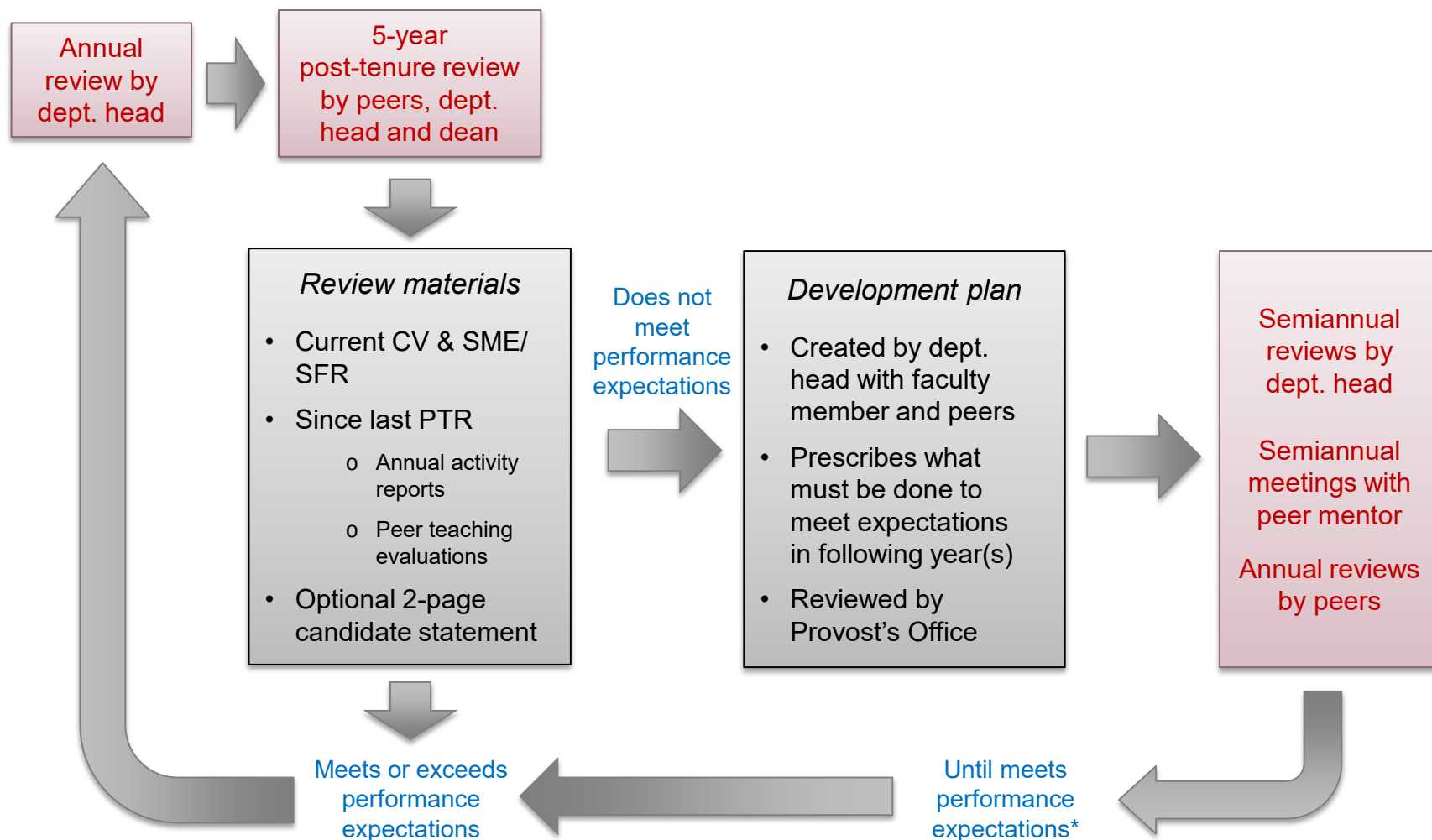


Board of Trustees Review

NC State 2015 to 2018 Tenure Review Summary

		2015-2016	2016-2017	2017-2018	Total
Annual RPT Process	Reviewed for tenure	39	51	37	127
	Granted tenure	38	50	36	124
	Denied tenure	1	1	1	3
	Denied tenure %	2.6%	2.0%	2.7%	2.4%
Faculty hired with tenure		16	20	8	44

Post-Tenure Review Process



* Not meeting expectations for multiple consecutive years may support an administrative action to dismiss

Summary: Principles of Faculty Evaluation

- Extremely rigorous and selective hiring process
- Focused coaching and mentoring at department and college level
- Fair and transparent processes that are faculty-driven and grounded in high standards

NC STATE UNIVERSITY

Chair of the NC State University Faculty Report to the North Carolina State University Board of Trustees

Submitted August 28, 2018

The last report to the Board of Trustees was submitted on March 26, 2018. Since that time, through April 17, 2018 the following topics have been **discussed at the full Faculty Senate**:

1. **Athletics and Academics at NC State (April 3)**

Joel Pawlak, (then) Interim Faculty Athletics Representative

Katie Sheridan Graham, Assistant Dean and Director, Academic Support for Students Athletes

Deborah A. Yow, Director of Athletics

Background: The duties of the Council on Athletics include advising the Faculty Senate on matters pertaining to NC State's intercollegiate athletics program. The Athletics leadership has a tradition of an annual presentation and discussion with the Faculty Senate.

Highlights included average student-athlete GPA of 3.08 for Fall 2017 and it was noted this is the highest average term GPA to date. For the same term (Fall 2017) 159 student-athletes were named to the Dean's list. The top five majors for student-athletes with Junior or higher standing are *Business Administration, Communications, Biological Sciences, Sports Management and Parks, Recreation, and Tourism*; with the first three being the same academic majors pursued by their non-athlete undergraduate peers. An extensive discussion was held covering a wide range of issues including, but not limited to special admit students and associated academic support programs, the fate of students who become injured and no-longer can play, and the intricacies of the Federal Academic Progress Rate calculation tracking eligibility and retention.

2. **Faculty Senate Business (April 17)**

Carolyn Bird, Chair of the Faculty

Background: As the last meeting of the semester, we welcomed incoming senators and current senators voted to elect an Executive Committee for the 65th Session. Elections to the Council on Athletics were held; for the two available seats six faculty members provided bios and spoke to the Faculty Senate. The two faculty elected to a 3-year term were:

James Mickle, Alumni Distinguished Undergraduate Professor, Plant and Microbial Biology - College of Agriculture and Life Sciences

Kimberly Bush, Director of Undergraduate Programs and Teaching Associate Professor, Parks, Recreation, and Tourism Management - College of Natural Resources.

Invited Speakers for **discussion in upcoming Faculty Senate meetings** include:

1. **Spring 2018 Employee Engagement Survey: A Summary of Results and Next Steps (August 28)**

Marie Williams, Associate Vice Chancellor for Human Resources

Nancy Whelchel, Director for Survey Research, Office of Institutional Planning and Research

The Faculty Senate will get an overview of the Employee Engagement Survey (a 5-year UNC initiative), hear results from the Spring 2018 administration of the survey at NC State, learn about plans for using the data, and have the opportunity for questions and discussion.

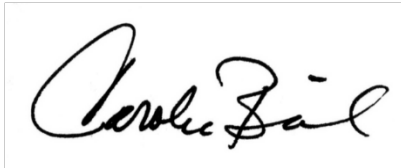
Other items:

Faculty Mediator Training. The Chair of the Faculty partnered with the Office of General Counsel and the Office of Faculty Affairs for professional mediation training. Fifteen faculty, most at the full professor rank, participated in the training and are now better equipped to serve as a mediator in instances of Faculty Grievance (604) and Non-Reappointment Review (607) petitions or other requests for mediation that involve faculty. This is the first time that we have used an external professional mediator to conduct the training. We, the faculty, thank Executive Vice Chancellor and Provost Warwick Arden for making this investment in faculty and the Office of Faculty Affairs (Courtney Thornton, Associate Vice Provost for Academic Personnel and Policy and Katharine Stewart, Vice Provost for Faculty Affairs) and General Counsel (Sarah Lannom) for key contributions.

The **Fall General Faculty Meeting** is scheduled for October 30, 2018 in the Talley Student Center, Room 4140, Governance Chamber.

The three **Faculty Senate Committees** (Academic Policy; Governance and Personnel Policy; Resources and Environment) discuss many issues and some of them are resolved without coming to the full Senate. Committee reports are posted on the website: <https://facultysenate.ncsu.edu/>

Respectfully Submitted by:

A handwritten signature in black ink, appearing to read "Carolyn L. Bird", enclosed within a thin black rectangular border.

Carolyn L. Bird, Ph.D.
Professor of Family Resource Management
Chair of the NC State University Faculty, 2017-2019

Board of Trustees Report

August 24, 2018

Honorable Trustees,

The Staff Senate is the representative voice for all staff in matters relating to the University. The Staff Senate:

- Provides feedback and consultation regarding interests/concerns that affect staff;
- Integrates staff into University governance and affairs;
- Facilitates communication between staff, administration, faculty, and other partners;
- Fosters staff development and recognition to support staff retention;
- Monitors, reviews, and makes recommendations on policies, programs, and initiatives that impact staff;
- Disseminates information about initiatives, programs, and policies that impact staff and share resources needed to navigate University systems;
- Encourages a sense of community and engagement among all staff by the promotion and facilitation of staff participation in the University community.

As the Chair of the Staff Senate, I asked each committee to adopt 2-3 OKRs (Objectives and Key Results) to help the Staff Senate in achieving the goals bulleted above. An objective is significant, action oriented, unambiguous, and inspiring. An objective is where one wants to get, it is a direction, it is what one hopes to accomplish such that at a later time anyone can easily tell if the objective was reached. Choosing the right objectives in one of the hardest things to do and requires a great deal of thinking and courage to do well. Key results are specific and time bound, aggressive yet realistic, and measurable and verifiable. It is how one measures the progress toward the objective. One must identify 3-5 measurable outcomes or key results for each objective to indicate if the objective is being achieved. Key results are quantitative in nature. These OKRs were set by each committee during the July Staff Senate retreat and will be monitored and assessed at each Staff Senate meeting.

As an example, the first OKR for the Public Relations Committee is:

Objective 1	Improve communication with constituents through interesting and timely communication disseminated through multiple channels, and through supporting staff senators in communicating directly with their constituents.
<i>Key Result 1.1</i>	<i>Send Staff Senate newsletter bimonthly, with a 75% open rate by the end of the fiscal year.</i>
<i>Key Result 1.2</i>	<i>Increase staff involvement in Staff Senate sponsored events by 50% on average from the beginning of the fiscal year (July-October) to the end of the year (March-June).</i>
<i>Key Result 1.3</i>	<i>For every Staff Senate social media account (Facebook, Twitter, LinkedIn, Snapchat), increase key metrics by 50% by the end of the fiscal year.</i>
<i>Key Result 1.4</i>	<i>Have at least one PR committee member at every Staff Senate sponsored event to take photos/video and count attendance.</i>

Adopting OKRs will help the NC State Staff Senate focus on what matters by increasing transparency and collaboration, measuring progress, and accomplishing its goals. In this the 24th session, Staff Senate includes 30 returning senators, 47 new senators, and 3 elected officers, representing nearly 6,000 staff, across all 100 counties of the State of North Carolina. This next year promises to be one filled with great opportunities for the Staff Senate to serve its constituents in meaningful ways and to make staff feel encouraged and appreciated each day.

Respectfully Submitted,



Jason Painter, PhD
 Director, The Science House
 Chair, NC State Staff Senate, 2017-2018

**BOARD OF TRUSTEES
NORTH CAROLINA STATE UNIVERSITY**

Executive Committee

September 21, 2018

Jimmy Clark, Chair

Members: Andrews, Cabaniss, Goodnight, Kelly

AGENDA

CALL TO ORDER

Reading of Conflicts of Interest

Jimmy Clark, Chair

ROLL CALL

APPROVAL OF MINUTES

✓ — April 20, 2018 Open & Closed Meeting of the Executive Committee

CLOSED SESSION

— Personnel Actions

RECONVENE IN OPEN SESSION

ADJOURN

OPEN SESSION MINUTES
North Carolina State University
Board of Trustees Executive Committee
Friday, April 20, 2018

Members present: Jimmy D. Clark, Chair; Robert F. "Chip" Andrews, Thomas E. Cabaniss; Ann B. Goodnight; and Stanhope A. Kelly

Others present: Randy Woodson, Chancellor; Eileen Goldgeier, Vice Chancellor and General Counsel; and PJ Teal, Assistant Secretary

Chair Clark called the meeting to order at 7:30 a.m. He reminded all members of their duty to avoid conflicts of interest and appearances of conflicts of interest under the State Government Ethics Act and inquired as to whether there were any known conflicts of interest or appearances of conflict with respect to any matters coming before the board at this meeting. There being none, Chair Clark then called on Assistant Secretary PJ Teal for the roll call.

ROLL CALL

Assistant Secretary PJ Teal called roll and certified that a quorum was present.

MINUTES

Mr. Cabaniss made the motion, seconded by Mr. Kelly, to approve the open session minutes of the March 21, 2018, meeting of the Executive Committee. The motion passed.

CLOSED SESSION

A motion was made by Mrs. Goodnight to go into closed session to consider the qualifications, competence, performance, condition of appointment of a public officer or employee or prospective public officer or employee. Mr. Kelly seconded the motion. The motion carried.

RECONVENE IN OPEN SESSION

After coming out of closed session, Chair Clark announced that the meeting is in open session. Mr. Kelly made a motion, seconded by Mr. Cabaniss, to approve the appointment of Kevin D. Howell as the Vice Chancellor for External Affairs, Partnerships and Economic Development as discussed in closed session for which the Executive Committee has final authority. The motion passed.

North Carolina State University
Executive Committee Minutes
Friday, April 20, 2018
Page 2

With no further business for the Executive Committee, Chair Clark adjourned the meeting at 7:50 a.m.

Respectfully submitted:

Assistant Secretary

Secretary

Chair