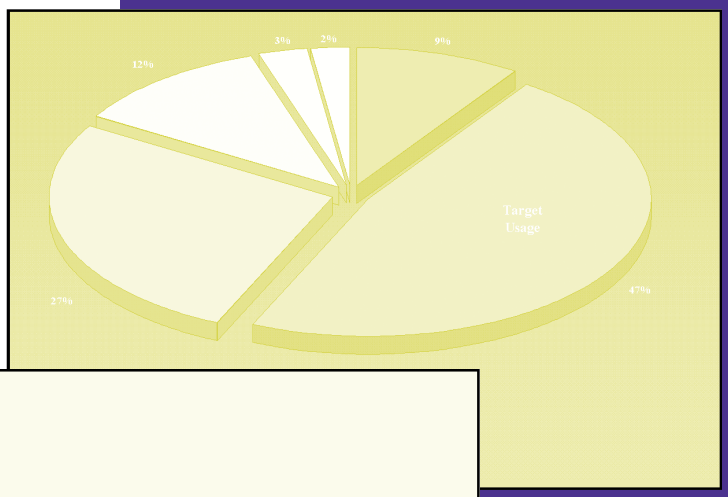
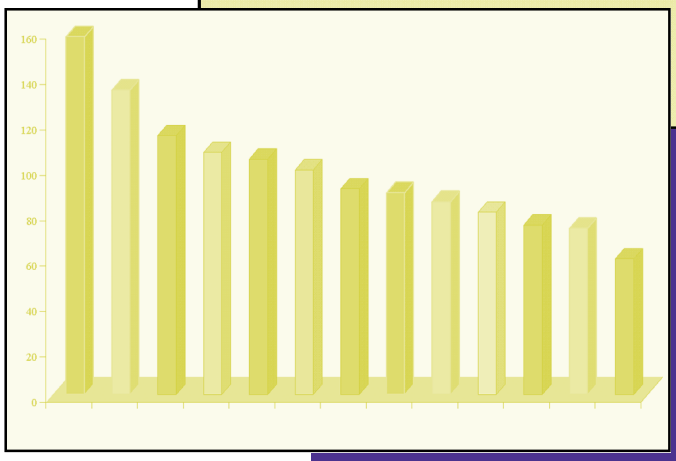
SPACE UTILIZATION STUDY

2002





CAMPUS MASTER PLAN

CLEMSON UNIVERSITY

DOBER, LIDSKY, CRAIG & ASSOCIATES, INC. * CRAIG, GAULDEN & DAVIS * SEAMON, WHITESIDE & ASSOCIATES, INC * MCCRACKEN & LOPEZ, P.A.

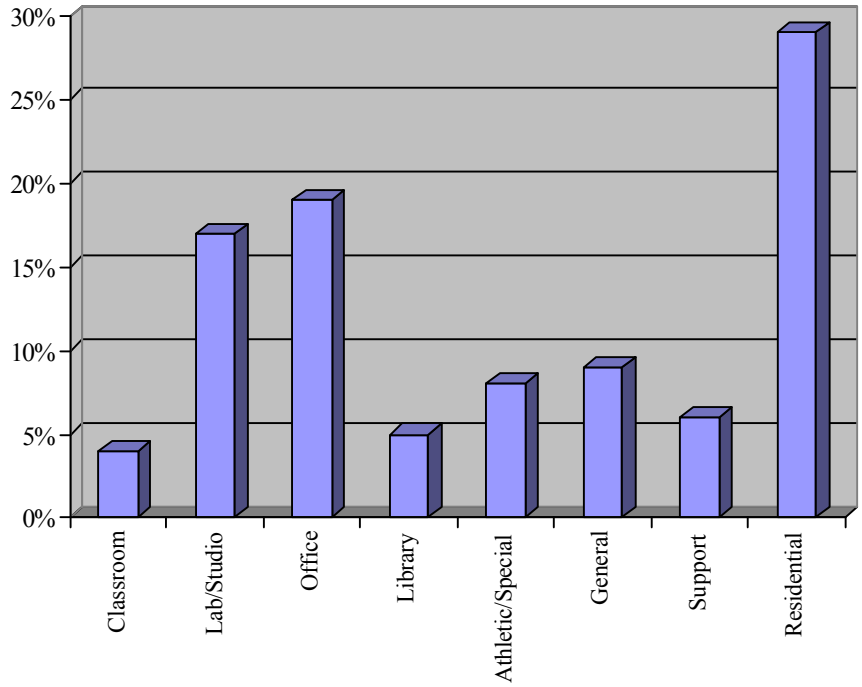
TABLE OF CONTENTS

OVERVIEW

The 2002 campus master planning effort at Clemson University included an analysis of existing space on campus — at the University, college, and department levels. Space was analyzed in terms of amount, type, and utilization. The adequacy of the amounts of space assigned for various uses was tested against state and normative standards as well as against the amounts assigned for similar uses at peer institutions.

A facility inventory was created by Clemson University as part of the campus planning process. The inventory encompassed 289 buildings, 11,000 spaces, and 4.1 million net assignable square feet (NASF). Of the total NASF, 4% is assigned to classrooms, 17% to labs and studios, 19% to offices, 5% to library use, 8% to athletic and related recreation use, 10% to resources for general and campus life uses, 6% to campus support, and 29% to residential space. The remaining 2% is unclassified or unassigned. See Graph 1 below.

Graph 1: Percent of Campus Space by Space Type



Space allocation Models were created as another aspect of space utilization. The Models, using data that is readily available, can test a range of space related alternatives. This management tool can predict the implications on assignable space resulting from factors such as changes in enrollment, numbers of faculty, or programmatic offerings.

Classrooms are a major component of the facilities at Clemson. Utilization of this important resource can have a significant impact on perceived space needs as well as management policy.

An analysis of existing Clemson classrooms was conducted to determine if the number is adequate and if the sizes are appropriate for the course sections taught. The number and size of offices are an important issue at any university. The Space Utilization Study analyzed faculty office sizes in a sampling of buildings.

In addition to more generalized utilization studies, an in-depth, Existing Facilities Study of sixteen Clemson buildings was conducted. These key buildings were analyzed in terms of utilization as well as condition and suitability for the uses assigned.

CAMPUS SPACE UTILIZATION

As of the 2001-2002 academic year, there were 5,935,000 gross square feet (GSF) of space on the Clemson Campus on 628 maintained acres. The enrollment was 15,830 full-time equivalent (FTE) undergraduate and graduate students and the number of FTE faculty was 962. Of the total amount of gross square footage, 79 percent was nonresidential — designated for uses such as academic, administrative, athletic, library, student life, and general support. The remaining 21 percent was student housing.

At the time of this study, there were 6,570 beds in the student housing inventory. This number reflects the Johnstone demolition and the replacement beds provided by the New Lightsey Bridge Apartments and New West Hall. Based on an enrollment of 15,830, 42 percent of Clemson undergraduate and graduate students live on campus. In August of 2003, the Fraternity Quad is to be renovated, and its residents will be housed in nearby off-campus housing. This temporary situation has not been factored into the analysis.

With this type of information in place, various data can be extracted such as GSF per student or faculty member, residential GSF per student, and number of faculty per student. To understand the implications, a peer comparison was conducted.

PEER COMPARISONS

The intention of the peer comparison was to contrast the amount of space at Clemson with the amounts at peer institutions. The resulting numbers should not be thought of as standards, or guidelines, or targets to reach or surpass. They are simply a description of immediate circumstances. This information, however, helps to place the University into a broader context and can also assist in understanding Clemson's competitive advantages or disadvantages.

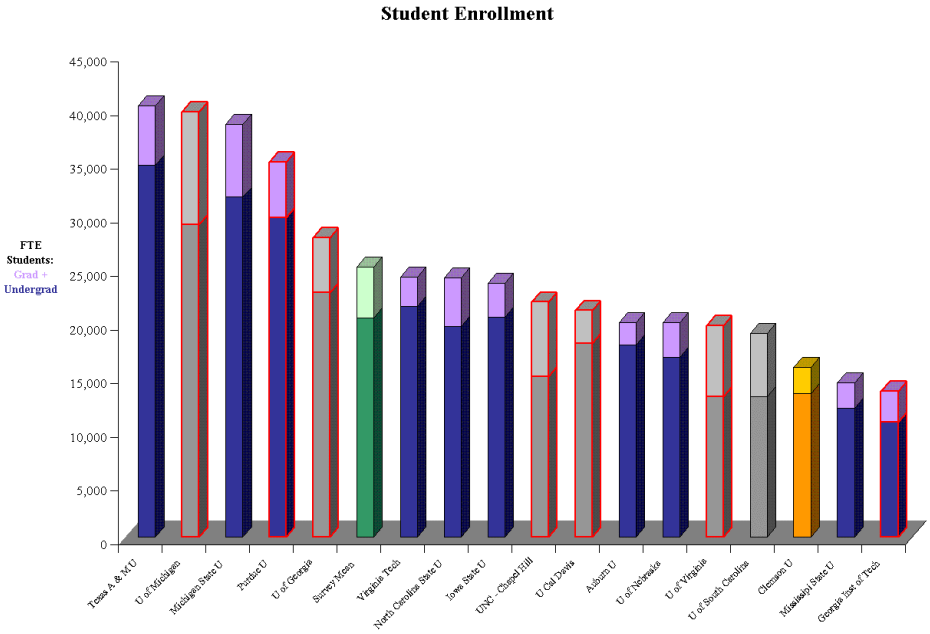
Sixteen peers[1] were used in the comparison, seven of which are ranked within the top 20 public universities.[2] They were all large, university-level institutions with enrollments of from 13,600 to 40,230 FTE students. In the comparison bar charts that follow, Clemson is orange, and the survey mean is green. Institutions that Clemson considers as peers are gray, and other peers that were applicable to this comparison are blue. The top 20 universities are outlined in red. On Graph 2, graduate student enrollment is shown in the lighter colors at the top of the bars.

[1]Peer institutions were Auburn University; Georgia Institute of Technology; Iowa State, Michigan State, Mississippi State, North Carolina State, Purdue, and Texas A & M universities; universities of California Davis, Georgia, Michigan, Nebraska, South Carolina, Virginia, and North Carolina Chapel Hill; and Virginia Tech.
[2] The top 20 public universities as listed by *U. S. News and World Report*.

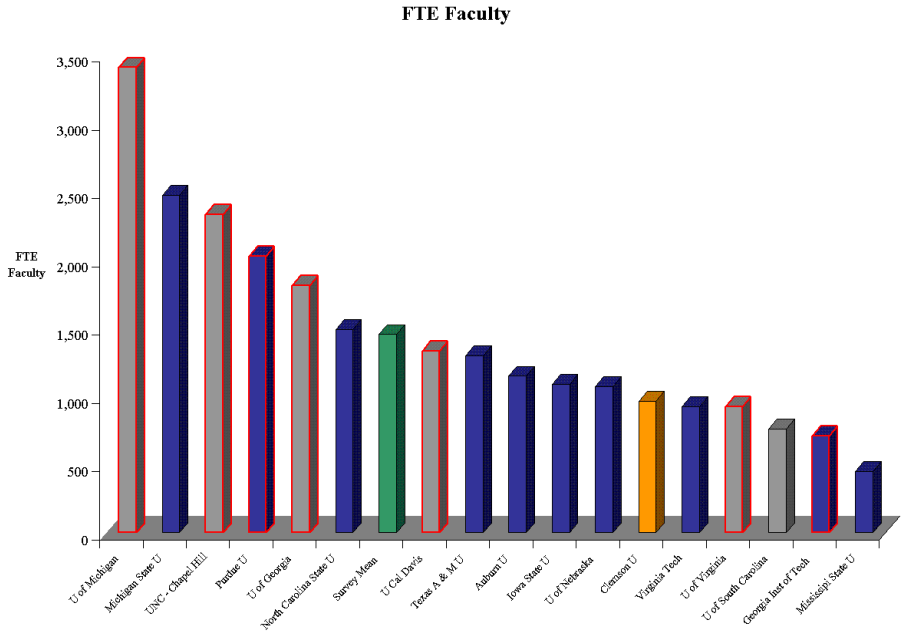
Numbers of Students and Faculty

The highest enrollment in the peer comparison was Texas A & M with over 40,000 students. The mean was 25,200 and Clemson's enrollment was15,800. The number of FTE faculty at Clemson was 960 while the mean was 1,450. The number of faculty at the University of Michigan, at 3,400, is well above the others.

Graph 2: Student Enrollment



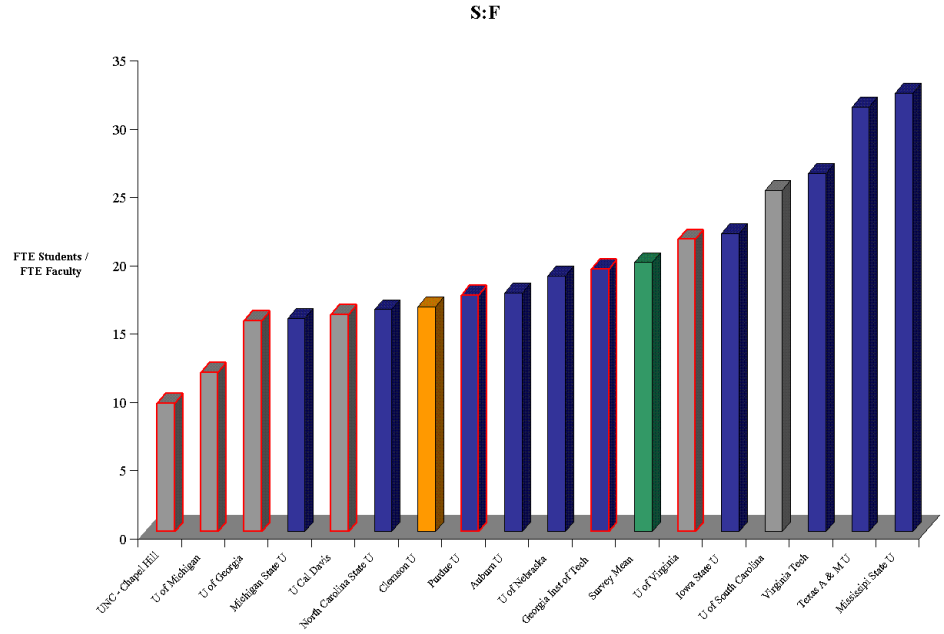
Graph 3: FTE Faculty



Students per Faculty

An academically significant comparison is the student-to-faculty ratio. At Clemson there are 16.5 FTE students per FTE faculty, which is on the low side of the 19.7 mean. Clemson is in a good position in this analysis, even though the data is slightly slanted, in this case by two very high numbers and one very low number. On the other hand, the student faculty ratio at the top 20 universities shown on the chart averages 15.7.

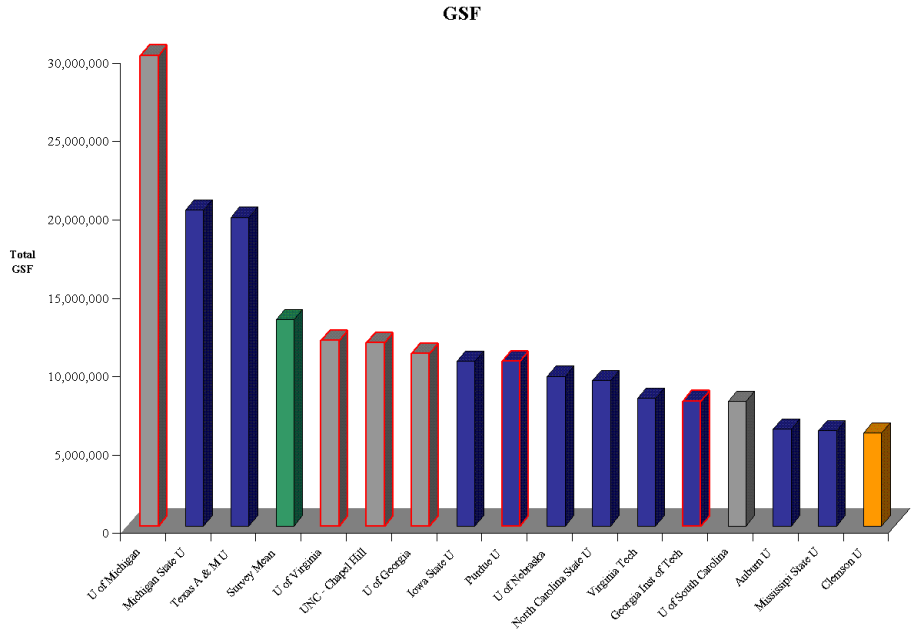
Graph 4: Students per Faculty



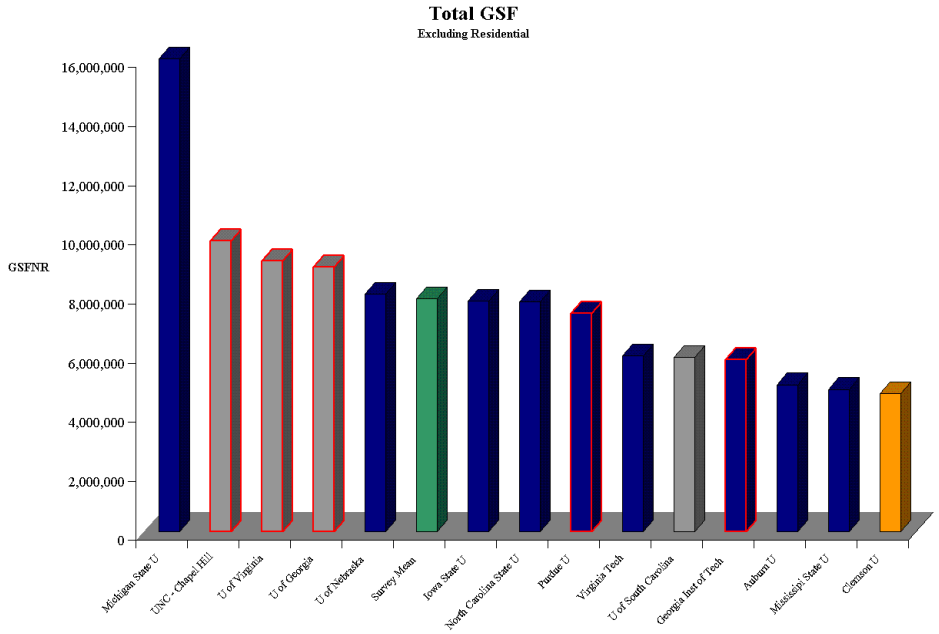
Gross Square Footage

With a total of 5,934,700 gross square feet (GSF), Clemson is at the low end of the comparison chart. The mean is more than two times that amount or over 12,000,000. See Graph 5. Graphs 6 and 7 show the break down of residential and non-residential space. Clemson rises to third from the bottom in residential space.

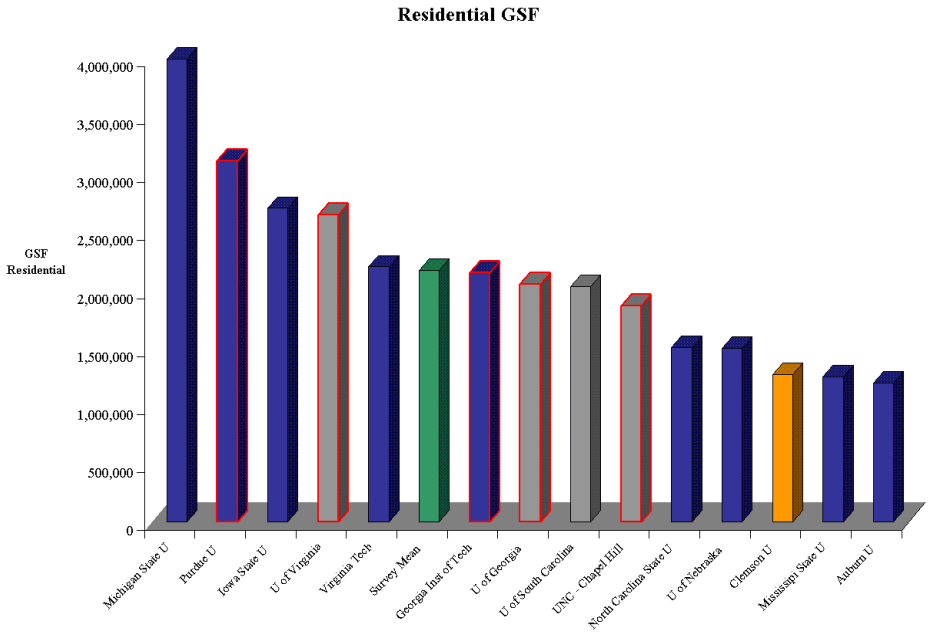
Graph 5: GSF



Graph 6: Total Non-residential GSF



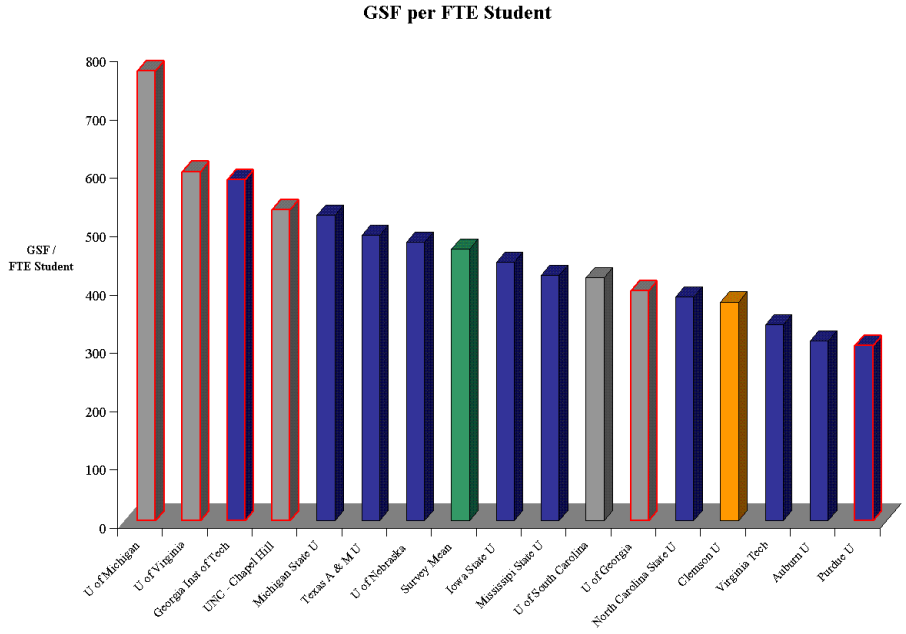
Graph 7: Total Residential GSF



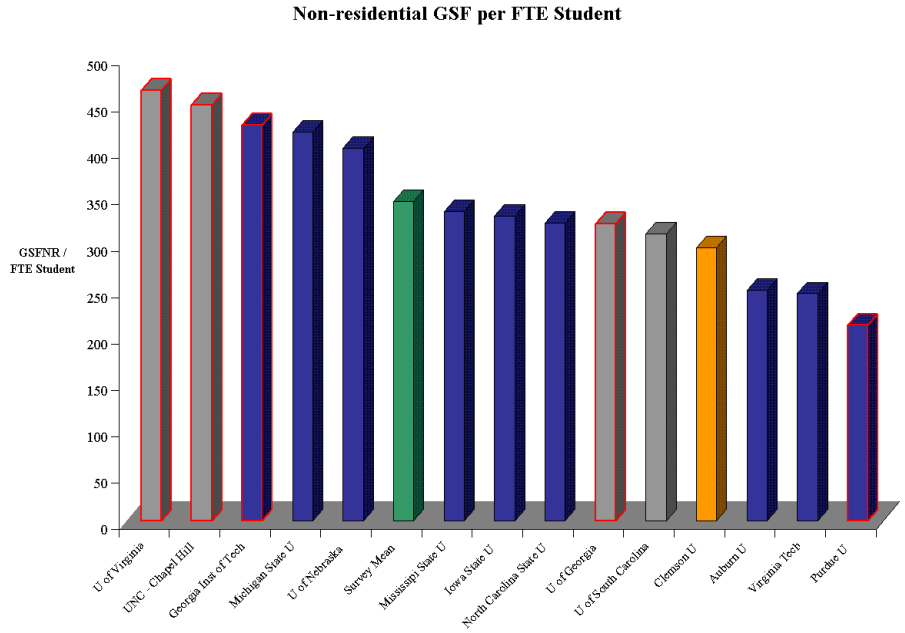
Space Per Student and Faculty

The total amount of space at Clemson per student is shown on Graph 8. Clemson is at 375 GSF/FTE student and the mean is 465. The University of Michigan, at 771 GSF, skews the mean somewhat. Graph 9 shows the nonresidential space where Clemson has 295 GSF per FTE student and the mean is 345 GSF. The differences are more striking when Clemson is compared to just the seven institutions in the comparison that are ranked within the top 20 public universities: 530 GSF to Clemson's 375 GSF per student and 374 non-residential GSF compared to Clemson's 295 GSF per student.

Graph 8: GSF/Student

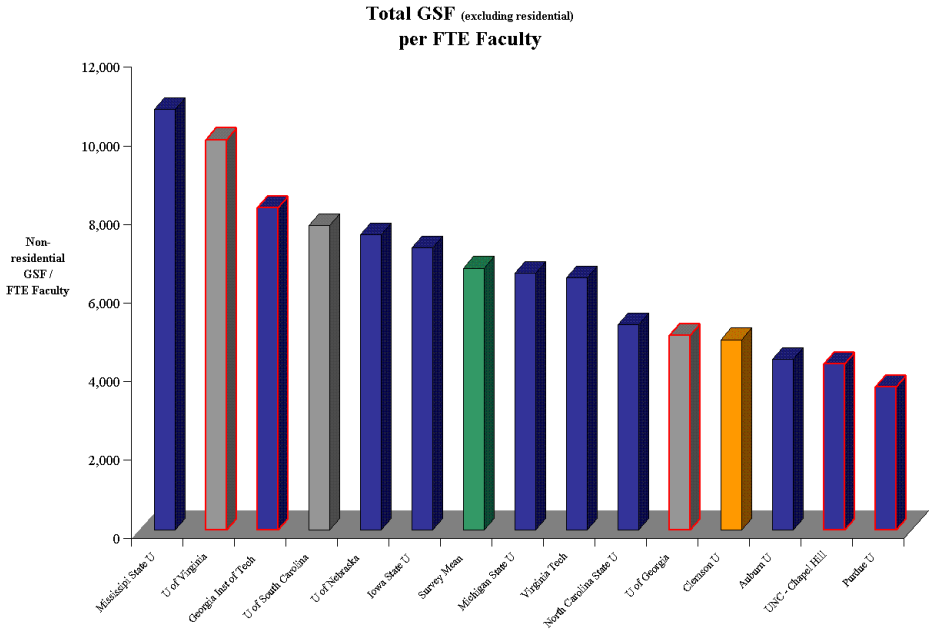


Graph 9: Non-residential GSF/Student



There are 4,846 GSF of nonresidential space per FTE faculty at Clemson, which is about one-quarter from the low end of the comparison on Graph 10. The mean is 6,700 GSF. For the top 20 institutions shown in the chart, the average is 5,700 GSF per faculty.

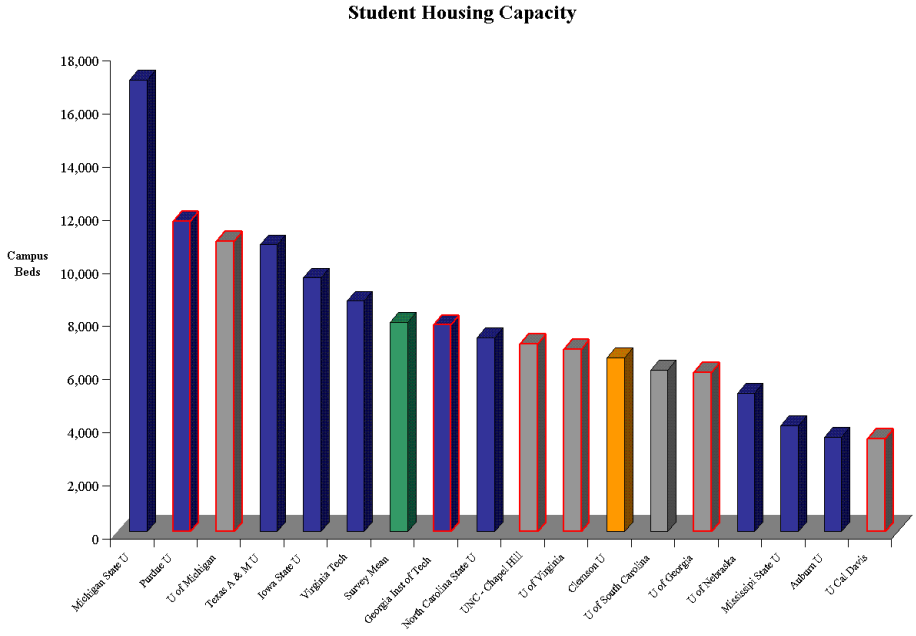
Graph 10: Non-residential GSF/Faculty



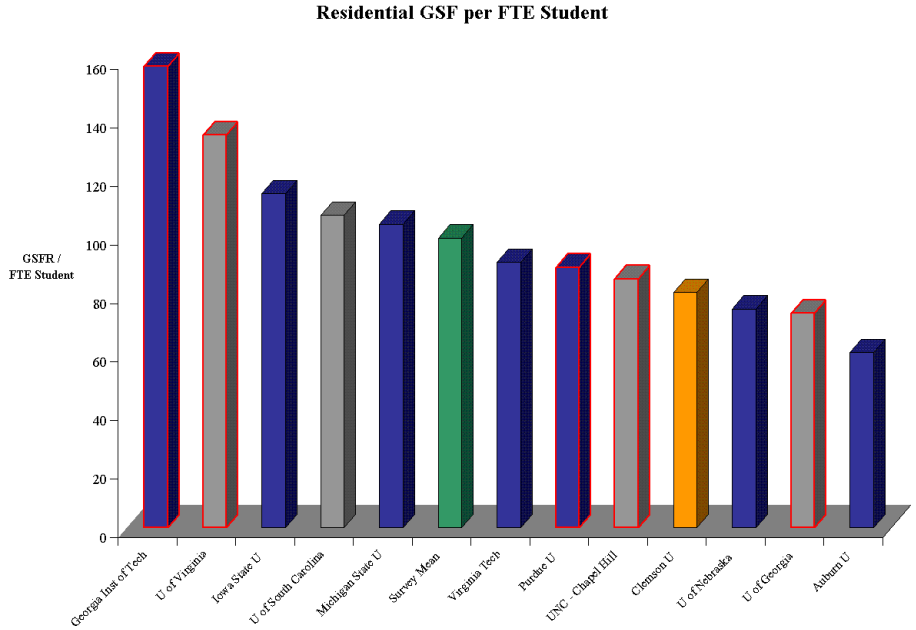
Student Housing

The need for housing on a campus is determined by program, although it is also affected by a number of other institutional characteristics, including the availability of appropriate housing off campus, commuter versus residential campus, strength of the Greek system, and the quality of existing on-campus housing. These factors must be considered in interpreting peer comparisons. Clemson provides 6,540 beds which is fairly close to the survey mean of 7,900 beds. There are 80 GSF of residential space per student at Clemson, which is close to the mean of 95 GSF. The amount of space per bed at Clemson is low, and 96 GSF less than the mean of 291 GSF.

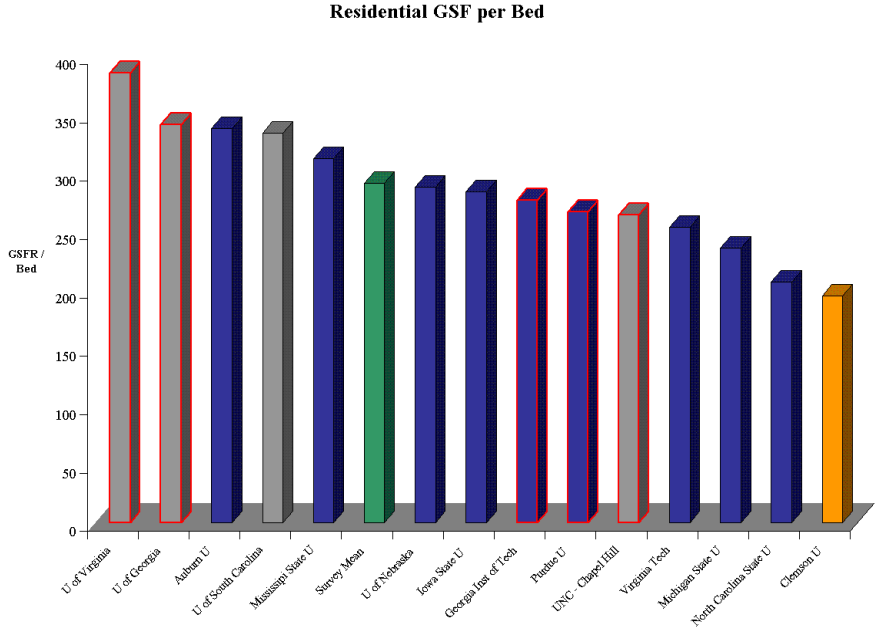
Graph 11: Student Housing Capacity



Graph 12: Residential GSF/Student

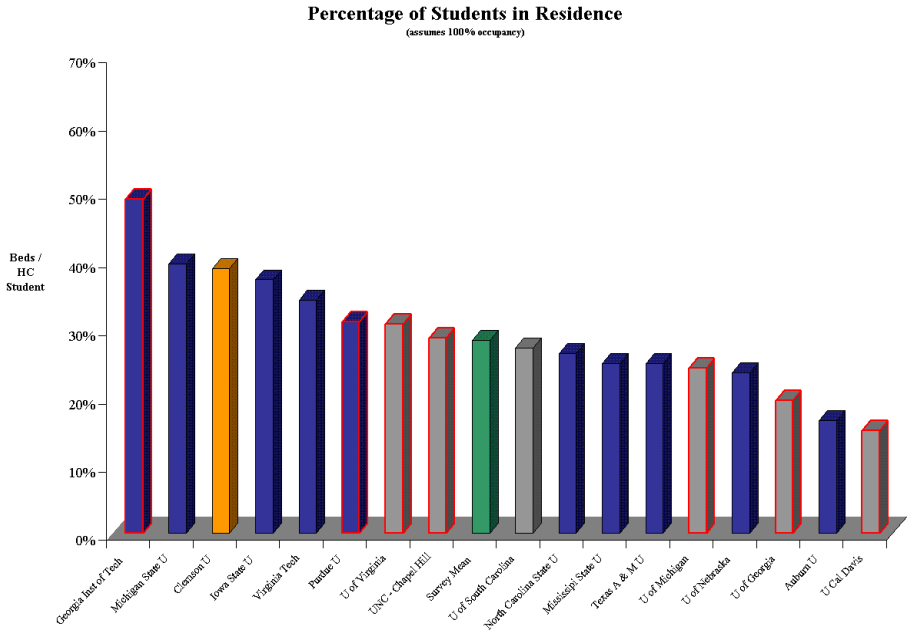


Graph 13: Residential GSF/Bed

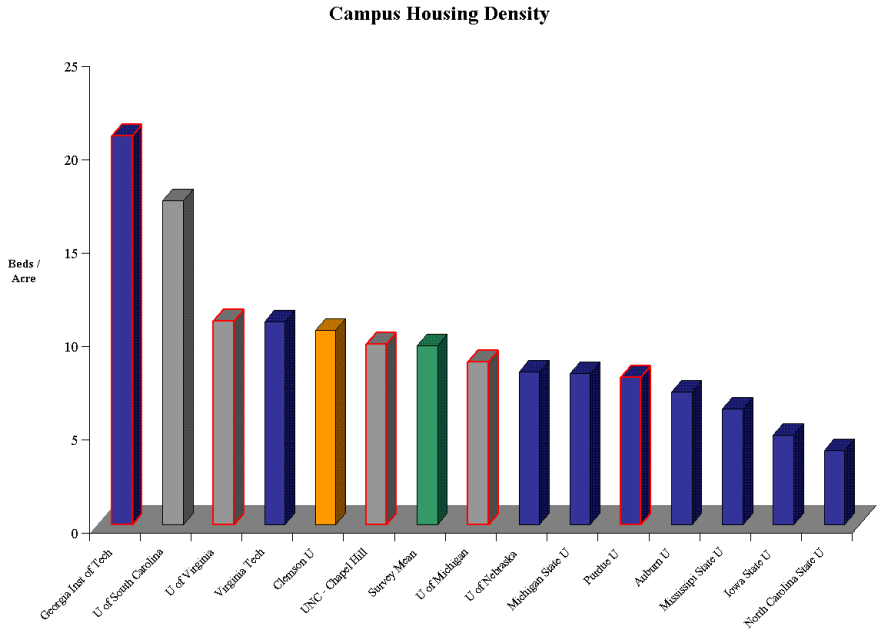


Clemson has a higher percentage of its students living on campus than the average of its peers. Approximately 40 percent of Clemson students live on campus. This is considerably higher than the mean of 28 percent. So although more students than average live on campus, the amount of space per student is low. The density or beds per acres, is shown on Graph 15. There is a wide range of from 4 to 21 beds aper acre. The mean is 10 and Clemson is slightly over.

Graph 14: Percentage of Students in Residence



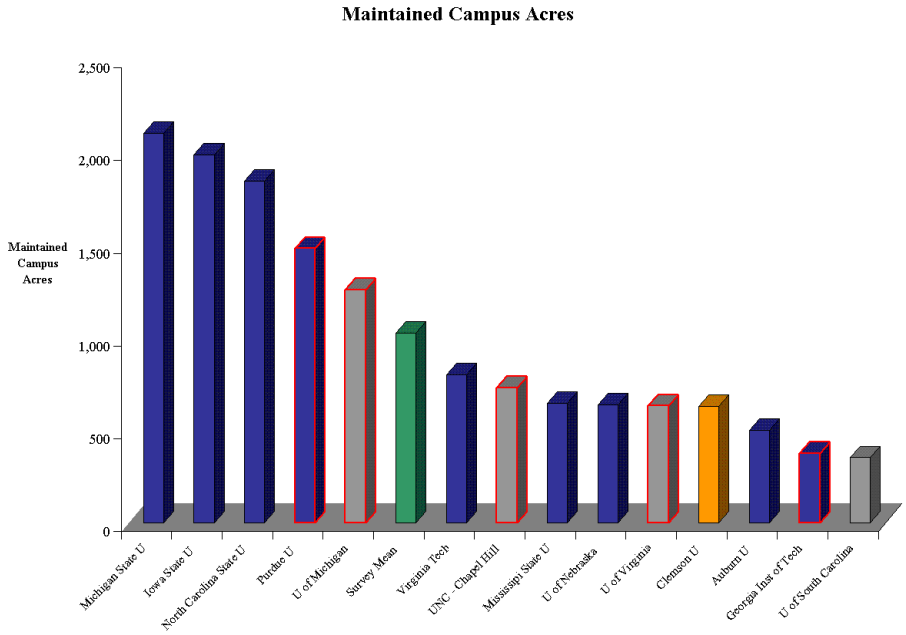
Graph 15: Campus Housing Density



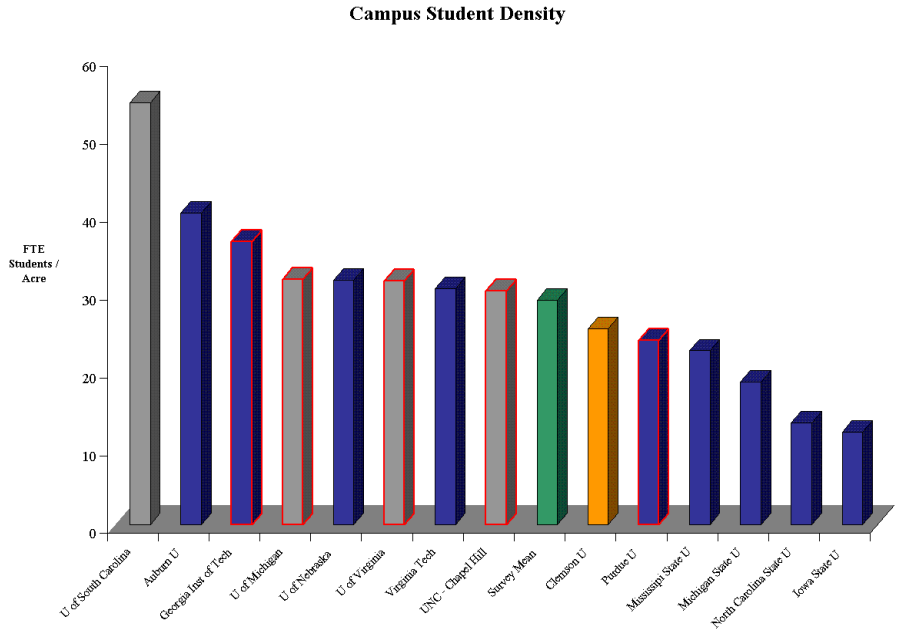
Maintained Acres

The maintained 628 acres at Clemson is on the low end of the comparison. See Graph 16. The lowest is 350 acres, the highest is 2,100, and the mean is 1,000. More important, however, is the Number of students per acre. Here Clemson is at 25 acres and the mean is 29 FTE students per acre.

Graph 16: Maintained Acres

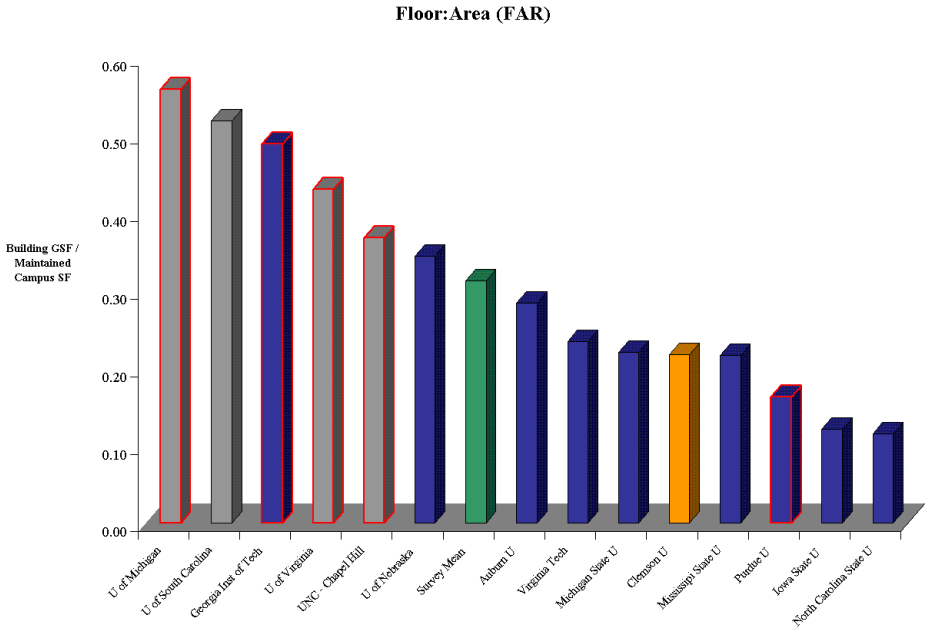


Graph 17: FTE Students Per Acre



The floor area ratio (FAR), or GSF per maintained campus square foot, is another indicator of the density of a campus. Clemson is .22 GSF per maintained square foot, which is between the low end at .12 and the mean at .31.

Graph 18: FAR



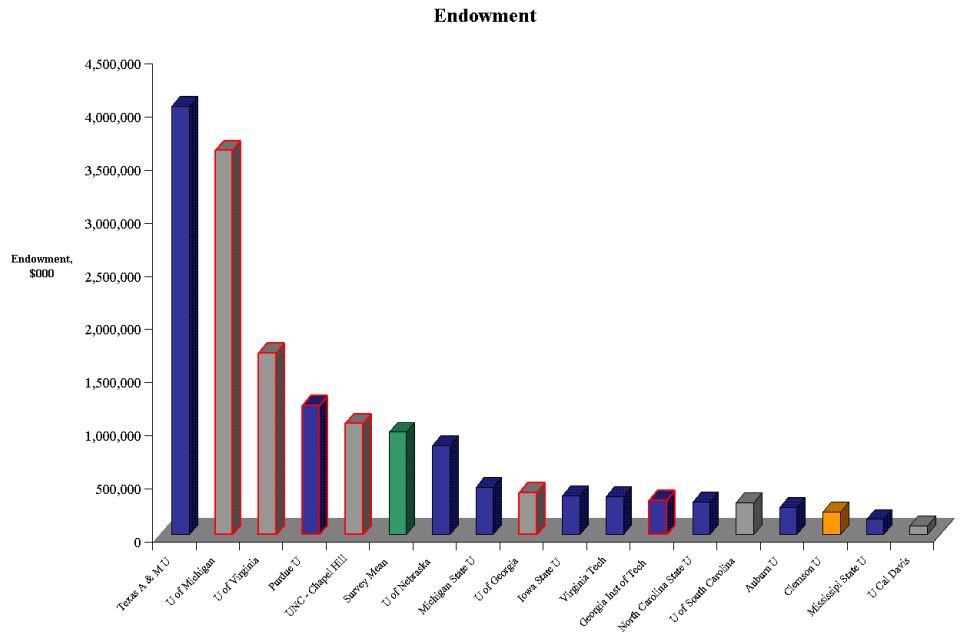
Endowment

A healthy endowment allows a public university latitudes not possible when funds are limited to those allocated by the state. Endowment income can fund special programs that enhance the university's stature and it can supplement faculty salaries and tuition, thereby attracting and retaining the best faculty and students. For such reasons as these, endowment is essential to the operation of a top-ranking university.

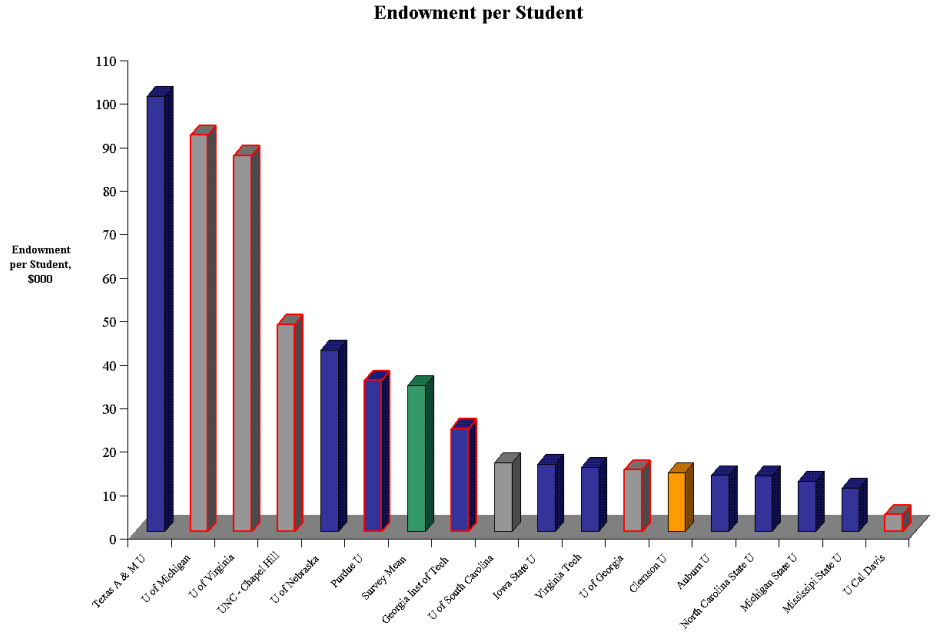
Clemson's endowment is at the low end of the peer survey, shown on Graph 19. It is, at $214 million, less than a quarter of the survey mean. Although Texas A & M and the University of Michigan are considerably higher than the others, which skews the mean, Clemson is still very low in the comparison.. Graph 20 shows the endowment per student. In this case Clemson's endowment is, at $13,500 per student, about forty percent of the mean.

Graph 21 compares endowment per faculty. At about $223,000 per faculty, Clemson's endowment is about a third of the mean. In this comparison, Texas A & M is well above the others, raising the mean.

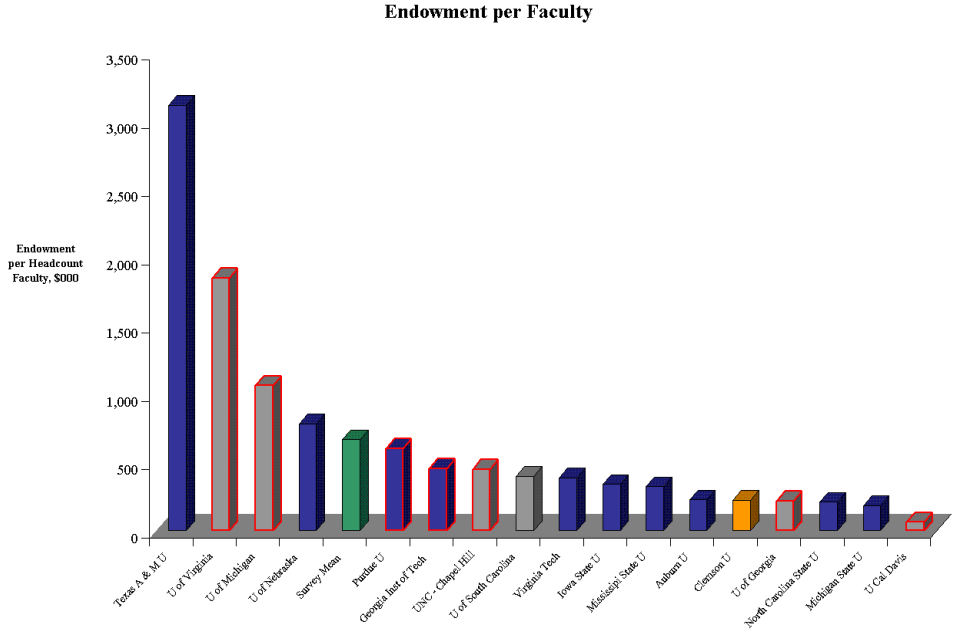
Graph 19: Endowment



Graph 20: Endowment/Student



Graph 21: Endowment/Faculty



MODEL

As part of the space utilization study, department specific-space allocation models using a set of square foot multipliers appropriate to the space use were created. The models provide a set of baselines for space allocation tailored to each department. An important reason to create these models is to provide guidelines for deciding the amount of space departments might require, based on a consistent set of acceptable assumptions. A set of standardized square-foot multipliers, appropriate to the space type, is used to determine how much space should be provided for the number of people or activity that will be accommodated in the space(s).

The model highlights policy assumptions that have spatial implications and allows the Dean, Chair, or Facilities Planning Office to modify those assumptions to test *what-if* scenarios. The model is an Excel file for simplicity of use.

The Model is organized by college and by department. For each department, there is a section on the number of faculty, staff, students, and administrators. Another section summarizes the number of weekly student contact hours in laboratory or studio courses. From this data, projections are developed for the amount of space required for offices, workrooms, file storage, office storage, conference rooms, department offices, GRA and GTA work areas, teaching laboratory and studio space and support, and research space.

In addition, specialized, department specific spaces are defined. For example, performing arts require performance space, green room, dressing rooms, shops, scene storage, costume storage, etc.

To simplify use, user input, or variables, can be inserted in the spreadsheet in areas that are colored green.

In general, the model uses the following assumptions:

- An office is provided to all FTE faculty
- GTAs and GRAs will share space.
- Managerial professionals will have individual offices.
- Clerical staff will share offices.
- Each department will have a department or unit office.
- In addition, each department will have workroom, storage, copier, and file room space.
- Each department will have a conference room
- A typical lower division laboratory will be scheduled for 20 hours per week
- Similarly, a typical upper division laboratory will be scheduled for 12 hours per week.
- Unscheduled labs or “open labs” will be available for 50 hours per week.
- The amount of space per researcher will be dependent upon the type of work and will therefore be department or discipline-specific.
- Research space will be provided to all faculty, research based non-faculty, funded masters and Ph.D. students — GRAs, GTAs and undergraduate researchers.

Table 1: Summary Program for the Master Plan

CLEMSON UNIVERSITY TOTAL NASF - EXISTING AND PROJECTED ©

BUDGET CENTER	EXISTING NASF Minus Dept. Clrms	MODEL OF EXISTING NASF	DIFFERENCE EXISTING AND MODEL NASF	FUTURE MODEL NASF	DIFFERENCE EXISTING AND MODEL NASF
COLLEGE OF ARCHITECTURE, ARTS, AND HUMANITIES	137,926	166,285	28,359	187,750	49,824
COLLEGE OF BUSINESS AND BEHAVIORAL SCIENCES	108,886	111,693	2,807	119,228	10,342
COLLEGE OF AGRICULTURE, FORESTRY, AND LIFE SCIENCES	328,916	395,190	66,274	478,591	149,675
COLLEGE OF ENGINEERING AND SCIENCE	477,434	580,945	103,511	670,455	193,021
COLLEGE OF HEALTH, EDUCATION, AND HUMAN DEVELOPMENT	106,815	127,295	20,480	130,885	24,070
RESEARCH	34,682	37,455	2,773	43,220	8,538
Sub Total College Space	**1,194,659**	**1,418,863**	224,204	**1,630,129**	435,470
	EXISTING NASF				
UNIVERSITY CLASSROOMS	158,500	192,812	34,312	192,812	34,312
Total Academic Space	**1,353,159**	**1,611,675**	**258,516**	**1,822,941**	**467,232**

CLASSROOM, LABORATORY, AND STUDIO ANALYSIS

Teaching space is a vital resource at any university. At Clemson, classrooms, labs, and studios account for 21 percent of the assignable space. There are several ways to assess the adequacy of teaching space. Measures include how intensely these spaces are being used, if they are the appropriate size for the scheduled classes, and if the size is adequate for the number of students given the desired seating style.

Classroom Utilization

Generally the target utilization for classrooms is between 60 and 75 percent, or 25 to 30 hours per week assuming a 40- to 50-hour week. If the hours of use fall between those numbers, the implication is that the number of classrooms is adequate. The average usage at Clemson for fall 2000 was 28.4 hours per week. This is within the range but on the high side.

Table 2 shows the number of registrar-scheduled classrooms and the classroom usage by building. Although the average usage is 28.4 hours per week, in nine of the twenty-five entries it is above 30.

Table 2: Classrooms by Building

Building	Number of Spaces	Mean Usage Hours/Week
Academic Learning Center (Vickery)	1	15.0
Brackett Hall	16	30.6
Chemistry Auditorium (Hunter)	1	34.0
Cook Lab	1	18.0
Daniel Hall	41	32.3
Earle Hall	5	23.3
Freeman Hall	2	33.8
Godfrey Hall	2	21.5
Hunter Hall	2	22.5
Jordan Hall	2	31.0
Kinard Lab	6	22.3
Lee Hall	3	32.5
Lehotsky Hall	7	30.1
Long Hall	4	19.9
Lowrey Hall	9	25.6
Martin Hall	15	29.3
McAdams Hall	4	21.6
Newman Hall	1	32.0
Nursing (Edwards Hall)	8	28.1
Performing Arts	1	25.5
Poole Agricultural Center	9	27.9
Rhodes Engineering Research Center	1	27.0
Riggs Hall	7	32.8
Sirrine Hall	21	29.6
Tillman Hall	13	20.9
Totals	**182**	**28.4**

One reason a lower rate of use is desirable on some campuses is so that students can be involved in outside activities such as athletics or student activities for part of the day, the late afternoon perhaps. A lower rate will also provide time for classrooms to be used for scheduled and unscheduled

meetings, student study, and for small group interaction. Another reason is to allow time between classes for faculty and student dialogues, begun in the class period, to continue; or for informal group interaction. If there is enough time, faculty can arrange the seating to fit a preferred style of teaching — the seminar format, seating in a circle, or seating arranged for small-group discussion. There also has to be enough time to clean and maintain these rooms as they are constantly in use.

The percentage of classroom usage is shown graphically on Diagram 1. The total usage is divided into increments of 14 percent except for the highest grouping, which is 25 percent. Each percentage of utilization is a section of the pie chart. The target usage of 60 to 74 percent, colored light orange, is noted. This category is 47 percent. The next largest grouping in 45 to 59 percent, accounting for 27 percent of classrooms. This shows that, in general, classroom utilization is reasonable.

Classroom Occupancy

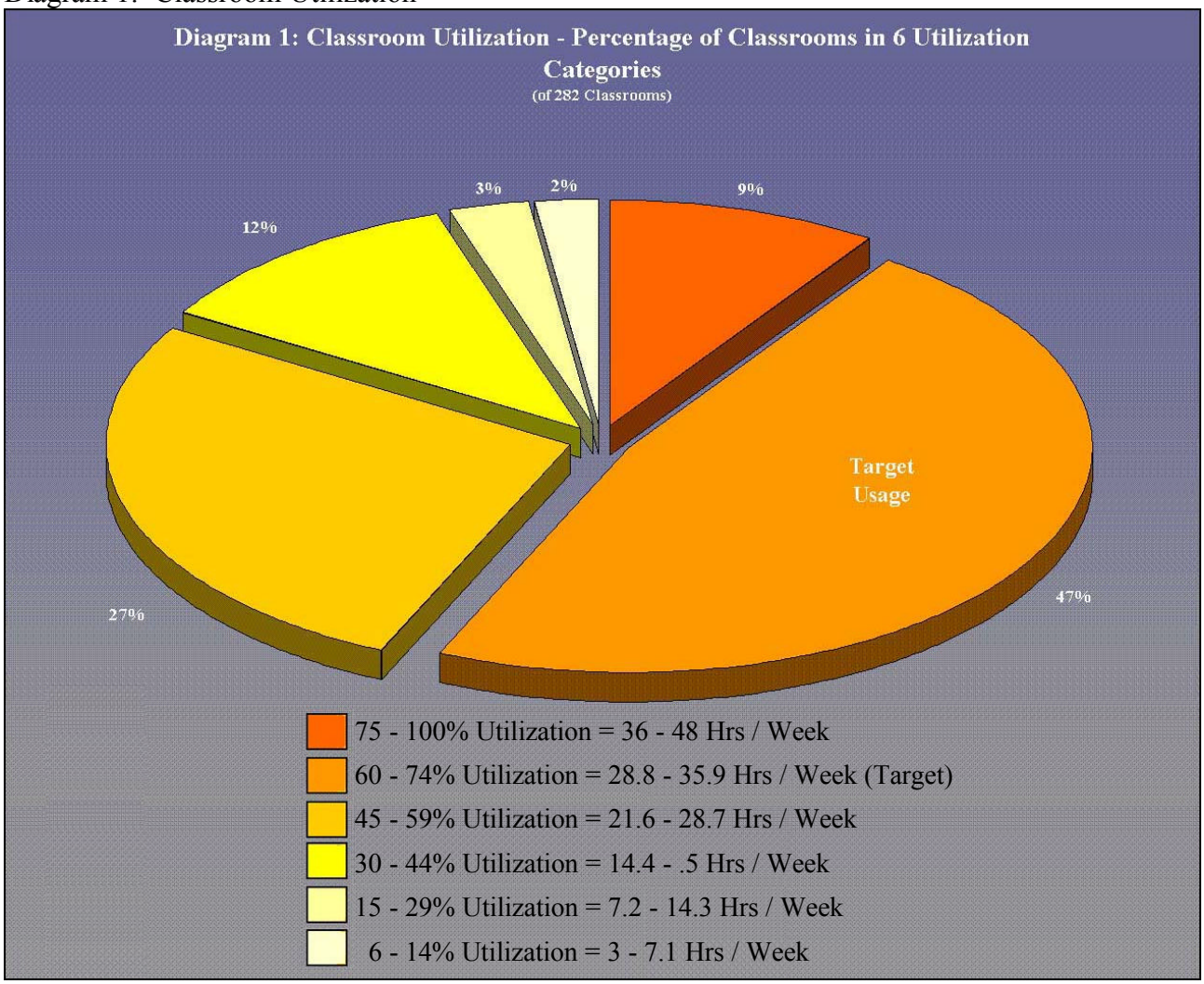
Another indication of the use of classrooms is the occupancy. The target occupancy rate is 60 percent. Table 3 shows the nine classroom size ranges on campus with the corresponding number of spaces and net assignable square feet (NASF) per station. The next two columns show the NASF per station for two types of seating — tablet-arm chairs and tables and chairs — based on normative standards. The last two columns are the mean section size and mean occupancy.

There are only three categories, which provide seating for 60 to 199, that are within the target. The two categories, seating 10 to 19 and 40 to 49, are up to 75 and 76 percent. These high occupancy rates mean the spaces are too small for the section sizes.

Table 3: Classroom Occupancy

Seating Capacity	No. of Spaces	Mean Capacity	Total Stations	NASF/ Station	DLCA NASF/Station Tablet Arm	DLCA NASF/Station Table/ Chairs	Mean Section	Mean Occupancy
B (10-19)	4	16	63	25.2	22	30	12	75%
C (20-29)	27	26	698	20.1	20	30	17	66%
D (30-39)	58	35	2,035	18.8	18	25	24	68%
E (40-49)	50	44	2,199	18.5	16	22	33	76%
F (50-59)	8	51	408	20.0	16	22	34	66%
G (60-99)	20	71	1,412	14.1	15	22	43	60%
H (100-149)	7	129	902	11.4	14	20	70	54%
I (150-299)	6	207	1,239	10.6	14	20	101	49%
J (300+)	2	345	689	11.0	12	18	246	71%
Totals	**182**	**53**	**9,645**	**15.9**			**35**	**66%**

Diagram 1: Classroom Utilization



Teaching Laboratory and Studio Utilization

Teaching laboratories and studios are analyzed in the same way as classrooms, by intensity of use and adequacy of size. The target utilization for laboratories, however, is between 12 and 20 hours per week assuming a 40 to 50-hour week. This lower rate is due to the fact that labs are used for nonscheduled work in addition to scheduled classes, and require time for set-up and clean-up.

The distribution of teaching labs and studios by building and the mean hours of usage per week are shown on Table 4. The mean usage is 15.3 hours, which is in the middle of the target range. Labs in Hunter and Martin are used over 28 hours per week and those in Godfrey and Long are used about 21 hours per week.

Table 4: Laboratories and Studios by Building

Building	Number of Spaces	Mean Usage Hours/Week
Brackett Hall	9	11.6
Cook Lab	2	13.5
Cooper Library	1	18.0
Daniel Hall	7	13.1
Earle Hall	1	12.0
Freeman Hall	7	10.5
Godfrey Hall	7	21.0
Hunter Hall	10	28.5
Jordan Hall	14	15.2
Kinard Lab	6	12.8
Lee Hall	25	14.3
Lehotsky Hall	3	13.0
Linvil Rich Environmental Research Lab	2	14.0
Long Hall	9	21.2
Lowrey Hall	6	18.5
Martin Hall	3	28.7
McAdams Hall	2	9.5
Newman Hall	2	6.6
Nursing (Edwards Hall)	2	6.0
Olin Hall	1	12.0
Performing Arts	8	10.9
Poole Agricultural Center	8	11.9
Riggs Hall	8	16.1
Sirrine Hall	4	5.8
Totals	**147**	**15.3**

Teaching Laboratory and Studio Occupancy

The target occupancy rate for teaching labs is 80 percent. Table 5 shows that the usage ranges from 54 percent to 180 percent. The high, 180% utilization indicates extreme overcrowding but could mean the number of stations was under counted. The amounts of space per station for labs above the 10 to 19-station capacity are low, depending on the subject being taught and the degree to which support space is included.

Table 5: Laboratory and Studio Occupancy

Seating Capacity	No. of Spaces	Mean Capacity	Total Stations	NASF/ Station	Mean Section	Mean Occupancy
A (1-9)	10	6	64	105.6	12	180%
B (10-19)	39	15	577	75.2	14	97%
C (20-29)	66	23	1,537	39.5	19	81%
D (30-39)	18	31	554	33.8	19	63%
E (40-49)	6	41	248	36.4	24	59%
F (50-59)	3	54	161	27.1	29	54%
G (60-99)	5	69	346	36.5	41	59%
Totals	**147**	**24**	**3,487**	**44.6**	**19**	**78%**

Tables A and B in the Appendix show time utilization for classrooms and teaching labs. All such spaces are included whether classes were in session or not. The tables are in two columns showing percent of rooms, to the left, and seats, to the right, in use by day and hour.

The heaviest scheduled time for classrooms is Monday through Friday morning, and Monday through Thursday afternoon until 3:15 PM. The percent of spaces and stations utilized essentially follows the same pattern, except the class size drops off on Friday afternoon. The heaviest scheduled time for laboratories and studios is Monday through Thursday afternoon.

FACULTY OFFICE ANALYSIS

Data used for this analysis was developed during the Existing Facilities Study. Space for about half of the faculty is included in this sampling. The University has other office data, but faculty and staff offices are not distinguished.

Faculty offices in this sample vary in size from 53 net assignable square feet (NASF) to 539 NASF. The mean size is 146 NASF, which is within the 140 to 160 NASF suggested by normative standards.[3] Table 6 summarizes the analysis of faculty offices by building, showing the number of offices in each building, the total amount of NASF, the largest and smallest office sizes, the number of stations, and the mean size.

When offices are shared, the number of stations is more than the number of offices, and consequently knowing the amount of space per person is useful. The last three columns in the table show this information; with the mean, the most and the least amount of space per faculty member.

Seventy-six of the 488 offices are less than 100 NASF, and therefore, should be considered substandard. Most of them are in Tillman (30), Sirrine (19), and Barre (18). Most of the offices over 180 NASF are in Sirrine (30), Riggs (15), and Earle (12).

[3] There are 34 states that have space allocation guidelines for faculty offices. These guidelines range from 100 NASF to 180 NASF. Usually, the larger allocation includes a prorated amount for conference or clerical offices as well. SUNY suggests 120 NASF. Cornell's guidelines call for 160 NASF. The University of California uses 140 NASF. MIT's guidelines call for 150 NASF. The University of Illinois uses 140 NASF, while the University of Minnesota uses 130 NASF.

Table 6: Faculty Offices by Building

		NASF/ Space					NASF/ Station		
Building	**No. of Offices**	**Sum**	**Largest**	**Smallest**	**Mean NASF/ Office**	**No. of Stations**	**Mean**	**Most**	**Least**
Barre	34	4,012	264	86	118	35	115	264	44
Cooper	8	1,393	325	57	174	8	174	325	57
Earle	12	2,315	279	181	193	12	193	279	181
Freeman	10	1,541	201	123	154	10	154	201	123
Godfrey	3	481	284	97	160	3	160	284	97
Holtzendorf	34	5,356	396	99	158	35	153	367	99
Lee	35	5,880	508	98	168	43	137	300	78
Newman	3	297	115	67	99	3	99	115	67
Olin	11	1,576	340	92	143	15	105	147	64
Poole	96	13,285	338	89	138	101	132	338	62
Rhodes	10	1,885	539	108	189	12	157	180	108
Riggs	29	5,326	368	89	184	29	184	368	89
Sikes	1	269	269	269	269	1	269	269	269
Sirrine	121	17,818	405	76	147	124	144	405	38
Tillman	81	9,707	499	53	120	84	116	499	26
Totals	**488**	**71,141**	**539**	**53**	**146**	**515**	**138**	**499**	**26**

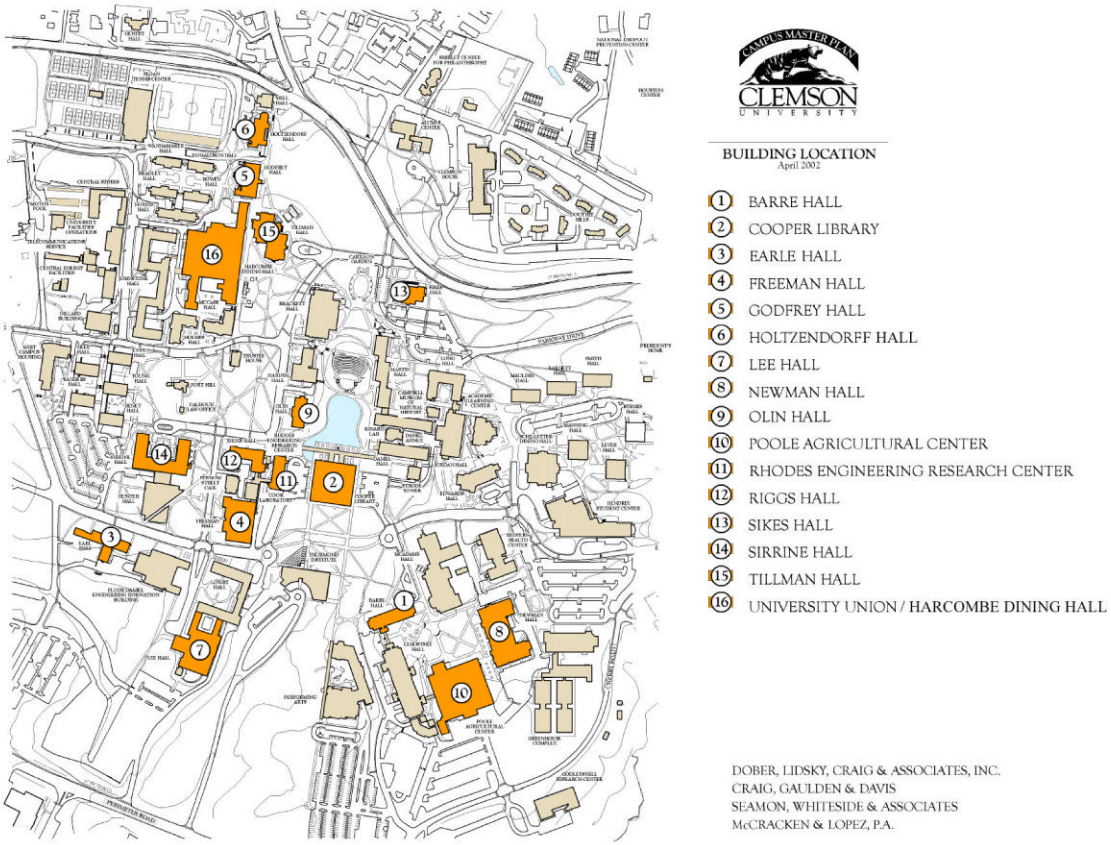
EXISTING FACILITIES SURVEY

A study of key Clemson buildings was conducted as part of the overall campus planning initiative. Sixteen primary buildings on campus, totaling nearly two million square feet of space, were analyzed in this Existing Facilities Survey. See Diagram 2 for building locations.

The Campus Plan addresses broad campus and environs issues within the framework of Clemson's mission and academic plan, and identifies specific facility improvements necessary to support existing and future programs. The Existing Facilities Survey assesses specific Clemson buildings in terms of condition and use, and provides the data necessary to evaluate changes in allocation and configuration.

The Existing Facilities Survey can be used as a management tool. As the Campus Plan is implemented, it will continue to provide use, condition, and budgeting documentation essential in confirming that those assigned to the buildings are allocated the appropriate amount of and type of space. The condition analysis will be used for capital planning, facility planning, and for addressing deferred maintenance. Highlights from the analysis of the sixteen buildings are included here. For detailed information, see the Existing Facilities Survey for each of the buildings.

Diagram 2: Survey Building Locations



EXISTING FACILITIES SURVEY

There are five building assessment categories: space utilization and program; architectural and structural; plumbing, mechanical, and fire protection systems; electrical systems; and landscape. Issues relating to building performance in these areas are highlighted below.

BARRE HALL

26,010 NASF
46,077 GSF

Barre is predominantly an office facility for both faculty and staff. The College of Agriculture, Forestry, and Life Sciences occupies 57 percent of the space and Public Service and Agriculture 30 percent. Barre is appropriate for offices, and could be reconfigured to include some classroom or seminar space. The building is in need of renovation, which could be done in phases.

Building Performance

- The building is less "efficient" than average in that the ratio of net to gross square feet is 56 percent. The target for this building type is 65 percent.
- The current office use works well as the building footprint is narrow. A high proportion of administrative (33 percent) and faculty (53 percent) offices are substandard in size, however.
- Architecturally and structurally the building is in good condition.
- The number of restrooms is marginal, and they do not meet ADA codes.
- The HVAC system is well suited for current use.
- Sprinklers are limited to basement storage areas with none in mechanical and electrical rooms, and no tamper switches were found on the sprinkler riser.
- A new fire alarm system is needed along with expansion of the smoke detector system and audiovisual appliances that meet ADA codes.
- There is a generator to provide emergency power for egress and exit lighting in corridors.
- There are no significant landscape problems associated with Barre.

COOPER LIBRARY

143,118 NASF
185,627 GSF

Cooper is the main Clemson library facility. University Libraries occupies 87 percent of the space and the remaining 13 percent is occupied by Computing and Information and Technology's Computer Center. Cooper is appropriate for its use, although the collection is comparatively small for a research university. Any renovation that may be required could be done in phases.

Building Performance

- The building is more "efficient" than average in that the ratio of net to gross square feet is 78 percent. The target for this building type is 70 to 75 percent.

- The configuration of the building is ideally suited for its present use as a library. Cooper Library would be graded as a "C" in the Association of College Research Libraries (ACRL) guidelines, which ranks libraries from "A", excellent to "D", poor.
- The waffle slab construction does not lend itself to penetrations for additional technology.
- Structurally the building is in good condition. The interior is also in good condition except for the restrooms, which are in fair condition.
- The restrooms do not meet ADA codes.
- The HVAC system plenum return has high pressure losses that cause excessive noise through openings in the mechanical room doors. Humidification is limited and, in some areas, there is insufficient cooling.
- Telecommunications equipment is located in electrical and mechanical rooms, not in dedicated, conditioned spaces.
- The fire alarm system does not meet current codes, there is incomplete coverage of smoke detectors, and the number of audiovisual appliances is not sufficient to provide the coverage required by ADA codes.
- The building's raised entry should be addressed as the campus-green concept is further developed.

EARLE HALL

32,436 NASF
50,168 GSF

Earle is predominantly a laboratory facility. Chemical Engineering occupies 86 percent of the space, and the Center for Advanced Engineering Fibers and Films occupies 14 percent. Earle is appropriate for offices, research or small teaching labs, and small classrooms. The building is not in need of renovation at this time.

Building Performance

- The building is somewhat less "efficient" than average in that the ratio of net to gross square feet is 56 percent. The target for laboratory buildings is 60 percent and for office buildings is 65 percent.
- Laboratory and laboratory-related space accounts for 54 percent of the space, 29 percent is assigned to research, 25 percent to teaching and open labs, 17 percent to offices, 12 percent to classrooms, and 7 percent to shop space.
- The five classrooms are scheduled slightly below the target range of 25 to 30 hours per week.
- Faculty offices are larger than average, determined by a bay size of 19'-6". This dimension limits the sizes of large spaces such as those required for teaching labs or classrooms. Currently classrooms are somewhat undersized for the scheduled class sections.
- The space works well for research labs now, but relatively low floor-to-floor heights could limit horizontal ductwork that might be required in the future.
- Architecturally and structurally the building is in good to fair condition with the exception some roof areas, which are in poor condition.
- The restrooms do not meet ADA codes.
- Ventilation is substandard for existing uses. Modifications to the current ventilation air distribution system are required to meet current codes.

- Sprinklers are limited to one office area.
- Telecommunications equipment is located in electrical and mechanical rooms, not in dedicated, conditioned spaces.
- The fire alarm system does not meet current codes, there is incomplete coverage of smoke detectors, and the number of audiovisual appliances is not sufficient to provide the coverage required by ADA codes.
- There is no emergency generator, so emergency egress lighting is supplied by battery packs, most of which do not work.
- High voltage transformer and service equipment are not properly labeled, and there is no surge protection at the main service switchboard or ground fault protection of the main circuit breaker.
- There are some paving failures in the adjacent plaza area, which require minimal work.

FREEMAN HALL

41,745 NASF
55,552 GSF

Freeman is predominantly a laboratory facility. Office and shop uses are major secondary types of allocation. The College of Engineering and Science occupies 75 percent of the space, the Art Department 11 percent, Graphic Communications over 4 percent, Technology and Human Resource Development over 6 percent, and Facilities 3 percent. Freeman is in need of renovation, which could be done in phases.

Building Performance

- The building is far more "efficient" than average in that the ratio of net to gross square feet is 75 percent. The target for laboratory buildings is 60 percent and for office buildings is 65 percent. The high ratio means the building is less flexible. For example, assigned space also serves as corridor space in some cases, which makes navigation difficult and limits usage. The NASF would be decreased in any major renovation.
- Laboratories account for 40 percent of the space; 26 percent is allocated to office and office-related space; 27 percent to campus support shops, two-thirds of which is assigned to the Materials Processing Group (College of Engineering and Sciences);
  6 percent to classrooms; and 1 percent to general use.
- The two classrooms are scheduled slightly above the target range; the seven teaching labs are scheduled within the target range for upper division courses, but less than the target for lower division courses.
- Although not ideal for offices and classrooms, due mainly to lack of windows and access and egress problems, these uses are best for this building as there is little likelihood it could be adapted for any other usage.
- Architecturally and structurally the building is in good condition, with the exception of the lower roof area, which is in poor condition; also in poor condition is an area of the first floor slab where reinforcing is exposed.
- The restrooms do not meet ADA codes.
- A partial sprinkler system exists serving one-third of the building.
- Many different air-handling units serve the facility; the rooftop systems are in fair to good condition. Airflow to many areas is poor providing insufficient cooling. A serious condition

exists in the welding shop where there is no venting to the outside. In addition, there are no temperature or humidity controls for any of the shops.
- Telecommunications equipment is located in electrical and mechanical rooms, not in dedicated, conditioned spaces.
- The fire alarm system does not meet current codes, there is incomplete coverage of smoke detectors, and the number of audiovisual appliances is not sufficient to provide the coverage required by ADA codes.
- There are two emergency generators that provide emergency egress and exit lighting in corridors.
- Some panelboards do not have required code clearance, and there is no surge protection at the main service switchboard.
- The landscape to the west side of the building, along Fernow Street, and to the south side needs to be redesigned and enhanced. Landscape elements would include sidewalks, sitting areas, bike racks, and ramps.

GODFREY HALL

29,484 NASF
47,900 GSF

Godfrey is predominantly a laboratory facility. Aerospace Studies and Graphic Communications, departments of the College of Business and Public Affairs, occupy 74 percent of the space, and Technology and Human Resource Development occupies 26 percent. Godfrey is appropriate for its current use, although there are many building constraints that limit flexibility and reassignment. The building is in need of renovation, which could be done in phases.

Building Performance

- The building is slightly more "efficient" than average in that the ratio of net to gross square feet is 62 percent. The target for laboratory buildings is 60 percent.
- Laboratories account for 77 percent of the space, 11 percent is allocated to classroom and classroom-related space, 7 percent to office and office-related space, 2 percent to general use, and 1 percent to unassigned or unclassified use.
- One of the two classrooms is scheduled above the target range and the other is scheduled below; the seven teaching labs are scheduled well above the target range.
- The current building use is appropriate as it provides space for labs with large pieces of equipment and where sight lines are not an issue, but it is not ideal for small offices and small teaching spaces, especially as the proportion of space with windows is limited. The connection between first and grounds floors is almost nonexistent, which limits allocation flexibility.
- Architecturally and structurally the building is in good condition, with the exception of some timber rafters that are twisted and the roof that is in poor condition. The interior wall finishes and doors are in excellent condition.
- Windows are single pane with no solar coatings.
- Water service to the building enters in unheated space, which should be heated to prevent possible freezing.
- The restrooms do not meet ADA codes.

- The air-handling units are not installed properly, creating excessive vibrations and noise. The ventilation and exhaust systems in the printing and graphic arts shops are inadequate causing fumes that spread to other areas. Thermal zoning and controls are poor creating a wide range of temperatures throughout the building, and the cooling system is not adequate as it is augmented with small, self-contained units.
- The building has a wet pipe sprinkler system; there are no fire hose cabinets.
- Telecommunications equipment is located in dedicated but not conditioned spaces.
- The fire alarm system does not meet current codes, there is incomplete coverage of smoke detectors, and the number of audiovisual appliances is not sufficient to provide the coverage required by ADA codes.
- There is no emergency generator, so emergency egress lighting is supplied by battery packs, most of which do not work.
- There is no surge protection at the main service switchboard.
- Its prominent location on campus; historical appearance; and rich, textured facade make Godfrey an important building in terms of campus image. The west side, a service area, should be redesigned to provide a more attractive entrance to the Fraternity Quad area.

HOLTZENDORFF HALL

28,264 NASF
47,399 GSF

Holtzendorff, formerly the YMCA, is predominantly an office facility for faculty and staff. The General Engineering Department of the College of Engineering and Science occupies 39 percent of the space, the History and Philosophy and Religion departments 32 percent, Student Affairs 27 percent, Aerospace Studies 2 percent, and the University Facilities Landscape Services Department less than 1 percent. Holtzendorff is appropriate for its current use, although only 73 percent of the offices have windows. The building is in need of renovation, which could be done in phases, probably one wing at a time.

Building Performance

- The building is less “efficient” than average in that the ratio of net to gross square feet is 60 percent. The target for office and academic buildings is 65 percent.
- Office and office-related space accounts for 42 percent of the space, 21 percent is allocated to laboratories, 21 percent to general use, 6 percent to classrooms, and 10 percent is unassigned or unclassified.
- There are many floor levels that create accessibility problems. The basement or former pool level needs extensive renovation and study if it is to be used for anything other than storage, and the sub-basement is totally disconnected and only suitable for storage.
- Architecturally and structurally the building is in good condition. There are many exceptions, all in the poor category, that include the roof, soffits and eaves, the cornice, some rafters that are damaged and ceiling joists that are twisted, and the rear exterior stairs that are rusted. The interior is in fair to poor condition.
- The restrooms do not meet ADA codes, and need mechanical exhaust.
- Window sash and glazing allow excessive air infiltration.

- The building has a wet pipe sprinkler system, except in the loggia where there is a dry pipe system, with no tamper switches.
- Telecommunications equipment is located in the electrical and mechanical rooms, not dedicated, conditioned spaces.
- The fire alarm system does not meet current codes, there is incomplete coverage of smoke detectors, and the number of audiovisual appliances is not sufficient to provide the coverage required by ADA codes.
- An emergency generator provides emergency power for egress and exit lighting in corridors.
- The electrical system is at capacity and there is no surge protection at the main service switchboard.
- Some panelboards do not have required code clearance, and there is no surge protection at the main service switchboard.
- Its prominent location on campus and historical appearance make Holtzendorff an important building in terms of campus texture. The parking and service area to the west should be redesigned, incorporating an architecturally attractive arch on that side of the building.

LEE HALL

71,571 NASF
112,100 GSF

Lee is predominantly a studio facility, although 15 percent of the space is allocated to faculty and staff offices. The College of Architecture, Arts, and Humanities occupies 91 percent of the space, and University Libraries occupies 9 percent. Lee is appropriate for its current use, although it appears crowded.

Building Performance

- The building is more "efficient" than average in that the ratio of net to gross square feet is 64 percent. The target for studio buildings is 60 percent and for general classroom and office buildings is 65 percent.
- Studios account for 58 percent of the space, 15 percent is allocated to office and office-related use, 9 percent to classrooms; 9 percent to the library; 6 percent to exhibit, 2 percent to support, and 1 percent is unassigned or unclassified.
- The three classrooms are scheduled well above the target range; the twenty-four studios are scheduled within the target range.
- Architecturally and structurally the building is in good condition. There are several exceptions: one section of roof is in poor condition and some cracks, settling, and brickwork damage are also evidence of poor condition. Windows, the exterior brick in general, and the other roof section are in fair condition. The interior is in fair to good condition, except for carpeting and studio finishes which are worn.
- Solar screens on the north side are broken.
- The restrooms meet ADA codes.
- Indoor air quality does not meet codes as no outdoor air is introduced; there is a lack of dehumidification; the fan coil units are not only in poor condition but they generate poor air flow and temperature gradients as they are trying to condition larger spaces than they were designed for; and some faculty offices do not have individual room control.

- The building has no automatic sprinkler system, but fire hose cabinets are located throughout.
- Telecommunications equipment is located in the electrical and mechanical rooms, not dedicated, conditioned spaces.
- The fire alarm system does not meet current codes, there is incomplete coverage of smoke detectors, and the number of audiovisual appliances is not sufficient to provide the coverage required by ADA codes.
- An emergency generator, although in only fair to poor condition, provides emergency power for egress and exit lighting in corridors.
- There is no surge protection at the main service switchboard, and there is no ground fault protection on the main circuit breaker.
- The fire alarm control panel is located in the main electrical room.
- The high voltage transformer contains PCB's, and the clearance is not adequate.
- The interior atrium needs to be refurbished and maintained, as do other courtyard spaces at this building except for the courtyard near the entrance to the Gallery.

NEWMAN HALL

38,357 NASF
56,736 GSF

Newman is predominantly a laboratory facility. The College of Agriculture, Forestry, and Life Sciences occupies over 78 percent of the space, the Food Services-Meal Plans Department 8 percent, the Economics Department in the College of Business and Public Affairs 7 percent. A University lecture room accounts for over 6 percent. Newman is appropriate for its current use in terms of research lab space, but is not appropriate for offices. Some of the space is intensely used, and some appears to be unusable. The building is in need of renovation, which could be done in phases.

Building Performance

- The building is substantially more "efficient" than average in that the ratio of net to gross square feet is 68 percent. The target for laboratory buildings is 60 percent.
- Laboratories account for 68 percent of the space, 13 percent is allocated to storage, 8 percent to classroom and classroom-related space, 6 percent to office and office-related space, and 5 percent to general use.
- The one classroom is scheduled above the target range; the two teaching labs are scheduled below and at the low end of the target range.
- Research is a good use as a large proportion of the space is lit from above with clerestory windows or skylights, or is windowless, which would be poor for office or teaching space. The central "locker" block is underused and the configuration for the north wing seems to limit its potential use.
- Architecturally the building is in fair condition except for the general structure and roof, which are in good condition. The small canopy over a door on the north side is in poor condition. The interior lobby and restroom finishes are in good condition.
- The restrooms do not meet ADA codes.

- Two evaporative condensers, which may not be operative, are in poor condition and the amount of outside air introduced into the HVAC system is minimal. The lecture room is served by an old AHU with steam preheat and 3-way chilled water coil, and a life expectancy that is minimal.
- Sprinklers are limited to the storage area under the lecture room.
- Telecommunications equipment is located in the electrical and mechanical rooms, not dedicated, conditioned spaces.
- The fire alarm system does not meet current codes, there is incomplete coverage of smoke detectors, and the number of audiovisual appliances is not sufficient to provide the coverage required by ADA codes.
- An emergency generator provides emergency power for egress and exit lighting in the corridors.
- There is no surge protection at the main service switchboard, service equipment is not adequately labeled, and all the electrical distribution equipment is old.
- McGinty Mall to the south will be a welcoming area once a planned renovation is implemented, although the covered walkway to Poole lacks character.
- There is extensive exterior loading and service space, some of which is unsightly, that may become unnecessary as the use of the building changes over time.

OLIN HALL

19,077 NASF
29,286 GSF

Olin is predominantly a laboratory facility, although 17 percent of the space is allocated to faculty and staff offices. All the space is occupied by the Ceramic and Materials Engineering Department of the College of Engineering and Science. Olin is appropriate for its current use, except that many offices have no windows. The building is not in need of renovation at this time, although the *ad hoc* mezzanine office suite should be removed.

Building Performance

- The building is more "efficient" than average in that the ratio of net to gross square feet is 65 percent. The target for laboratory buildings is 60 percent.
- Laboratories account for 68 percent of the space, 17 percent is allocated to office and office-related use, 8 percent to classroom and classroom-related use, 4 percent to study space, and 3 percent to general support.
- The one teaching lab is scheduled within the average range.
- Room layouts are constrained because of structural bay size and column spacing.
- Architecturally and structurally the building is in good condition with the exception of windows and exterior doors that are in fair condition, and the perimeter flat roof that is in poor condition. However, there has been some interior water damage. Some settling and spalling of the basement slab has occurred. The settlement does not appear to have impacted any adjacent structural elements.
- There are soffit cracks and a wall crack on the east side.
- The interior finishes are in good condition with the exception of the lobby that is in excellent condition, and the mezzanine over an existing lab area where there has been water damage. There is some concern as to the structural integrity of this mezzanine.
- The restrooms do not meet ADA codes.

- The condition of mechanical equipment is very good.
- Several exhaust hoods are not connected to ductwork.
- The building has no automatic sprinkler system, but there is a standpipe system and there are fire hose cabinets.
- Telecommunications equipment is located in the electrical and mechanical rooms, not dedicated, conditioned spaces.
- The fire alarm system does not meet current codes, there is incomplete coverage of smoke detectors, and the number of audiovisual appliances is not sufficient to provide the coverage required by ADA codes.
- There is no emergency generator, and no battery packs, for egress and exit lighting.
- There is a new electrical distribution system, although panels and transformers are located in labs and other public space rather than in electrical rooms. There is no surge protection at the main service switchboard.
- The east side of Olin needs some landscape attention, as this is a prominent view from the amphitheater, the Carillon Garden and the opposite side of the reflection pond.

POOLE AGRICULTURAL CENTER

134,175 NASF
200,577 GSF

Poole is predominantly a laboratory and faculty and staff office facility. The College of Agriculture, Forestry, and Life Sciences occupies 66 percent of the space. Other major tenants are the Communications and Computer centers and Public Service and Agriculture. Poole is appropriate for its current use, except that there is a high percentage of interior space and many offices as well as other types of spaces have no windows. The building is in need of renovation, although this could be done in phases.

Building Performance

- The building is more "efficient" than average in that the ratio of net to gross square feet is 67 percent. The target for laboratory buildings is 60 percent and for office buildings is 65 percent.
- Office and office-related use account for 38 percent of the space, 33 percent is allocated to laboratories. 11 percent to University support, 9 percent to special uses such as media production and animal care, 7 percent to classroom and classroom-related use, and 2 percent to study space.
- The nine classrooms are scheduled within to above the target range; the eight teaching labs are scheduled from below to above the target range.
- The building is simple to navigate, but the only elevator is a freight elevator that is not centrally located.
- Architecturally and structurally the building is in fair to good condition, with the exception of exterior sealants that are in poor condition.
- The interior finishes are in good to excellent condition although restroom finishes are in fair condition.
- The restrooms do not meet ADA codes.
- The HVAC systems are inadequate and problems exist such as use of the corridor for return air, abandoned chillers, and fan coil units in offices with no outside air.

- A wet sprinkler system is limited to the basement, although it does not include the main electrical room, and there are no tamper switches. There are five fire hose cabinets throughout the facility. A small halon system is also located in the basement.
- Telecommunications equipment is located in the electrical and mechanical rooms, not in dedicated, conditioned space.
- The fire alarm system does not meet current codes, there is incomplete coverage of smoke detectors, and the number of audiovisual appliances is not sufficient to provide the coverage required by ADA codes.
- Two emergency generators provide for egress and exit lighting in corridors.
- Electrical service is marginal, there is no surge protection at the main service switchboard, and services and service equipment are not properly labeled.
- To the east the paving is heaving and buckling due to pressure from tree roots. Either the paving should be reconfigured or the trees removed. The outdoor seating in this area should be improved and expanded.
- The south side of Poole lacks any planting and the parking lot on that side is devoid of trees. The parking lot between the greenhouses and Poole is relatively inefficient.

RHODES ENGINEERING RESEARCH CENTER

35,359 NASF
56,312 GSF

Rhodes is a College of Engineering and Science research facility. Bioengineering occupies 51 percent of the space, the Center for Advanced Engineering Fibers and Films occupies 19 percent, Ceramic and Materials engineering 15 percent, and Electrical and Computer Engineering 7 percent. The remaining 8 percent is allocated to Computer Network Services, Materials Science and Engineering, Engineering Graphics, Computer Network Services, and the Bioengineering Alliance of South Carolina. Rhodes is appropriate for labs, but not ideal for offices and classrooms due to lack of windows and wide bay size.

Building Performance

- The building is more "efficient" than average in that the ratio of net to gross square feet is 63 percent. The target for laboratory buildings is 60 percent and for office buildings is 65 percent.
- Laboratories account for 67 percent of the space, 27 percent is assigned to office and office-related use, 4 percent to classrooms and classroom-related use, and the remaining 2 percent to study and general use.
- The one classroom is scheduled within the target range, although only 29 percent of the seats are occupied on average.
- Installation of current technology is difficult within the constraints of the building, and the floor-to-floor height is adequate for current use but may not be in the future.
- Architecturally and structurally the building is in good condition with the exception of the roof, inside the screen wall, which is in excellent condition. All roof drains should have trash guards and there should be emergency overflow drains as well.
- Moderate to severe deflection has occurred at both end spandrel beams on the top two floors, causing cracks in the floor surfaces, which have fallen as much as an inch.

- The interior finishes are in good condition, but 75 percent of the flooring is vinyl asbestos tile that should be removed or encapsulated.
- Indoor air quality does not meet current codes, particularly for classroom and office use. Fire dampers are not installed in the ducts that penetrate corridor walls.
- The building has no automatic sprinkler system, but fire hose cabinets are located in the stairwells at each floor.
- Telecommunications equipment is located in the electrical and mechanical rooms, not in dedicated, conditioned space.
- The output of fire alarm audiovisual appliances does not meet ADA codes, and additional fire alarm pull stations are needed.
- There appear to be no spares or spaces available in the main switchboard.
- A generator provides emergency power for egress lighting and the fire alarm system.
- The numerous sets of steps connecting the various building levels and changes of grade on the exterior are not articulated well, and do not provide places for gathering and sitting. The eastern side, adjacent to a small parking lot, lacks adequate landscaping. Other areas of potential improvement are the spaces under the pedestrian connector bridges.

RIGGS HALL

47,455 NASF
70,336 GSF

Riggs is predominantly a laboratory and faculty and staff office facility. The College of Engineering and Science, including the Dean's offices, occupy all the space. Electrical and Computer Engineering is assigned 59 percent of the space; Computer and Network Services, the Dean's offices, and Mechanical Engineering each are assigned approximately 9 percent; and the remaining 14 percent is allocated to Electrical Power Research, General Engineering, the Office of Administrative and Research Support, and PEER. Riggs is appropriate for its current use as a teaching and research facility with office space. The building is not in need of renovation at this time.

Building Performance

- The building is more "efficient" than average in that the ratio of net to gross square feet is 68 percent. The target for laboratory buildings is 60 percent and for office buildings is 65 percent.
- Offices and office-related use account for 41 percent of the space; 38 percent is allocated to laboratories; 15 percent to classroom and classroom-related use; and the remaining 6 percent to library and study, general, and support use.
- Of the laboratory space, 15 percent is assigned to research and 23 percent is assigned to teaching and open labs and related service.
- The seven classrooms are scheduled well above the target range; the eight teaching labs are scheduled from below to above the target range.
- Because of its central campus location, Riggs would be ideal for a variety of disciplines.
- Architecturally and structurally the building is in good condition, with the exception of exterior sealants that are in fair condition, exterior brick that shows some minor deterioration, and reinforcing bars in some of the basement level floor beams that are exposed.
- Exterior glazing is single pane.

- The interior finishes vary from fair to good condition with the exception of the lobby, which is in excellent condition.
- The HVAC system air handling and cooling capabilities need improvement such as the addition of 100 percent outdoor air economizer cycles.
- The water services need to have reduced pressure backflow preventers installed.
- Ventilation air to fan coil units is limited and they do not provide sufficient dehumidification.
- The chilled water system should be expanded so that the entire building is served from the central plant.
- There is no automatic fire protection sprinkler system.
- Telecommunications equipment is located in the electrical and mechanical rooms, not in dedicated, conditioned space.
- The fire alarm system does not meet current codes, there is incomplete coverage of smoke detectors, and the number of audiovisual appliances is not sufficient to provide the coverage required by ADA codes.
- There is no emergency generator, and no battery pack, for egress and exit lighting.
- There is no surge protection at the main service switchboard; and the panels, which are in poor condition, are located in corridors and stairs as there are no electrical rooms.
- Riggs is in an urban feeling location, at the crossroads of two major pedestrian spines. The streetscapes should be better developed to help prevent conflicts between pedestrians and automobiles. Gathering and sitting space adjacent to the building should be improved, and plantings should be revamped to provide more visual interest at this location.

SIKES HALL

28,467 NASF
42,919 GSF

Sikes is predominantly an administrative office facility. The offices of the Provost and Vice President of Academic Affairs occupy 48 percent of the space. Business Affairs and Financial Affairs are allocated 24 percent, the President's offices 15 percent, the Executive Secretary to the Board of Trustees and Institutional Research 9 percent, and Student Affairs is allocated 4 percent. Sikes is appropriate for its office use.

Building Performance

- The building is relatively "efficient" in that the ratio of net to gross square feet is 64 percent. The target for offices buildings is 65 percent.
- All of the space is allocated to office and office-related use.
- There are many levels that make navigation through the building difficult. Most of the spaces are intensely used, however because of building constraints some are either too large or not dividable, such as the underused, main lobby.
- The building is the *front door* of the campus and holds an important position in the history of the University.
- Architecturally and structurally the building is in good condition with some exceptions. The roof, windows, and exterior doors are in excellent condition. The brick is also in excellent condition except for some minor deterioration. Exterior sealants that are in poor condition.
- Interior finishes vary in condition, but essentially are in good condition.

- The existing air conditioning systems are expensive to operate and noisy and they should be replaced. Adequate ventilation air should be provided to all conditioned spaces, as well as 100 percent outdoor air economizer cycles.
- Fan coil units do not provide sufficient dehumidification.
- Reduced pressure backflow preventers are needed on the water services.
- There is no automatic fire protection sprinkler system.
- Telecommunications equipment is located in the electrical and mechanical rooms, not in dedicated, conditioned space.
- The fire alarm system does not meet current codes, there is incomplete coverage of smoke detectors, and the number of audiovisual appliances is not sufficient to provide the coverage required by ADA codes.
- There is an emergency generator for egress and exit lighting in corridors.
- There is no surge protection at the main service switchboard; and the panels, which are in poor condition, are located in rooms that do not provide the required amount of access.
- The landscape around Sikes is well designed and well maintained except for the south side parking area, which should be redesigned to reflect the level of care expressed on the other three sides of the buildings. The redesign of President's Park will address connections between the park and Sikes, which need to be emphasized.

SIRRINE HALL

110,149 NASF
172,200 GSF

Sirrine is predominantly a laboratory and faculty and staff office facility. The College of Business and Public Affairs occupies 54 percent of the space. The College of Engineering and Science is allocated 39 percent: 38 percent to Textiles, Fiber, and Polymer Science and less than 1 percent to Physics and Astronomy. Off-campus Distance and Continuing Education occupies 6 percent of the space, and the Computer Center the remaining 1 percent. Sirrine is appropriate for its current use, although many offices are substandard in size and many have no windows. The building is not in need of renovation at this time.

Building Performance

- The building is more "efficient" than average in that the ratio of net to gross square feet is 64 percent. The target for laboratory buildings is 60 percent and for office buildings is 65 percent.
- Office and office-related use accounts for 45 percent of the space, 31 percent is allocated to laboratories, 15 percent to classroom and classroom-related use, 8 percent to general support, and 1 percent to general use.
- The twenty-one classrooms are scheduled within the target range; the four teaching labs are scheduled below the target range.
- The sub-basement space is marginal, and there is no passenger elevator.
- Architecturally and structurally the building is in good condition with the exception of the roof that is in excellent condition and exterior sealants that are in fair condition. There are some cracks and exposed reinforcing in the basement floor slab, which appear to be a cosmetic issue, and a wall crack in the sub-basement.

- The interior finishes are in good condition except for those in the restrooms that are in fair condition.
- There is no ventilation in restrooms and about half meet ADA codes.
- The cooling tower is in poor condition and needs to be replaced.
- A minimum amount of air is introduced into systems especially into the lab and shop space systems; and outdoor intake for new air handling units is next to the cooling tower resulting in high humidity and low quality air intake.
- Stairwells are not conditioned.
- The building has a wet pipe sprinkler system; there are no fire hose cabinets.
- Telecommunications equipment is located in the electrical and mechanical rooms, not in dedicated, conditioned space.
- The fire alarm system does not meet current codes, there is incomplete coverage of smoke detectors, and the number of audiovisual appliances is not sufficient to provide the coverage required by ADA codes.
- There are two electrical services to the building, but they are not properly labeled; and there is no surge protection at the main service switchboard.
- There is an emergency generator for egress and exit lighting in corridors.
- There is a newly reconstructed courtyard to the north, which provides gathering space. The landscaping on the west side should be enhanced, which would improve the view from Fernow Street, and the sculpture should be moved to a more appropriate location. The dead-end space to the south could be better utilized if it were redesigned.

TILLMAN HALL

51,808 NASF
96,654 GSF

Tillman is predominantly a faculty and staff office facility. The College of Health, Education, and Human Development occupies 66 percent of the space. Student Affairs is allocated 21 percent; the Aerospace Studies, Graphic Communications, and Military Science departments of the College of Business and Public Affairs occupy 12 percent; and the remaining 1 percent is assigned to the offices of Access and Equity and Undergraduate Studies.

Tillman is appropriate for its current use, although many offices are substandard in size and many have no windows. The building is in need of renovation, although this could be done in phases.

Building Performance

- The building is considerably less “efficient” than average in that the ratio of net to gross square feet is 54 percent. The target for office and academic buildings is 65 percent.
- Office and office-related use accounts for 44 percent of the space; 20 percent is allocated to classroom and classroom-related use; 19 percent to general use, namely the auditorium; 6 percent to study use; and 1 percent is general support.
- The thirteen classrooms are scheduled at the low end of the target range.
- The large window sizes work well for large spaces such as classrooms, although this feature along with structural constraints and a high percentage of internal space limit flexibility in room layouts.

- Structurally the building is in good shape, although the roof system is in fair condition with structural deficiencies and some water damage; and there are several floor areas on the third and fourth floors that have dipped and buckled as much as two inches; the original west wall footing has been undermined in several locations, and there are some exterior wall cracks.
- Architecturally the exterior brick is in adequate condition except at the chimneys, wood soffits are in poor condition, and much of the granite needs repointing. Windows and doors are in fair condition; exterior sealants are in good condition; and the main roof is in fair condition, but several other sections are in poor condition while the elevator penthouse roof is in excellent condition.
- The interior finishes are in good condition, except for the auditorium seating and the recently renovated classrooms that are in excellent condition.
- The restrooms meet ADA codes.
- Space conditioning is by fan coil units except for the auditorium, which is served by a new air-handling unit, although without fire dampers.
- The building has a wet pipe sprinkler system except in the attic, which is being used for storage; there are fire hose cabinets throughout the building.
- Telecommunications equipment is located in the electrical and mechanical rooms, not in dedicated, conditioned space.
- The fire alarm system does not meet current codes, there is incomplete coverage of smoke detectors, and the number of audiovisual appliances is not sufficient to provide the coverage required by ADA codes.
- An emergency generator provides emergency power for egress and exit lighting in corridors.
- The fire alarm control panel is located in the main electrical room behind the high voltage switchboard; there is no annunciator panel at the main entrance; and there is no surge protection at the main service switchboard.
- Although there are significant mature trees and shrubs around Tillman, the foundation planting in several areas is becoming spotty with age and eventually will need rejuvenation; and the combined service and pedestrian area that connects Tillman with the University Union to the west could be made more welcoming.

UNIVERSITY UNION/HARCOMBE DINING HALL

136,845 NASF
198,284 GSF

The Union is predominantly a food service and administrative facility. Food Services-Meal Plans occupies 45 percent of the space and Student Affairs 34 percent. Space that was formerly assigned to the Bookstore, totaling 13 percent, is now in use as a temporary gymnasium during the Fike renovation. The Post Office, Military Science, and Facilities Maintenance occupy the remaining 8 percent.

The Union space assigned to office use is not ideal; and Harcombe Dining works as a food service facility, but the building is no longer appropriate. The building is in need of renovation. The office portion could be renovated in phases, however renovation of the dining facility would shut the facility down.

Building Performance

- The building is relatively "efficient" in that the ratio of net to gross square feet is 69 percent. The target for office and academic buildings is 65 percent and for dining halls is 72 percent.
- General campus use accounts for 61 percent of the space. Offices and office-related space is allocated 18 percent, 13 percent is temporarily assigned, and the remaining 8 percent is assigned to residential, study, general support, and special uses.
- Much of the space is internal with no possibility of windows, and the windows that exist are inadequate for most uses.
- Structural elements constrict floor layouts on the top three levels.
- Architecturally and structurally the building is in good condition with the exception of a significant crack, seen in the vacated bookstore, that continues over six bays, running north to south; and penetrates the floor slab, floor joists, and girders in the weight room. In addition, some reinforcing is exposed and there are some wall cracks. The exterior doors and windows and exterior sealants are in fair condition, and the Union roof is in excellent condition.
- The interior finishes are in good condition, but need refurbishing.
- The top three levels of the Union, with ceiling heights of only 8' 6", are served by fan coil units with no outside air; and the level below (Level 6) and auditorium are served by units where minimum outside air is introduced.
- The Union has no automatic sprinkler system, although there is a standpipe in a stair well but no fire hose cabinets. There are no sprinklers in the auditorium and office areas on the Plaza level.
- Telecommunications equipment is located in the electrical and mechanical rooms, not dedicated, conditioned spaces.
- The fire alarm system does not meet current codes, there is incomplete coverage of smoke detectors, and the number of audiovisual appliances is not sufficient to provide the coverage required by ADA codes.
- There are five electrical services to the building; and there is no surge protection at the main service switchboard.
- The lower-level courtyard is in need of repair and is underutilized; the paving is failing and the outdoor furniture is in very bad condition. The upper level plaza is in a state of bad disrepair and is an eyesore. The paving is loose and traps water; and the raised planters and light wells are too large and contribute to making the space very uncomfortable.
- There is a high volume of illegal parking around this facility making the area uncomfortable and hazardous to pedestrians.

APPENDIX

Clemson University - Space Utilization Study 2002

Table A: CLASSROOMS - TIME UTILIZATION ANALYSIS

HEGIS CATEGORY: 100 (Classrooms)

Classes Starting at	183 Spaces Percent of Spaces Utilized					9660 Stations Percent of Stations Utilized				
	M%	T%	W%	R%	F%	M%	T%	W%	R%	F%
8:00 AM	64	68	67	70	65	46	42	47	45	47
8:30 AM	66	68	68	70	65	49	42	49	45	47
8:50 AM	1	63	3	64	2	2	38	3	41	0
9:00 AM	2	63	3	65	4	3	39	3	41	2
9:05 AM	86	63	89	65	86	68	39	69	41	64
9:30 AM	86	86	89	89	86	68	55	69	56	64
10:00 AM	1	86	3	88	3	2	55	3	56	1
10:10 AM	82	86	85	88	83	65	55	70	56	59
10:30 AM	82	81	85	83	83	65	52	70	53	59
11:00 AM	2	86	3	87	4	3	55	3	56	1
11:15 AM	85	86	87	87	79	74	55	74	56	58
11:50 AM	84	78	86	79	79	71	51	72	51	58
12:00 PM	84	77	84	77	76	71	50	71	50	58
12:10 PM	0	77	0	77	0	0	50	0	50	0
12:15 PM	0	0	0	2	0	0	0	0	0	0
12:20 PM	65	0	67	2	55	50	0	51	0	42
12:30 PM	64	80	67	79	55	49	50	51	50	42
12:50 PM	64	80	67	79	55	49	50	51	49	42
1:00 PM	64	80	67	79	55	49	50	51	49	42
1:10 PM	2	80	3	79	0	0	50	0	49	0
1:20 PM	2	77	3	76	0	0	48	0	47	0
1:25 PM	66	77	67	76	58	43	48	42	47	36
1:30 PM	66	77	67	76	58	43	48	42	47	36
2:00 PM	66	80	67	82	58	43	46	42	46	36
2:15 PM	7	80	7	81	3	2	46	2	46	0
2:30 PM	77	81	77	81	25	47	46	47	45	13
2:40 PM	77	81	77	81	25	47	46	47	45	13
2:45 PM	77	81	77	81	25	47	46	47	45	13
2:50 PM	77	76	77	77	25	47	42	47	41	13
3:00 PM	77	76	77	77	25	47	42	47	42	13
3:05 PM	77	76	77	77	25	47	42	47	42	13
3:15 PM	77	10	76	10	25	47	3	46	3	13
3:20 PM	54	10	52	10	4	32	3	32	3	1
3:25 PM	53	10	52	10	3	32	3	32	3	0
3:30 PM	54	57	54	57	5	32	29	32	30	2
3:35 PM	66	57	65	57	8	40	29	39	30	2
3:40 PM	66	56	65	57	8	40	29	39	30	2
3:50 PM	22	55	21	56	8	12	28	12	29	2
4:00 PM	45	58	48	60	9	26	30	25	30	2
4:10 PM	45	58	48	60	9	26	30	25	30	2
4:15 PM	45	58	48	60	9	26	30	25	30	2
4:20 PM	44	53	48	57	9	26	26	25	27	2
4:25 PM	36	53	40	57	5	21	26	20	27	1
4:30 PM	34	53	39	57	5	21	26	20	27	1
4:35 PM	34	53	39	57	5	21	26	20	27	1
4:40 PM	38	53	43	57	5	22	26	22	27	1
4:45 PM	39	13	43	18	5	23	4	22	6	1
4:50 PM	34	14	36	17	5	20	4	19	6	1
5:00 PM	34	23	38	22	5	21	12	20	12	0

Clemson University - Space Utilization Study 2002

Table A: CLASSROOMS - TIME UTILIZATION ANALYSIS

HEGIS CATEGORY: 100 (Classrooms)

Classes Starting at	183 Spaces Percent of Spaces Utilized					9660 Stations Percent of Stations Utilized				
	M%	T%	W%	R%	F%	M%	T%	W%	R%	F%
5:05 PM	34	23	38	23	5	21	12	19	12	0
5:15 PM	16	22	21	22	4	9	12	8	12	0
5:30 PM	19	21	21	20	2	11	12	9	9	0
5:35 PM	19	21	21	20	2	11	12	9	10	0
5:45 PM	19	20	21	20	2	11	11	9	10	0
6:00 PM	19	21	20	19	2	10	10	9	7	0
6:05 PM	19	21	20	19	2	10	10	9	7	0
6:10 PM	20	21	21	19	2	11	10	9	8	0
6:15 PM	28	21	29	19	4	13	7	11	5	0
6:30 PM	27	21	27	19	3	13	7	11	5	0
6:35 PM	27	21	27	19	3	13	7	11	5	0
6:45 PM	19	16	17	17	3	7	5	6	5	0
6:50 PM	19	15	17	17	3	7	5	6	5	0
7:00 PM	22	17	21	18	3	9	6	7	5	0
7:15 PM	21	16	19	15	2	9	6	7	5	0
7:20 PM	22	17	19	16	3	7	6	7	5	0
7:30 PM	21	17	17	15	3	7	6	6	5	0
8:00 PM	19	13	15	10	2	7	4	6	3	0
8:15 PM	18	12	13	10	2	6	4	5	3	0
8:25 PM	18	12	14	10	2	6	4	5	3	0
8:30 PM	17	13	14	10	2	6	4	5	3	0
9:00 PM	6	5	4	3	2	2	2	1	0	0

Key:	61% - 100%	46% - 100%
	41% - 60%	31% - 45%
	21% - 40%	16% - 30%
	0% - 20%	0% - 15%

Clemson University - Space Utilization Study 2002

Table B: LABORATORIES & STUDIOS - TIME UTILIZATION ANALYSIS

HEGIS CATEGORY: 200 (Laboratories and Studios)

Classes Starting at	150 Spaces Percent of Spaces Utilized					3548 Stations Percent of Stations Utilized				
	M%	T%	W%	R%	F%	M%	T%	W%	R%	F%
8:00 AM	7	16	9	13	9	6	11	6	10	6
8:30 AM	7	16	9	13	9	6	11	6	10	6
8:50 AM	3	11	5	11	5	3	9	4	8	4
9:00 AM	3	11	5	11	5	3	9	4	9	4
9:05 AM	17	11	21	11	17	13	9	15	9	13
9:30 AM	17	29	21	27	17	13	23	15	21	13
10:00 AM	9	29	13	27	9	7	24	10	21	8
10:10 AM	20	30	25	28	19	14	24	18	21	14
10:30 AM	21	26	25	25	19	14	21	18	18	14
11:00 AM	8	29	10	27	6	6	24	8	21	5
11:15 AM	21	29	23	27	15	18	24	19	21	13
11:50 AM	19	23	21	23	14	17	19	18	17	11
12:00 PM	19	25	23	25	14	18	20	19	19	11
12:10 PM	6	25	8	25	4	6	20	7	19	3
12:15 PM	5	15	8	16	4	5	13	7	13	3
12:20 PM	26	16	31	17	14	20	13	24	13	11
12:30 PM	31	45	33	38	15	23	37	26	31	11
12:50 PM	31	45	33	37	15	23	37	26	30	11
1:00 PM	33	43	35	37	15	25	36	27	30	11
1:10 PM	28	43	28	36	9	21	36	21	30	7
1:20 PM	27	39	28	33	9	21	34	21	27	7
1:25 PM	57	43	48	36	23	51	35	39	29	20
1:30 PM	57	41	50	36	23	51	33	39	29	20
2:00 PM	57	59	49	52	23	50	42	38	37	20
2:15 PM	45	59	39	52	15	41	43	32	37	15
2:30 PM	63	58	59	52	19	55	41	45	36	18
2:40 PM	63	60	59	53	19	55	43	45	38	18
2:45 PM	63	61	59	54	19	55	43	45	38	18
2:50 PM	63	58	58	51	19	54	41	44	36	18
3:00 PM	64	59	60	53	19	55	42	46	37	18
3:05 PM	64	60	60	53	19	55	43	46	38	18
3:15 PM	64	53	60	47	19	55	38	46	34	18
3:20 PM	47	49	39	45	13	40	36	29	33	12
3:25 PM	45	45	39	44	13	39	32	29	32	12
3:30 PM	47	60	43	56	14	40	47	33	41	13
3:35 PM	65	61	59	57	16	55	48	45	41	13
3:40 PM	65	63	59	57	16	55	49	45	41	13
3:50 PM	62	63	55	57	15	52	49	42	41	13
4:00 PM	62	59	55	53	15	52	47	42	38	13
4:10 PM	62	59	55	53	15	52	47	42	39	13
4:15 PM	62	59	55	53	15	52	47	42	39	13
4:20 PM	59	55	51	49	15	50	43	40	36	13
4:25 PM	44	54	41	48	11	38	42	32	35	10
4:30 PM	45	56	40	49	11	38	43	32	36	10
4:35 PM	45	56	40	49	11	37	43	32	36	10
4:40 PM	51	54	45	48	11	41	40	36	35	9
4:45 PM	51	44	45	39	11	41	32	36	27	9
4:50 PM	49	45	44	39	11	40	32	34	27	9
5:00 PM	50	41	45	32	11	41	31	36	23	9

Clemson University - Space Utilization Study 2002

Table B: LABORATORIES & STUDIOS - TIME UTILIZATION ANALYSIS

HEGIS CATEGORY: 200 (Laboratories and Studios)

Classes Starting at	150 Spaces Percent of Spaces Utilized					3548 Stations Percent of Stations Utilized				
	M%	T%	W%	R%	F%	M%	T%	W%	R%	F%
5:05 PM	49	41	45	32	11	40	31	35	23	9
5:15 PM	45	41	41	31	11	39	31	34	23	9
5:30 PM	29	37	27	28	2	20	29	21	21	1
5:35 PM	27	37	27	28	2	20	29	21	21	1
5:45 PM	29	35	29	27	2	21	28	23	21	1
6:00 PM	29	33	27	25	2	21	26	22	19	1
6:05 PM	29	33	27	25	2	21	26	22	19	1
6:10 PM	29	33	27	24	2	21	26	22	19	1
6:15 PM	30	31	28	22	2	22	25	23	18	1
6:30 PM	27	19	21	14	0	21	16	17	10	0
6:35 PM	15	21	10	13	0	11	18	8	10	0
6:45 PM	13	19	8	13	0	10	17	6	10	0
6:50 PM	13	14	7	10	0	9	13	6	7	0
7:00 PM	15	15	9	9	0	10	14	6	6	0
7:15 PM	15	15	9	9	0	10	13	6	6	0
7:20 PM	15	15	9	9	0	10	13	6	6	0
7:30 PM	12	15	7	8	0	9	13	6	6	0
8:00 PM	10	12	7	6	0	8	11	5	4	0
8:15 PM	10	13	7	7	0	8	11	5	4	0
8:25 PM	8	11	5	5	0	6	10	3	3	0
8:30 PM	7	9	3	5	0	6	9	2	3	0
9:00 PM	6	9	3	6	0	5	7	2	4	0

Key:	150 Spaces	3548 Stations
	61% - 100%	46% - 100%
	41% - 60%	31% - 45%
	21% - 40%	16% - 30%
	0% - 20%	0% - 15%