BURSON SCIENCE BUILDING

BUILDING AND USE ASSESSMENT STUDY

Tobin+Dudley PLLC

Health Education Research Associates

United Engineering Group

October 2007

UNC Charlotte
Burson Science Building – Existing Building Assessment
October 25, 2007

Table of Contents

General Power Distribution & Capacity
Laboratory Power Distribution & Capacity
Life Safety Emergency Power
Laboratory Stand-by Power
Lighting Systems
Security Systems

Building Expansion Concept Studies

SKA-1 – Ground Floor Plan Study
SKA-2 – 2nd Floor Plan Study
SKA-3 – Elevation Studies
SKA-4 – Perspective Study 'A'
SKA-5 – Perspective Study 'B'

Executive Summary & Architectural Considerations

Existing Structure –

1. Two story, laboratory, classroom and office building of approximately 100,000 gross square feet constructed in 1985. Conforms generally to Type IB Construction (North Carolina State Building Code, 2006)
2. Originally designed for Chemistry on upper level (extensive laboratory exhaust systems/wet labs) and Physics (dry labs) on lower level.
3. Pre-cast concrete post-and-beam structural frame with pre-cast concrete double-tee floor and roof structure.
4. Some irregular areas of floor and roof structure are framed in steel.
5. The exterior is predominantly brick veneer and vision glass, flush on the West, North and East facades, deeply recessed on the South Façade.
6. Interior partitions are generally non-load bearing concrete masonry block.

Existing Fire Protection –

1. No existing automatic fire suppression systems, either water or chemical.
2. Current building code requires such occupancies to be fully sprinklered and
3. Any significant interior changes to the building will require that an automatic sprinkler system be installed throughout.

Existing Plumbing Fixtures –

1. Minor current deficit in comparing existing conditions with the latest North Carolina Plumbing Code
2. Generally, plumbing fixture quantities must remain unchanged or increased with any new renovation.
3. Changes in occupancy or changes in building population, as defined in the NC State Building Code, will necessitate conformance with the current NC State Plumbing Code.

Existing Accessibility –

1. Constructed prior to the adoption of ADA in 1991, Burson is relative inaccessible. An informal list of general and pervasive accessibility shortcomings is provided.

    a. Inaccessible Toilet Rooms
    b. Non-conforming handrail dimensions.
    c. Non-conforming door jamb to adjacent wall clearances.
    d. Inadequate accessibility to laboratory equipment and work surfaces.
    e. Inadequate wheel chair accommodation in classrooms and lecture rooms.

2. Accessibility shortcomings of the toilet rooms may be corrected by the construction of new, conforming, toilet rooms which by necessity will displace other existing spaces in the building.

3. While somewhat costly, the construction of new toilet rooms is technically feasible.
    a. non-conforming handrails are relatively easy to replace.
    b. Non-conforming door jamb-to-adjacent wall clearances are much more pervasive and not practical to correct unless significant interior renovations of broad scope are undertaken.

Space Utilization –

A detailed space utilization report is attached. The report combines data from recent course enrollment and building utilization data, combines information regarding estimated growth and generally accepted academic needs in the next 5-10 years. The utilization report concludes that while it could be theoretically possible to accommodate Chemistry Department teaching space needs, if Physics Department space was completely removed from the building, there are no circumstances under which adequate Chemistry Research Laboratory space can be accommodated.

Expansion Options –

A significant benefit of the site is the obvious potential for significant expansion northward toward Craver Road. By assuming a new façade alignment approximate with the adjacent Health and Human Services building, an expansion of approximately ninety feet (90') beyond the existing façade is possible. Such expansion could accomplish two significant goals, the first being to provide adequate building space for the Chemistry Departments clear needs for more space in the near future, and the second being to enhance the aesthetic presentation of the Burson Building directed to the North, facing the planned new Student Union. Logistically, a new expansion of this type could be constructed while the existing building remains operational. Once finished and occupied with potentially as much as 50,000 new gross square feet on two levels, the new wing could serve as swing-space for displaced areas in the existing building as it could be renovated without displacing the Chemistry department.

Options and Probable Costs

Basic Construction Cost Estimates (mid 2007 dollars)

	gross sq. ft.	$/s.f.	
Option 1 - Gut and Renovate as Classroom/Office Building	100,000	$ 130.00	$ 13,000,000.00
Option 2 - Gut and Renovate as Laboratory/Classroom Building	100,000	$ 180.00	$ 18,000,000.00
Option 3 - New Laboratory/Classroom Expansion	50,000	$ 300.00	$ 15,000,000.00
add to Option 2 or Option 3			

Mechanical, Electrical, Plumbing –

A detailed report on building systems is attached, with recommendations for remediation of various Mechanical, Electrical, and Plumbing systems design and operating shortcomings.

Safety –

The review of the existing building conditions exposes two dominant substandard conditions with substantial detriment to occupant safety.

Automatic Fire Suppression – Under current building code, occupancy such as this must, under any circumstance, be equipped with an automatic sprinkler system throughout the building. Regardless of future plans for utilization of the building, whether fully remodeled or expanded, the installation of an automatic fire suppression system should take the highest priority.

Chemical Fume Exhaust –

Internal - As described in detail in the Space Utilization section and Building Systems section of the report, the existing chemical fume exhaust systems are inadequate in quantity and in operation for the safety related function they serve. The current exhaust hoods and table-top devices in many cases do not meet current safety standards for fume exhaust, while also being a major source of energy waste. Regardless of future plans for utilization of the building, replacement and installation of additional exhaust equipment should take highest priority.

External – When constructed more than 20 years ago, Burson occupied land on the outer perimeter of the campus in relative isolation. Within the past 20 years various new structures have been constructed in the immediate vicinity of Burson, most notably, the new College of Health and Human Services, and soon, the new Student Union. By its design, and for the safety of its occupants, Burson is a source of external chemical fume exhaust. While probably not being of much consequence in its early years, now with the construction of new campus buildings nearby, the review team has serious concerns about potential air quality problems currently and in the future. A significant observation is that the main air intake location for the new Health and Human Services Building appears to be in a location vulnerable to intake of chemical fume contamination from Burson's fume exhaust systems. The review team specifically recommends and air quality assessment around Burson at various times of the academic year and under various weather conditions. Additionally, the team recommends a study be performed to determine the potential impact of building expansion and related increases in fume exhaust volume.

Net Area Analysis

Existing Area Profile

The net square feet (NSF) of Burson Hall is 79,078 distributed on two levels above grade and a small addition below grade. Net area is measured as the distance between the inside faces of walls. Net area does not include public hallways and lobbies, exit stairs, and shafts. The net assignable area (NASF), of Burson Hall is 72,933 net square feet, which excludes mechanical/electrical/plumbing areas, private circulation, public restrooms, housekeeping closets and general building storage rooms. Net assignable area, NASF, represents the actual usable space in a building. Figures cited below are designated as net or net assignable areas.

Room dimensions were accurately taken from the original construction drawings, using computer-aided-design (CAD) software. A list of each room with ID number, function, and net area was generated from dimensioned plans. In addition, the team performed several walk-throughs of Burson Hall to count the quantity and cumulative linear feet of chemical fume hoods currently in use. Chemical fume hoods are of particular importance to the Chemistry Department, in that fume hoods constitute the primary containment equipment for hazardous fumes and chemicals and one of the critical safety features in chemistry laboratories.

Functional Use Categories

In order to analyze the existing area allocations, each room was assigned a general category of primary function. The categories are as follows and include certain room types:

BS	building support	mechanical, electrical, elevator, restroom, housekeeping closet, storage, etc
C	classroom	classroom, lecture hall, conference room
CS	classroom support	storage for demonstration materials, AV booth, kitchenette
LS	laboratory support	stockroom and storage
O	offices	administrative, faculty and graduate student offices
OS	office support	storage, copy/fax and mail room
RL	research laboratories	assigned laboratory for faculty and/or student research
RS	shared research support	instrument, preparation laboratory
TL	teaching laboratories	instructional laboratory
TS	teaching support	preparation laboratory and storage

Please note that community/social space is not included as a category, because it does not exist in Burson.

Existing NASF utilization shows that over half the entire building is in research and teaching laboratory uses with an additional 11% for shared support functions for these laboratories. General classroom use and offices are nearly equal at 15% and 16% respectively. Chemistry Department profile is very similar to percentages for the entire building with Chemistry assigned area in research and teaching laboratory uses but only 6.4% for shared laboratory support functions, nearly 18% in classroom and support use and 15% for offices. Note the relatively low proportion of shared laboratory support functions. Physical sciences teaching and research buildings usually range from 15% to 25% of total net assignable area for lab support functions. In fact, Chemistry Department currently has only one small solutions preparation laboratory to support all the teaching and research laboratories, no central glasswash facility, nor adequate storage for chemicals and gas cylinders. Please refer to Table 1 below

Table 1: EXISTING NET AREA SUMMARY OF BURSON HALL

Current Function	Net Area In SF	Existing No. Rms	Percent Total NASF	Chemistry Existing Net SF	Chemistry Existing No. Rms	Chemistry Percent of NASf
Total Net Area	**79.078**	179		**47,923**	92	
Total Net Assignable SF	**72,933**	158		**47,135**	85	
Building Support	**6,145**	21	NA	**789**	7	NA
Classroom	**9,017**	9	12.4%	**6,437**	7	13.7%
Classroom Support	**2,129**	5	2.9%	**1,896**	3	4.0%
Laboratory Support	**2,044**	5	2.8%	**2,044**	315	4.3%
Offices	**11,905**	60	16.3%	**7,193**	31	15.3%
Office Support	**112**	2	0.2%	**0**	0	0%
Research Laboratories	**16,711**	34	22.9%	**10,784**	21	22.9%
Shared Research Support	**5,424**	17	7.4%	**1,517**	5	3.2%
Teaching Laboratories	**22,681**	21	31.1%	**14,865**	10	31.5%
Teaching Support	**2,878**	6	3.9%	**1,518**	3	3.2%

Building Occupancy - Students

The study team needed to compare these building statistics to the occupancy profile for Burson Hall and Chemistry Department specifically in order to fully understand the building utilization. The study team looked at faculty and staff current status and projected growth for 10 years, and University representatives provided current enrollments and student projections out 15 years. The University of North Carolina – Charlotte is planning for a 60% increase in total enrollment within 15 years, growing from 22,000 students to 35,000, due to a swell of population in North Carolina and in the Charlotte region specifically. In addition, the graduate student population is expected to rise from 18% currently to 25% in 15 years, approximately 4,000 to nearly 9,000 graduate students. Rise in overall enrollment will affect both faculty and student counts.

Table 2: STUDENT ENROLLMENT PROJECTIONS FOR 2022

Student Enrollment	2007	2012	2017	2022	Percent Growth	Annual Growth
Total UNC-C	22,000	26,333	30,666	35,000	62%	
All Graduate Students	4,000	5,583	7,166	8,750	46%	
Percent of Grad Students	18%	21%	23%	25%	7%	
Total Chemistry	5,612	8,000	11,000	15,500	36%	7%
Chemistry Majors	195	249	317	NA	61%	
Master's Students	25	62	79	NA	32%	5%
PhD Students	0	2	10	NA	1000%	
Post-Doctoral Students	4	10	15	NA	27%	
Percent of Grad Students	0.5%	4.0%	3.8%			

As shown in Table 2 above, Chemistry Department also expects enrollment in chemistry courses to rise at a similar, but perhaps steeper rate due to two factors. First, within five years, Chemistry will offer a PhD degree program that will attract more majors. Second, Chemistry Department will develop more general education courses to share more of the science credit demand with the departments of Biology and Geology. Dr. Donovan-Merkert expects an increase of 5% per year for Chemistry majors in the Bachelor's degree program and 20% per year for Masters Degree students. Currently Chemistry offers night courses due to lack of teaching lab availability during normal working hours.

Fall of 2007 is the beginning of a new multi-disciplinary PhD Nano-Scale Program. The director of this program will likely be a chemist and may base his/her research team within the Chemistry Department. Interest in this new research focus will attract additional students to Chemistry courses.

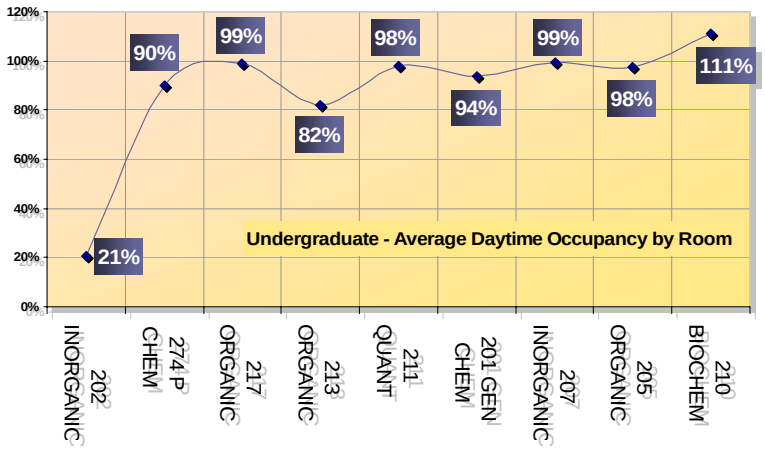
Because Fall '07 actual enrollments were not available for this report, we analyzed Fall '06 enrollments because in fall terms Chemistry has generally higher enrollments than in spring terms. Total undergraduate enrollment in Chemistry courses was 5,547 students for 9,177 weekly student contact hours (wsch). Undergraduate course limit was for 5,957 students, so last year, Chemistry enrollment was 93% of total capacity. Graduate course enrollment was 65 for 112 wsch and 25% of total course capacity. Looking just at Fall 2007 first level undergraduate Chemistry enrollment includes general studies students, Health Sciences, and Nursing students. The total was 4,462 students and 7,152 wsch, with the course limit of 4,730. Again this gained 94% of total capacity. Second level courses enrollment was 809 students and 1,530 wsch, with course limits of 822, an extraordinary 98% of capacity. Second level courses have a large component of students from other science and engineering departments taking required courses in chemistry. All of this enrollment growth impacts the limits of existing conditions in Burson Hall facilities.

Current Utilization - Instructional Laboratories

Undergraduate Seat Occupancy - Daytime

During fall 2006, there were 1,322 available seats in Undergraduate Laboratory Classes that were scheduled to begin before 5pm Monday through Thursday. During this semester, 1241 of the available seats were occupied for an average occupancy rate of **93.9%.**

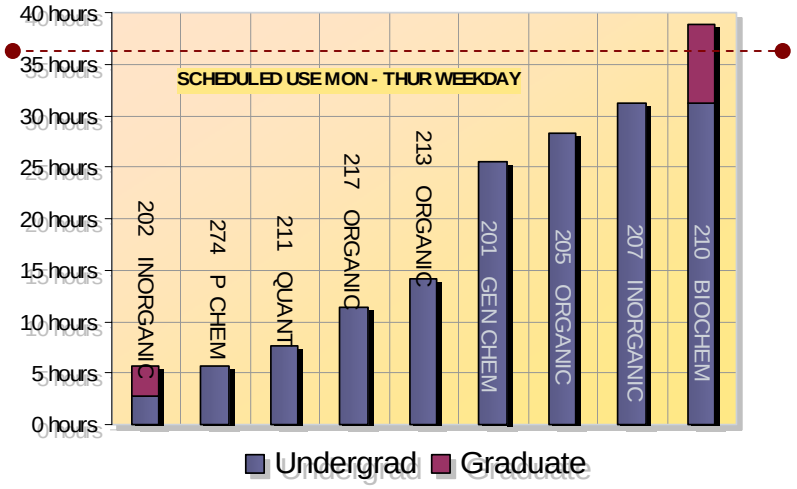
Figure 1: FALL 2006, UNDERGRADUATE AVERAGE DAYTIME OCCUPANCY BY ROOM



Graduate Daytime Occupancy – Daytime:
During fall 2006, there were 9 available seats in Graduate Laboratory Classes scheduled during weekdays. One seat was filled during this time period for an average occupancy rate of 11%.

Utilization Rate:
The Chemistry Department at The University of North Carolina -Charlotte does not currently schedule laboratory instruction on Friday. On Friday, teaching labs are used for Graduate Seminar Internship. The remaining days of the week (Monday -Thursday) are available for scheduled instruction. During the hours of 8:00am - 5:00pm, there are 36 available hours in 9 Teaching Labs for a total of 324 hours. The average laboratory course at UNC-D is 2 hours and 50 minutes (2.83hours). During fall 2006, there were a total of 168 hours of instruction in Undergraduate and Graduate Level Lab courses. Although overall utilization rate is 52%, some rooms such as Room #210 exceeded 100% utilization by 2 hours.

Figure 2: FALL 2006 SCHEDULED WEEKDAY USE



Projection of Future Need - Instructional Laboratories

Methodology for Planning Laboratories:
The formula used to project UNC-C future laboratory need was developed in the late 1980s by the Council of Educational Facility Planners – International (CEFPI). This method is still considered current and is used by many states to allocate space and funding. The factors that make up the formula are:

1) ASF (assignable square foot) The square foot area per student that meets an institutions' space allocation objectives such as 14-18ASF for lecture halls or 20-25ASF for seminar rooms.
2) Station Occupancy Rate Projected or actual number of seats filled when a room is in use.
3) Room Utilization Rate Projected or actual number of hours a room is used for instruction.
4) Space Factor A Planning Guide to be multiplied by the weekly student contact hours (WSCH) to determine how many rooms are needed.
5) WSCH The total number of hours students were seated in class during a semester.

To derive future space need, the factors described above are used in the following way:
ASF ÷ (Room Use x Occupancy Rate) = Space Factor Space Factor x WSCH = Total SF Need

To adapt this method to meet UNC-C Needs, the following guideline standards were developed:

- Daytime Chemistry Lab courses are currently scheduled twice a day, Monday through Thursday for a total of 22.64 hours of use per week. Based on a 45-hour week (8am – 5pm) this is a 50% utilization rate.
- Laboratory station counts in General Chemistry laboratories are 24 per lab at 60ASF per station.
- Laboratory station counts for Organic Chemistry courses are 20 per lab at 70ASF per station.
- Laboratory station counts for Inorganic Chemistry courses are 20 per lab at 60 ASF per statio.
- Laboratory station counts in Quantitative Analysis laboratories are 24 per lab at 60ASF per station.
- Laboratory station counts for Physical Chemistry courses are 12 per lab at 70ASF per station.
- Laboratory station counts for Biochemistry courses are 12 per lab at 70ASF per station.
- Enrollment growth is projected to double in ten years resulting in a current occupancy rate of 50%.

Using the above guidelines, the total need for UNC-C Chemistry Department laboratories is projected to be:

General Chemistry	11 teaching labs	
Organic Chemistry	3 teaching labs	
Inorganic Chemistry	1 teaching labs	
Quantitative Analysis	1 teaching labs	
Physical Chemistry	1 teaching labs	
Biochemistry	1 teaching labs	
Total Projected Need	**18 teaching labs**	**and teaching preparation laboratories**

Calculations using Fall 2006 WSCH and Guideline Planning Standards are provided on the following page. If any one of the guideline standard parameters is changed, the projected need will change.

Burson Hall Instructional Area and Chemical Fume Hood Capacity

Currently Burson Hall houses a total of 21 teaching laboratories for both physics and chemistry with a total area of 22,681 net assignable square feet. Based only on number of spaces and net area, Burson Hall could possibly be renovated to meet Chemistry's need, if Physics Department instructional functions move out. However, the greatest difficulty right now is insufficient numbers of chemical fume hoods in both teaching and research laboratories within Chemistry space and one within all of Physics space. For example, each of two existing organic chemistry teaching labs has only two fume hoods at 8 linear feet (lf) for use by 28 students. American Chemical Society (ACS) and National Science Teachers' Association (NSTA) suggest that organic chemistry teaching laboratories have minimum of 3 lf fume hood per student. For 28 students then 84 lf of fume hood would be required. Renovated organic chemistry labs must provide 14 chemical fume hoods at 6 lf each or 10.5 fume hoods at 8 lf each. None of the existing chemical fume hoods or student benches is ADA accessible. Each of the general chemistry teaching laboratories has two 8 lf chemical fume hoods. The study team has not investigated those courses to understand if that quantity and total linear feet of chemical fume hoods are adequate. In addition the fume hoods are not an up-to-date design or perform within current safety and energy conservation standards. Existing chemical fume hoods should be replaced.

Table 3: PROJECTIONS OF AREA REQUIREMENTS TO 2017
Fall 2006 as basis of enrollment

Guideline Planning Standard for General Chemistry Labs

Hours of Use	2 Sections/Day Monday - Thursday =	**22.64 hours**	**11.32**
Occupancy Rate	Projected for growth to double over 15 ye	**50%**	Divisor

					Space Factor	
General Chemistry Lab		Current Max	24 stations per lab	**60 sf/occ**	5.3 NASF / WSCH	1,440 NASF
CHEM 1111	LAB(S) - Chem in Today's Soc.	32	136 WSCH	5.7 hours		
CHEM 1203	LABORATORY (S) - Gen Chem	32	887 WSCH	28.3 hours		
CHEM 1251	LABORATORY (S) - Prin of Chem	32	1618 WSCH	51.0 hours		
CHEM 1252	LABORATORY (S) - Prin of Chem	32	173 WSCH	5.7 hours		
CHEM 1253	INT MOD LAB MET(S)	1	0 WSCH	0.0 hours		
TOTAL HOURS & NEED			2814 WSCH	90.7 hours	14,913 NASF	**15,840 NASF**
General Chem Laboratory Need					**10.36 LABS**	**11.0**

Organic Chemistry Lab		Current Max	20 stations per lab	**70 sf/occ**	6.2 NASF / WSCH	1,400 NASF
CHEM 2131	ORGANIC CHEMISTRY LAB	28	502 WSCH	19.8 hours		
CHEM 2132	ORGANIC CHEMISTRY LAB	28	119 WSCH	5.7 hours		
CHEM 2136	ORGANIC CHEM LAB	32	0 WSCH	0.0 hours		
TOTAL HOURS & NEED			621 WSCH	25.5 hours	3,837 NASF	**4,200 NASF**
Organic Laboratory Need					**2.74 LABS**	**3.0**

Inorganic Lab		Current Max	20 stations per lab	**60 sf/occ**	5.3 NASF / WSCH	1,200 NASF
CHEM 4121	ADV INORGANIC CHEM - LAB	24	14 WSCH	2.8 hours		
CHEM 5121	ADV INORGANIC CHEM	0	0 WSCH	2.8 hours		
TOTAL HOURS & NEED			14 WSCH	5.7 hours	75 NASF	**1,200 NASF**
Inorganic Laboratory Need					**0.06 LABS**	**1.0**

Quantitative Analysis		Current Max	24 stations per lab	**60 sf/occ**	5.3 NASF / WSCH	1,440 NASF
CHEM 3111	QUANTITATIVE ANALYSIS - LAB	24	266 WSCH	11.3 hours		
TOTAL HOURS & NEED			266 WSCH	11.3 hours	1,412 NASF	**1,440 NASF**
Quantitative Laboratory Need					**0.98 LABS**	**1.0**

Physical Chemistry		Current Max	12 stations per lab	**70 sf/occ**	6.2 NASF / WSCH	840 NASF
CHEM 3141	PHYSICAL CHEM LAB	10	51 WSCH	5.7 hours		
TOTAL HOURS & NEED			51 WSCH	5.7 hours	315 NASF	**840 NASF**
P. Chem Laboratory Need					**0.38 LABS**	**1.0**

Biochemistry		Current Max	12 stations per lab	**70 sf/occ**	6.2 NASF / WSCH	840 NASF
CHEM 5165	PRIN BIOCHEM I - LAB	2	4 WSCH	7.7 hours		
CHEM 4165	PRIN BIOCHEM I - LAB	10	8 WSCH	7.7 hours		
TOTAL HOURS & NEED			12 WSCH	15.3 hours	71 NASF	**840 NASF**
P. Chem Laboratory Need					**0.08 LABS**	**1.0**

CHEM 6150	SEM-INTERNSHIP	**Friday Use in Labs**	5.5 hours	No requirement

TOTAL HOURS OF CURRENT USE	**159.7 hours**	**18.0**
AMOUNT OF SF PROJECTED FOR FUTURE LABS		**24,360 NASF**
NUMBER OF PROJECTED LABS FOR FUTURE		**18.0**

In the programming phase of Burson Hall project development, alternatives can be thoroughly investigated.

Fume Collection Boxes

Burson Hall chemistry instructional laboratories have large fume collection boxes at student benches intended to substitute for chemical fume hoods. The fume collection boxes do not meet current standards for safety equipment; they do not contain fumes; they severely obstruct instructors' sight-lines to students, as shown.

Figures 3: FUME COLLECTION BOX AT STUDENT BENCH

Figure 4: FUME COLLECTION BOXES OBSTRUCT INSTRUCTORS' SIGHT-LINES

View from space between fume collection boxes

View from side of laboratory

All of these considerations lead the design team to recommend removal of all the fume collection boxes and replacement with chemical fume hoods that meet current safety and energy conservation standards for any improvement to Burson Hall. Inadequate ventilation and out-dated or inadequate safety equipment is a very significant deficit in Burson Hall.

Research Laboratory Functions

Existing Conditions

As shown in Table 1, Existing Net Area Summary of Burson Hall, nearly 30% of net assignable area is used for research. Department of Chemistry has slightly less, at 26%. There are a total of 50 spaces designated for research and 26 of these are in Chemistry. Department of Chemistry minimum standard for research facilities is 1,100 NASF, or two existing laboratory units, not including any office area for the faculty member or his/her staff. Dr. Donovan-Merkert explained that Chemistry offers this area to new assistant professors as well as those of more senior rank, because their expectations are that junior faculty members will grow their research groups to fully utilize this area. There may be exceptions to the minimum for individuals conducting computational chemistry research or for experimental physical chemists. This study will use the minimum standard as the basis for analysis.

Table 4: CHEMISTRY FACULTY and STAFF PROJECTIONS

Faculty & Staff	2007 Spg	2007 Fall	2012	2017	2022
Total Tenured, Tenure-track Faculty, FTE	16.0	18.0	23.0	27.0	NA
Chairperson	1.0	1.0	1.0	1.0	1.0
Director, Nano Program		1.0	1.0	1.0	1.0
Laboratory Manager	1.0	1.0	2.0	2.0	NA
Lecturer, FTE	5.0	6.0	10.0	12.0	NA
Technician, FTE	1.0	1.0	2.0	2.0	NA
Administrator, FTE	3.0	3.0	3.0	4.0	NA
Adjunct Faculty, PT	3.0	3.0	3.0	0	NA
Director, RACHEL	1.0	1.0	1.0	1.0	1.0
Technician, RACHEL	1.5	1.5	1.5	1.5	NA
TOTAL STAFF	**32.5**	**36.5**	**44.5**	**49.5**	**NA**

Dr. Donovan-Merkert further described the current faculty research as very interdisciplinary, so designating individuals in traditional experimental disciplines is difficult. Prediction of disciplinary growth is difficult too.

Table 5: RESEARCH DISCIPLINE PROJECTIONS

Tenured & Tenure Track	2007	2012	2017	2022
Analytical Chemistry	3	3	5	NA
Biochemistry	1	2	2	NA
Computational Chemistry	1	1	1	NA
Inorganic Chemistry	3	4	4	NA
Materials Science	0	1	1	NA
Organic Synthesis	8	9	11	NA
Physical Chemistry	2	3	3	NA

Area Requirements for Research

Although the number of research faculty is not the only parameter for estimating area of research facilities, the study team used it as a starting point to test the feasibility of Burson Hall to continue to house Chemistry.

Table 6: FACULTY RESEARCH LABORATORY AREA and PROJECTIONS

Tenured & Tenure Track	**2007**	**NASF**	**2012**	**NASF**	**2017**	**NASF**
Analytical Chemistry	3	3,300	3	3,300	5	5,500
Biochemistry	1	1,100	2	2.200	2	2,200
Computational Chemistry	1	300	1	300	1	300
Inorganic Chemistry	3	3,300	4	4,400	4	4,400
Materials Science	0	0	1	1,100	1	1,100
Organic Synthesis	8	8,800	9	9,900	11	12,100
Physical Chemistry	2	3,000	3	4,500	3	4,500
Recommended Research Lab NASF		**19,800**		**25,700**		**30,100**
Existing Research Laboratories NASF		*10,784*		*16,711*		*16,711*
Existing Shared Research Support NASF		*1,517*		*5,424*		*5,424*
Recommended Shared Support- 20%		**3,960**		**5,140**		**6,020**
Area Deficit NASF (rounded to nearest hundred)		**11,500**		**11,000**		**14,000**

Note: area allocation for computational chemistry reduced to 300 and additional 800 NASF distributed into the physical chemistry research laboratories and support.

Given this approach to projecting space needs within ten years, Department of Chemistry will need over 30,000 NASF just to house assigned research under the minimum current standards. All research laboratories in Burson Hall, as currently configured amount to 16,711 NASF and research support functions are 5,424 NASF, for a total of 22,135 NASF. If Physics moves out of Burson Hall entirely, there remains a true deficit in research and shared research support area in the magnitude of 11,000 to 14,000 NASF. Existing Burson Hall cannot support the growth of the Chemistry Department faculty research, even if sufficient area exists for instructional laboratories and teaching preparation facilities.

Burson Hall Research Chemical Fume Hood Capacity

In discussions with Chemistry Department representatives including Mr. Dewey Wilson, the laboratory manager, the study team learned that UNC-C has invested a lot to remediate immediate deficits in numbers and performance of chemical fume hoods and the supporting ventilation make-up air in Burson Hall over a decade. These facility improvements have helped, but as noted in Table 7 below, not enough. Dr. Donovan-Merkert and others are completely clear that Chemistry research and instructional activities cannot function at safe and productive levels without considerably more chemical fume hoods being installed in Burson Hall.

Compounding operational difficulties with existing chemical fume hoods are their types of and locations. Many of the fume hoods the study team observed are a type called “auxiliary air constant volume”, as shown below in Figure 5. This type was frequently used in the late 1960’s and ‘70’s to conserve energy by using make-up air directly from outside the building with no temperature control. In winter this resulted in researchers having to wear hats and coats while working under strong flows of cold air. In summer, the

Figure 5: EXISTING CHEMICAL FUME HOOD – AUXILIARY AIR TYPE

make-up air adds uncomfortable heat and humidity to laboratories. Since Burson was constructed, the make-up air system was upgraded with heating coils to temper cold air from blowing on top of researchers, but auxiliary air fume hoods still don't work as well for containment of hazardous fumes as up-to-date types that supply make-up air through the general laboratory ventilation system. Air flows at faces of new types of fume hood sashes are less turbulent and perform better in containment and capture, as well as energy efficiency.

The second obstacle in existing chemical fume hood performance is in 5 organic synthesis laboratories, Rooms 244, 246, 248, 249, and 253. There, faces of fume hoods are less than four feet apart, because the fume hood superstructure protrudes into the aisle space more than 6 inches each side. When both fume hoods are auxiliary air type, the distance between the plenums becomes less than three feet.

Figure 6: CLOSE PROXIMITY of CHEMICAL FUME HOODS in ORGANIC SYNTHESIS LABORATORIES

This poses an acute safety hazard for two primary reasons. First, two persons working back to back cannot move comfortably in a four foot wide aisle without looking over their shoulders to make sure they aren't going to bump into one another. If an emergency arises within the fume hood or in the lab, two persons in this aisle could collide or impede each others' exit from the lab.

Secondly, a chronic, unrelieved hazard is that one fume hood competes with the second fume hood for supply and/or make-up air trying to flow into both. This causes unacceptably unsafe turbulence in both fume hoods. Turbulence has been shown by NIH studies and others to cause loss of capture and lower capture rate for possibly hazardous fumes. All fume hoods in these five laboratories, and any other labs with face-to-face chemical fume hoods should be replaced and relocated! In summary, many existing chemical fume hoods experience critical, unsafe conditions.

Table 7: CHEMICAL FUME HOOD NEEDS and PROJECTIONS for RESEARCH ONLY

		2007	min	ave		2012	min	ave		2017	min	ave
Research Lab Discipline	**PI**	**Qty**	**LF**	**LF**	**PI**	**Qty**	**LF**	**LF**	**PI**	**Qty**	**LF**	**LF**
Analytical Chemistry (4, 6 lf)	3	6	24	36	3	6	24	36	5	10	40	60
Biochemistry (4, 6 lf)	1	2	8	12	2	3	12	18	2	3	12	18
Inorganic Chemistry (8, 10 lf)	3	9	72	90	4	12	96	120	4	12	96	120
Materials Science (6, 8 lf)	0	0	0	0	1	2	12	16	1	3	18	24
Organic Synthesis (8, 10 lf)	8	32	256	320	9	36	288	360	11	44	352	440
Physical Chemistry (4, 6 lf)	2	1	4	6	3	2	8	12	3	2	8	12
Research Lab FH Need		**50**	**364**	**464**		**60**	**440**	**562**		**72**	**526**	**674**
Shared Support FH Need (6 lf)		**5**	**30**	**30**		**8**	**32**	**48**		**8**	**32**	**48**
Existing Fume Hood Qty & LF		*43*	*228*	*228*		*46*	*276*	*276*		*46*	*276*	*276*
Fume Hood Deficit		**12**	**166**	**266**		**22**	**196**	**334**		**34**	**282**	**446**

Note: Chemical fume hood allocation for computational chemistry is 0

Office and Community Functions

Existing Capacity and Utilization of Office Area

This is the last primary function that the study team studied and made preliminary area projections. Existing Chemistry faculty offices vary in size, but the average is 116 NASF. We used this average in projecting the faculty and staff office need for the future. There is no Chairperson's office and we recommend increasing the average faculty office to 200 NASF to accommodate small group meetings in the Chairperson's space. There are two Directors' positions, for RAChEL and for the new Nano Scale Program. We arbitrarily allocated 150 NASF each to those offices. There is a total of 1,666 NASF for all current students shared study space in Chemistry. Dr. Donovan-Merkert and others commented that lack of adequate study space is a detractor for recruiting undergraduate majors and teaching assistants, and for graduate students. We propose a very modest 20 NASF study carrel/per student for half the current undergraduate majors, assuming that 2 undergrads can "time-share" a carrel. We propose the same area allocation for Master's students who primarily attend classes and do research in evening hours. For PhD and Post Doctoral level students, we propose the 116 NASF, to add assignment flexibility to Burson Hall. Table 8 shows the results.

Table 8: CHEMISTRY FACULTY / STAFF OFFICE AREA STANDARDS & PROJECTIONS

	Office	2007	Sprg	2007	Fall	2012		2017	
Faculty & Staff	**NASF**	**Ofc**	**NASF**	**Ofc**	**NASF**	**Ofc**	**NASF**	**Ofc**	**NASF**
Total Tenured, Tenure-track Faculty, FTE	116	16	1,856	18	2,088	23.0	2,668	27.0	3,132
Chairperson	200	1	200	1	200	1	200	1	200
Director, Nano Program	150	0	0	1	150	1	150	1	150
Laboratory Manager	116	1	116	1	116	2	232	2	232
Lecturer, FTE	116	5	580	6	696	10	1,160	12	1,392
Technician, FTE	116	1	116	1	116	2	232	2	232
Administrator, FTE	116	3	348	3	348	3	348	4	464
Adjunct Faculty, PT	58	2	116	2	232	3	232	0	
Director, RACHEL	150	1	150	1	150	1	150	1	150
Technician, RACHEL	116	2	232	2	232	2	232	2	232
Chemistry Majors	20	60	1,200	60	1,200	80	1,600	100	2,000
Teaching Assistants	20	40	800	40	800	40	800	50	1,000
Master's Students	20	25	500	25	500	62	1,240	80	1,600
PhD, Post Doc Students	116	4	464	4	464	12	1,392	25	2,900
Total Ofc Need NASF		**145**	**6,678**	**162**	**7,292**	**207**	**10,636**	**280**	**12,060**
Chemistry Existing NASF			*6.475*		*6,475*		*10,691*		*10,691*
Office Deficit / Excess			**203**		**817**		**55**		**1,369**

Note: These projections of Existing NASF assume Chemistry occupancy of all of Burson Hall by 2012.

In the scenario that Physics vacates all areas in Burson Hall, there is a brief period of time, when there is just enough existing office area to accommodate Chemistry's need, only for offices. As Chemistry grows, this area, barely the size of a closet, disappears and deficits continue to mount.

Existing Facilities and Justification for Community Functions

In addition, the study team observed, during visits in both fall and spring terms, there are minimal office support and community facilities in Burson Hall. Through Project Kaleidoscope and National Science Foundation studies, the science education and research faculty and staff members are well-aware of the importance of peer interactions on learning outcomes, whether at the undergraduate, graduate or junior faculty levels. To do science, people occupying science buildings must interact. We observed faculty and students socialize and exchange information in dim hallways, leaning against door frames. This isn't comfortable or productive. UNC-Charlotte needs to bring emphasis to filling this critical need in the Chemistry Department in any improvements to, total renovation or replacement of Burson Hall.

Currently there is a single reading room (Rm 237) in Burson Hall that is assigned to Chemistry. Physics has no community facility and minimal teaching assistant and graduate student office area. Although one of the large existing food service facilities (Cone Center) isn't that far away from Burson Hall, and the new proposed Student Center will be close by, these very large facilities don't create a "home-base" environment for either students or faculty in Chemistry. Places for people to eat and drink safely and out of laboratory settings,

places for people to study together and alone are all necessary components for building a true research-driven science department. Table 9 gives a snap-shot of several possible improvements that could increase productive, scholarly interaction among Burson Hall occupants and aid in recruiting students and faculty.

Department Office: gives a better look and feel for Chemistry for recruiting/retaining students
Conference Rooms: full faculty meetings and smaller research team meetings.
Multi-purpose Meeting Room: department functions, poster sessions, parties, celebrations
Copy/Fax/Supply Room: improve efficiency for administrative staff and convenience for faculty
File Room: keep personnel and student files private
Mail/Coffee Break Room: informal interaction place for faculty and graduate students
Reading Room: quiet place for study and research
Peer-Tutoring Room: quiet place for study and assistance for and by students
Student Lounge: used for daily student informal interaction and for student organizations (ACS)

Table 9: CHEMISTRY OFFICE SUPPORT AREA & COMMUNITY FACILITIES

		2007		2012		2017
Function	**Rms**	**NASF**	**Rms**	**NASF**	**Rms**	**NASF**
Department Office Reception	1	200	1	200	1	200
Conference Room	1	264	2	1,200	2	1,200
Multi-purpose Meeting Room	0	0	1	2,000	1	2,000
Copy/Fax/Supply Room	1	150	1	150	1	150
File Room – Secure	1	200	1	200	1	200
Mail and Coffee Break Room	1	0	1	150	1	150
Reading Room	1	718	1	1,000	1	1,000
Peer-Tutoring Room	1	232	1	232	1	232
Student Lounge	0	0	1	1,500	1	1,500
Office Support/Social NASF	**6**	**1,764**	**9**	**6,282**	**49.5**	**10,784**
Total Chemistry Existing NASF		*982*		*1,094*		*1,094*
Office Support/Social Deficit		**550**		**4,956**		**9,458**

Note: These projections of Existing NASF assume Chemistry occupancy of all of Burson Hall by 2012.

Dept	Flr	Original Rm ID	Vacant	Current Function	Exist Function Code	Net Area	Percent Net Area to Total	Qty FH	L.F. Fume Hoods	Type & Condition	Observations
ALL				**TOTAL NET AREA BURSON HALL**		**79,717**		**55**	**312**		
				TOTALS for CHEMISTRY DEPT		**47,923**	**60.1%**	**55**	**312**		
CHE	1	110		Lecture Hall	C	2,256					
CHE	1	111		Conference Room	C	275					
CHE	1	115		Lecture Hall	C	1,399					
CHE	1	116		Classroom	C	724					
CHE	1	117		Classroom - Storage	CS	1,527					
CHE	1	118		Classroom	C	665					
CHE	1	119		Classroom	C	562					
CHE	1	120		Classroom	C	557					
CHE	2	200		Office - Admin, Reception	O	416					
CHE	2	201		Teaching Lab - Gen'l Chem	TL	1,747		2	12		
CHE	2	202		Teaching Lab - Advanced Chem	TL	1,650		4	24	old	
CHE	2	203		Instrument Lab-Shared, Gen Che	C	414		0			
CHE	2	204		Balance Room	TL	368		0			
CHE	2	205		Teaching Lab - Gen'l Chem	TL	1,739		2	12		
CHE	2	206		Storage - ???	B	172					
CHE	2	207		Teaching Lab - Gen'l Chem	TL	1,940		2	12		
CHE	2	208		Stockroom - Glassware	TS	494					
CHE	2	209		Instrument Lab - Shared, Quant	TS	197		0			
CHE	2	210		Teaching Lab - Biochemistry	TL	1,218					
CHE	2	211		Teaching Lab - Quant Analysis	TL	1,722		2	12		
CHE	2	212		Teaching Lab - Inorganic Chem	TL	1,023		4	24		
CHE	2	213		Teaching Lab - Organic Chem	TL	1,705					
CHE	2	214		Research Lab - Orgo Synthesis	RL	520		4	24		unsafe locations of fume hoods
CHE	2	215		Instrument Lab - Shared, Orgo	TS	414					
CHE	2	216	1	Research Lab -	TL	528		0			
CHE	2	218		Office - Admin	O	354					
CHE	2	219		Stockroom - ???	B	115					
CHE	2	220		Office - Faculty	O	114					
CHE	2	221		Stockroom - Dispensing	LS	529					
CHE	2	222		Office - Faculty	O	107					
CHE	2	223		Preparation Lab - Solutions	LS	160					
CHE	2	224		Office - Faculty	O	102					
CHE	2	225		Stockroom - Organic Chem	LS	608					
CHE	2	226		Office - Faculty	O	105					
CHE	2	227		Instrument Lab-NMR (300 MHz)	RS	387		2	4	old	
CHE	2	228		Office - Faculty	O	103					
CHE	2	229		Instrument Lab - ???	RS	175					
CHE	2	230		Office - Faculty	O	77					
CHE	2	231		Instrument Lab -	RS	713					
CHE	2	232		Office - Faculty	O	119					
CHE	2	233		Research Lab -	RL	573					
CHE	2	234		Office - Faculty	O	110					
CHE	2	235		Research Lab - Nanotech	RL	451					
CHE	2	236		Office - Faculty	O	113					
CHE	2	237		Reading Room	O	718					
CHE	2	238		Office - Faculty	O	111					
CHE	2	239		Office - Teaching Assistant	O	83					
CHE	2	240		Office - Faculty	O	127					
CHE	2	241	1	Research Lab - Material Science	RL	919		3	18		unsafe locations of fume hoods
CHE	2	242		Research Lab - Electro Chem	RL	574					unsafe locations of fume hoods
CHE	2	243		Research Lab - Biochemistry	RL	997		2	12		unsafe locations of fume hoods
CHE	2	244		Research Lab -	RL	560		3	18		
CHE	2	246		Research Lab - Orgo Synthesis	RL	574		3	18		unsafe locations of fume hoods
CHE	2	247		Research Lab - Biochemistry	RL	569					unsafe locations of fume hoods
CHE	2	248		Research Lab -	RL	543		3	18		unsafe locations of fume hoods
CHE	2	249		Research Lab - Orgo Synthesis	RL	554		3	18		unsafe locations of fume hoods
CHE	2	250		Office - Faculty	O	119					
CHE	2	251		Research Lab - Orgo Synthesis	RL	542		2	12	newer	unsafe locations of fume hoods
CHE	2	252		Office - Faculty	O	114					
CHE	2	253		Research Lab - Orgo Synthesis	RL	559		3	18		unsafe locations of fume hoods
CHE	2	254		Office - Faculty	O	113					
CHE	2	255		Research Lab - Orgo Synthesis	RL	529		2	12		unsafe locations of fume hoods

Dept	Flr	Original Rm ID	Vacant	Current Function	Exist Function Code	Net Area	Percent Net Area to Total	Qty FH	L.F. Fume Hoods	Type & Condition	Observations
ALL				**TOTAL NET AREA BURSON HALL**		**79,717**		**55**	**312**		
CHE	2	256		Office - Faculty (Dr. Donovan-M)	O	114					
CHE	2	258		Office - Faculty	O	114					
CHE	2	260		Office - Faculty	O	113					
CHE	2	262		Office - Faculty	O	108					
CHE	2	264		Office - Faculty	O	107					
CHE	2	266		Office - Faculty	O	114					
CHE	2	268		Office - Faculty	O	116					
CHE	2	269		Storage - Housekeeping	B	28					
CHE	2	270		Research Lab - X-Ray Analysis	RL	177					
CHE	2	271		Teaching Lab - Organic Chem	TL	1,753					
CHE	2	272		Research Lab - X-Ray Analysis	RL	276		2	8		
CHE	2	273		Research Lab -	RL	554		2	8		
CHE	2	274	1	Research Lab - Laser	RL	557		2	12		
CHE	2	276	1	Research Lab - Laser	RL	556		2	12		
CHE	1	115A		Corridor - Classroom	CS	301					
CHE	1	11A		AV Booth	CS	69					
CHE	B	173A		Corridor - Egress Stair	RS	130					
CHE	B	173B		Research Lab- X-Ray	RL	142		0			
CHE	2	200A		Office - Admin	O	149					
CHE	2	200B		Office - Admin	O	111					
CHE	2	200C		Office - Admin	O	138					
CHE	2	202A		Storage - Housekeeping	B	44					
CHE	2	210A		Storage - Housekeeping	B	111					
CHE	2	218A		Restroom - Men	B	293					
CHE	2	218B		Restroom - Women	B	242					
CHE	2	221A		Office - Stockrm Manager	O	108					
CHE	2	223A		Storage	LS	20					
CHE	2	225A		Stockroom - Inorganic Chem	LS	727					
CHE	2	239A-F		Research Lab - Computational	O	1,324					
CHE	2	239G-I		Office - Graduate Students	O	1,475					
CHE	2	241A	1	Research Lab - Material Science	RL	57		1	4		unsafe locations of fume hoods
CHE	2	243A		Restroom - Men	B	58		0			
CHE	2	243B		Restroom - Women	B	76					
CHE	2	270A		Preparation Lab-X-Ray Analysis	RS	114					
				TOTAL for FACILITIES DEPT		**4,693**	**5.9%**				
FAC	1	135		Corridor - Office	O	81					
FAC	1	150	1	Electrical Room	B	321					
FAC	1	101A		Restroom - Women	B	169					
FAC	1	101B		Restroom - Man	B	138					
FAC	1	150A	1	Mechanical		3,734					
FAC	1	150B	1	Mechanical		84					
FAC	1	155A	1	Restroom - Women	B	84					
FAC	1	155B	1	Restroom - Men	B	84					
				TOTAL for PHYSICS DEPT		**27,101**	**34.0%**				
PHY	1	100		Office - Admin, Reception	O	113					
PHY	1	101		Office - Graduate Student	O	114					
PHY	1	102		Office - Faculty	O	102					
PHY	1	103		Office - Faculty	O	101					
PHY	1	104		Office - Faculty	O	100					
PHY	1	105		Office - Faculty	O	110					
PHY	1	112		Kitchenette	CS	91					
PHY	1	113		Conference Room	C	264					
PHY	1	114		Teaching Lab - Astronomy	TL	1,316					
PHY	1	121		Lecture Hall	C	2,316					
PHY	1	122		Closet	B	77					
PHY	1	130		Office - Faculty	O	88					
PHY	1	131		Teaching Lab	TL	1,163					
PHY	1	132		Preparation Lab	TS	617					
PHY	1	133		Preparation Lab	TS	529					

Dept	Flr	Original Rm ID	Vacant	Current Function	Exist Function Code	Net Area	Percent Net Area to Total	Qty FH	L.F. Fume Hoods	Type & Condition	Observations
ALL				**TOTAL NET AREA BURSON HALL**		**79,717**		**55**	**312**		
PHY	1	134		Teaching Lab	TL	1,117					
PHY	1	136	1	Office - Faculty	O	106					
PHY	1	137	1	Instrument Lab -	RS	726					
PHY	1	138	1	Office - Faculty	O	112					
PHY	1	139	1	Office - Faculty	O	114					
PHY	1	140	1	Office - Faculty	O	114					
PHY	1	141	1	Office - Faculty	O	101					
PHY	1	142	1	Office - Faculty	O	130					
PHY	1	143	1	Office - Faculty	O	127					
PHY	1	144	1	Office - Faculty	O	124					
PHY	1	145	1	Office - Faculty	O	122					
PHY	1	146	1	Shop	RS	495					
PHY	1	147	1	Office - Teach Assistants	O	174					
PHY	1	148	1	Research Lab - quantum optic	RL	377		1	6	old	
PHY	1	149	1	Building Service	B	151					
PHY	1	151	1	Teaching Lab - Gen'l Physics	TL	1,165					
PHY	1	153	1	Teaching Lab - Gen'l Physics	TL	1,113		0			
PHY	1	154	1	Research Lab - Photonics	RL	431		0			
PHY	1	156	1	Research Lab	RL	819		0			
PHY	1	157	1	Research Lab	RL	316		0			
PHY	1	158	1	Research Lab	RL	316		0			
PHY	1	159	1	Storage	RS	318					
PHY	1	160	1	Research Lab	RL	316		0			
PHY	1	161	1	Research Lab	RL	380		0			
PHY	1	162	1	Research Lab	RL	382		0			
PHY	1	163	1	Office - Graduate Students	O	191					
PHY	1	164	1	Research Lab- UV	RL	464		0			
PHY	1	165	1	Dark Room	RS	221					
PHY	1	166	1	Teaching Lab - Adv Physics	TL	521		0			
PHY	1	167	1	Teaching Lab	TL	906		0			
PHY	1	168	1	Research Lab- optics	RL	377		0			
PHY	1	169	1	Preparation Lab	TL	199		1	6	old	
PHY	1	170		Shop	RS	468		0			
PHY	1	171		Shop	RS	478		0			
PHY	1	171A		Shop	RS	639					
PHY	1	172	1	Research Lab	RL	389		0	6	old	
PHY	1	173	1	Research Lab- laser	RL	960		0			
PHY	1	100A		Storage -	OS	47					
PHY	1	100B		Office - Administration	O	165					
PHY	1	100C		Office - Administration	O	186					
PHY	1	100D		Storage -	OS	65					
PHY	1	100E		Office - Administration	O	254					
PHY	1	121A		AV Booth	CS	141					
PHY	1	132A		Preparation Lab	TS	213					
PHY	1	134A		Preparation Lab	TL	96					
PHY	1	134B		Preparation Lab	TL	124					
PHY	1	134C		Preparation Lab	TL	98					
PHY	1	135A		Office - Dept Admin	O	311					
PHY	1	135B		Office - Faculty	O	154					
PHY	1	135C		Office - Faculty	O	138					
PHY	1	135D		Office - Faculty	O	135					
PHY	1	135E		Office - Faculty	O	186					
PHY	1	135G		Corridor - Office	O	41					
PHY	1	135H		Closet	B	43					
PHY	1	135I		Office - Dept Admin	O	311					
PHY	1	135J		Office - Dept Admin	O	233					
PHY	1	137A	1	Instrument Lab -	RS	123					
PHY	1	137B	1	Instrument Lab -	RS	120					
PHY	1	137C	1	Instrument Lab - SEM	RS	119					
PHY	1	137D	1	Instrument Lab -	RS	99					
PHY	1	137E	1	Instrument Lab -	RS	99					
PHY	1	164A	1	Research Lab- optic metrology	RL	401		0			
PHY	1	171A	1	Research Lab	RL	639		0			

Dept	Flr	Original Rm ID	Vacant	Current Function	Exist Function Code	Net Area	Percent Net Area to Total	Qty FH	L.F. Fume Hoods	Type & Condition	Observations
ALL				**TOTAL NET AREA BURSON HALL**		**79,078**		**58**	**330**		
				TOTALS FOR FIRST FLOOR		**39,760**	**50.3%**	**3**	**18**		
PHY	1	100		Office - Admin, Reception	O	113					
PHY	1	100A		Storage -	OS	47					
PHY	1	100B		Office - Administration	O	165					
PHY	1	100C		Office - Administration	O	186					
PHY	1	100D		Storage -	OS	65					
PHY	1	100E		Office - Administration	O	254					
PHY	1	101		Office - Graduate Student	O	114					
FAC	1	101A		Restroom - Women	B	169					
FAC	1	101B		Restroom - Man	B	138					
PHY	1	102		Office - Faculty	O	102					
PHY	1	103		Office - Faculty	O	101					
PHY	1	104		Office - Faculty	O	100					
PHY	1	105		Office - Faculty	O	110					
CHE	1	110		Lecture Hall	C	2,256					
CHE	1	11A		AV Booth	CS	69					
CHE	1	111		Conference Room	C	275					
PHY	1	112		Kitchenette	CS	91					
PHY	1	113		Conference Room	C	264					
PHY	1	114		Teaching Lab - Astronomy	TL	1,316					
CHE	1	115		Lecture Hall	C	1,399					
CHE	1	115A		Corridor - Classroom	CS	301					
CHE	1	116		Classroom	C	724					
CHE	1	117		Classroom - Storage	CS	1,527					
CHE	1	118		Classroom	C	665					
CHE	1	119		Classroom	C	562					
CHE	1	120		Classroom	C	557					
PHY	1	121		Lecture Hall	C	2,316					
PHY	1	121A		AV Booth	CS	141					
PHY	1	122		Closet	B	77					
PHY	1	130		Office - Faculty	O	88					
PHY	1	131		Teaching Lab	TL	1,163					
PHY	1	132		Preparation Lab	TS	617					
PHY	1	132A		Preparation Lab	TS	213					
PHY	1	133		Preparation Lab	TS	529					
PHY	1	134		Teaching Lab	TL	1,117					
PHY	1	134A		Preparation Lab	TL	96					
PHY	1	134B		Preparation Lab	TL	124					
PHY	1	134C		Preparation Lab	TL	98					
FAC	1	135		Corridor - Office	O	81					
PHY	1	135A		Office - Dept Admin	O	311					
PHY	1	135B		Office - Faculty	O	154					
PHY	1	135C		Office - Faculty	O	138					
PHY	1	135D		Office - Faculty	O	135					
PHY	1	135E		Office - Faculty	O	186					
PHY	1	135F		Office - Dept Admin	O						
PHY	1	135G		Corridor - Office	O	41					
PHY	1	135H		Closet	B	43					
PHY	1	135I		Office - Dept Admin	O	311					
PHY	1	135J		Office - Dept Admin	O	233					
PHY	1	136	1	Office - Faculty	O	106					
PHY	1	137	1	Instrument Lab -	RS	726					
PHY	1	137A	1	Instrument Lab -	RS	123					
PHY	1	137B	1	Instrument Lab -	RS	120					
PHY	1	137C	1	Instrument Lab - SEM	RS	119					
PHY	1	137D	1	Instrument Lab -	RS	99					
PHY	1	137E	1	Instrument Lab -	RS	99					
PHY	1	138	1	Office - Faculty	O	112					
PHY	1	139	1	Office - Faculty	O	114					
PHY	1	140	1	Office - Faculty	O	114					
PHY	1	141	1	Office - Faculty	O	101					
PHY	1	142	1	Office - Faculty	O	130					
PHY	1	143	1	Office - Faculty	O	127					

Dept	Flr	Original Rm ID	Vacant	Current Function	Exist Function Code	Net Area	Percent Net Area to Total	Qty FH	L.F. Fume Hoods	Type & Condition	Observations
ALL				**TOTAL NET AREA BURSON HALL**		**79,078**		**58**	**330**		
PHY	1	144	1	Office - Faculty	O	124					
PHY	1	145	1	Office - Faculty	O	122					
PHY	1	146	1	Shop	RS	495					
PHY	1	147	1	Office - Teach Assistants	O	174					
PHY	1	148	1	Research Lab - quantum optic	RL	377		1	6	old	
PHY	1	149	1	Building Service	B	151					
FAC	1	150	1	Electrical Room	B	321					
FAC	1	150A	1	Mechanical	B	3,734					
FAC	1	150B	1	Mechanical	B	84					
PHY	1	151	1	Teaching Lab - Gen'l Physics	TL	1,165					
PHY	1	153	1	Teaching Lab - Gen'l Physics	TL	1,113		0			
PHY	1	154	1	Research Lab - Photonics	RL	431		0			
FAC	1	155A	1	Restroom - Women	B	84					
FAC	1	155B	1	Restroom - Men	B	84					
PHY	1	156	1	Research Lab	RL	819		0			
PHY	1	157	1	Research Lab	RL	316		0			
PHY	1	158	1	Research Lab	RL	316		0			
PHY	1	159	1	Storage	RS	318					
PHY	1	160	1	Research Lab	RL	316		0			
PHY	1	161	1	Research Lab	RL	380		0			
PHY	1	162	1	Research Lab	RL	382		0			
PHY	1	163	1	Office - Graduate Students	O	191					
PHY	1	164	1	Research Lab- UV	RL	464		0			
PHY	1	164A	1	Research Lab- optic metrology	RL	401		0			
PHY	1	165	1	Dark Room	RS	221					
PHY	1	166	1	Teaching Lab - Adv Physics	TL	521		0			
PHY	1	167	1	Teaching Lab	TL	906		0			
PHY	1	168	1	Research Lab- optics	RL	377		0			
PHY	1	169	1	Preparation Lab	TL	199		1	6	old	
PHY	1	170	1	Shop	RS	468		0			
PHY	1	171	1	Shop	RS	478		0			
PHY	1	171A	1	Shop	RS	639		0			
PHY	1	172	1	Research Lab	RL	389		1	6	old	
PHY	1	173	1	Research Lab- laser	RL	960		0			
CHE	B	173A		Corridor - Egress Stair	RS	130					
CHE	B	173B		Research Lab- X-Ray	RL	142		0			
				TOTALS FOR SECOND FLOOR		**39,318**	**49.7%**	**55**	**312**		
CHE	2	200		Office - Admin, Reception	O	416					
CHE	2	200A		Office - Admin	O	149					
CHE	2	200B		Office - Admin	O	111					
CHE	2	200C		Office - Admin	O	138					
CHE	2	201		Teaching Lab - Gen'l Chem	TL	1,747		2	12		
CHE	2	202		Teaching Lab - Advanced Chem	TL	1,650		4	24	old	
CHE	2	202A		Storage - Housekeeping	B	44					
CHE	2	203		Instrument Lab-Shared, Gen Che	TL	414		0			
CHE	2	204		Balance Room	TL	368		0			
CHE	2	205		Teaching Lab - Gen'l Chem	TL	1,739		2	12		
CHE	2	206		Storage - ???	B	172					
CHE	2	207		Teaching Lab - Gen'l Chem	TL	1,940		2	12		
CHE	2	208		Stockroom - Glassware	TS	494					
CHE	2	209		Instrument Lab - Shared, Quant	TS	197		0			
CHE	2	210		Teaching Lab - Biochemistry	TL	1,218					
CHE	2	210A		Storage - Housekeeping	B	111					
CHE	2	211		Teaching Lab - Quant Analysis	TL	1,722		2	12		
CHE	2	212		Teaching Lab - Inorganic Chem	TL	1,023		4	24		
CHE	2	213		Teaching Lab - Organic Chem	TL	1,705					
CHE	2	214		Research Lab - Orgo Synthesis	RL	520		4	24		unsafe locations of fume hoods
CHE	2	215		Instrument Lab - Shared, Orgo	TS	414					
CHE	2	216	1	Research Lab -	TL	528		0			
CHE	2	218		Office - Admin	O	354					
CHE	2	218A		Restroom - Men	B	293					
CHE	2	218B		Restroom - Women	B	242					

Dept	Flr	Original Rm ID	Vacant	Current Function	Exist Function Code	Net Area	Percent Net Area to Total	Qty FH	L.F. Fume Hoods	Type & Condition	Observations
ALL				**TOTAL NET AREA BURSON HALL**		**79,078**		**58**	**330**		
CHE	2	219		Stockroom - ???	B	115					
CHE	2	220		Office - Faculty	O	114					
CHE	2	221		Stockroom - Dispensing	LS	529					
CHE	2	221A		Office - Stockrm Manager	O	108					
CHE	2	222		Office - Faculty	O	107					
CHE	2	223		Preparation Lab - Solutions	LS	160					
CHE	2	223A		Storage	LS	20					
CHE	2	224		Office - Faculty	O	102					
CHE	2	225		Stockroom - Organic Chem	LS	608					
CHE	2	225A		Stockroom - Inorganic Chem	LS	727					
CHE	2	226		Office - Faculty	O	105					
CHE	2	227		Instrument Lab-NMR (300 MHz)	RS	387		2	4	old	
CHE	2	228		Office - Faculty	O	103					
CHE	2	229		Instrument Lab - ???	RS	175					
CHE	2	230		Office - Faculty	O	77					
CHE	2	231		Instrument Lab -	RS	713					
CHE	2	232		Office - Faculty	O	119					
CHE	2	233		Research Lab -	RL	573					
CHE	2	234		Office - Faculty	O	110					
CHE	2	235		Research Lab - Nanotech	RL	451					
CHE	2	236		Office - Faculty	O	113					
CHE	2	237		Reading Room	O	718					
CHE	2	238		Office - Faculty	O	111					
CHE	2	239		Office - Teaching Assistant	O	83					
CHE	2	239A-F		Research Lab - Computational	O	1,324					
CHE	2	239G-I		Office - Graduate Students	O	1,475					
CHE	2	240		Office - Faculty	O	127					
CHE	2	241	1	Research Lab - Material Science	RL	919		3	18		unsafe locations of fume hoods
CHE	2	241A	1	Research Lab - Material Science	RL	57		1	4		unsafe locations of fume hoods
CHE	2	242		Research Lab - Electro Chem	RL	574					unsafe locations of fume hoods
CHE	2	243		Research Lab - Biochemistry	RL	997		2	12		unsafe locations of fume hoods
CHE	2	243A		Restroom - Men	B	58		0			
CHE	2	243B		Restroom - Women	B	76					
CHE	2	244		Research Lab -	RL	560		3	18		
CHE	2	246		Research Lab - Orgo Synthesis	RL	574		3	18		unsafe locations of fume hoods
CHE	2	247		Research Lab - Biochemistry	RL	569					unsafe locations of fume hoods
CHE	2	248		Research Lab -	RL	543		3	18		unsafe locations of fume hoods
CHE	2	249		Research Lab - Orgo Synthesis	RL	554		3	18		unsafe locations of fume hoods
CHE	2	250		Office - Faculty	O	119					
CHE	2	251		Research Lab - Orgo Synthesis	RL	542		2	12	newer	unsafe locations of fume hoods
CHE	2	252		Office - Faculty	O	114					
CHE	2	253		Research Lab - Orgo Synthesis	RL	559		3	18		unsafe locations of fume hoods
CHE	2	254		Office - Faculty	O	113					
CHE	2	255		Research Lab - Orgo Synthesis	RL	529		2	12		unsafe locations of fume hoods
CHE	2	256		Office - Faculty (Dr. Donovan-M)	O	114					
CHE	2	258		Office - Faculty	O	114					
CHE	2	260		Office - Faculty	O	113					
CHE	2	262		Office - Faculty	O	108					
CHE	2	264		Office - Faculty	O	107					
CHE	2	266		Office - Faculty	O	114					
CHE	2	268		Office - Faculty	O	116					
CHE	2	269		Storage - Housekeeping	B	28					
CHE	2	270		Research Lab - X-Ray Analysis	RL	177					
CHE	2	270A		Preparation Lab-X-Ray Analysis	RS	114					
CHE	2	271		Teaching Lab - Organic Chem	TL	1,753					
CHE	2	272		Research Lab - X-Ray Analysis	RL	276		2	8		
CHE	2	273		Research Lab -	RL	554		2	8		
CHE	2	274	1	Research Lab - Laser	RL	557		2	12		
CHE	2	276	1	Research Lab - Laser	RL	556		2	12		

Dept	Flr	Original Rm ID	Vacant	No. Rms	Current Function	Exist Function Code	Net Area	Chemistry Existing Net Area	Chemistry Percent Net Area to Total	Qty FH	L.F. Fume Hoods
ALL					**TOTAL NET AREA BURSON HALL**		**78,550**	**47,923**	**61.0%**	**66**	**378**
				7	**TOTAL BUILDING SUPPORT**	**7.8%**	**6,145**				
				7	**Chemistry Subtotal**			**789**	**1.0%**		
CHE	2	218B		1	Restroom - Women	B	242				
CHE	2	243B		1	Restroom - Women	B	76				
CHE	2	219		1	Storage - ???	B	115				
CHE	2	206		1	Storage - ???	B	172				
CHE	2	269		1	Storage - Housekeeping	B	28				
CHE	2	202A		1	Storage - Housekeeping	B	44				
CHE	2	210A		1	Storage - Housekeeping	B	111				
PHY	1	149	1	1	Building Service	B	151				
PHY	1	122		1	Closet	B	77				
PHY	1	135H		1	Closet	B	43				
FAC	1	135		1	Corridor - Office	B	81				
FAC	1	135G		1	Corridor - Office	B	41				
FAC	1	150	1	1	Electrical Room	B	321				
FAC	1	150A	1	1	Mechanical	B	3,734				
FAC	1	150B	1	1	Mechanical	B	84				
FAC	1	101B		1	Restroom - Man	B	138				
FAC	1	155B	1	1	Restroom - Men	B	84				
CHE	2	218A		1	Restroom - Men	B	293				
CHE	2	243A		1	Restroom - Men	B	58				
FAC	1	101A		1	Restroom - Women	B	169				
FAC	1	155A	1	1	Restroom - Women	B	84				
				9	**TOTAL CLASSROOM**	**11.5%**	**9,017**				
				7	**Chemistry Subtotal**			**6,437**	**8.2%**		
CHE	1	110		1	Lecture Hall	C	2,256				
CHE	1	111		1	Conference Room	C	275				
CHE	1	115		1	Lecture Hall	C	1,399				
CHE	1	116		1	Classroom	C	724				
CHE	1	118		1	Classroom	C	665				
CHE	1	119		1	Classroom	C	562				
CHE	1	120		1	Classroom	C	557				
PHY	1	113		1	Conference Room	C	264				
PHY	1	121		1	Lecture Hall	C	2,316				
				5	**TOTAL CLASSROOM SUPPORT**	**2.7%**	**2,129**				
				3	**Chemistry Subtotal**			**1,896**	**2.4%**		
CHE	1	117		1	Classroom - Storage	CS	1,527				
CHE	1	115A		1	Corridor - Classroom	CS	301				
CHE	1	11A		1	AV Booth	CS	69				
PHY	1	112		1	Kitchenette	CS	91				
PHY	1	121A		1	AV Booth	CS	141				
				5	**TOTAL LABORATORY SUPPORT**	**2.6%**	**2,044**				
				5	**Chemistry Subtotal**			**2,044**	**2.6%**		

Dept	Flr	Original Rm ID	Vacant	No. Rms	Current Function	Exist Function Code	Net Area	Chemistry Existing Net Area	Chemistry Percent Net Area to Total	Qty FH	L.F. Fume Hoods
ALL					**TOTAL NET AREA BURSON HALL**		**78,550**	**47,923**	**61.0%**	**66**	**378**
CHE	2	221		1	Stockroom - Dispensing	LS	529				
CHE	2	223		1	Preparation Lab - Solutions	LS	160				
CHE	2	225		1	Stockroom - Organic Chem	LS	608				
CHE	2	223A		1	Storage	LS	20				
CHE	2	225A		1	Stockroom - Inorganic Chem	LS	727				
				66	**TOTAL OFFICES**	**14.5%**	**11,409**				
				38	**Chemistry Subtotal**			**7,193**	**9.2%**		
CHE	2	218		1	Office - Admin	O	354				
CHE	2	200A		1	Office - Admin	O	149				
CHE	2	200B		1	Office - Admin	O	111				
CHE	2	200C		1	Office - Admin	O	138				
CHE	2	200		1	Office - Admin, Reception	O	416				
CHE	2	220		1	Office - Faculty	O	114				
CHE	2	222		1	Office - Faculty	O	107				
CHE	2	224		1	Office - Faculty	O	102				
CHE	2	226		1	Office - Faculty	O	105				
CHE	2	228		1	Office - Faculty	O	103				
CHE	2	230		1	Office - Faculty	O	77				
CHE	2	232		1	Office - Faculty	O	119				
CHE	2	234		1	Office - Faculty	O	110				
CHE	2	236		1	Office - Faculty	O	113				
CHE	2	238		1	Office - Faculty	O	111				
CHE	2	240		1	Office - Faculty	O	127				
CHE	2	250		1	Office - Faculty	O	119				
CHE	2	252		1	Office - Faculty	O	114				
CHE	2	254		1	Office - Faculty	O	113				
CHE	2	258		1	Office - Faculty	O	114				
CHE	2	260		1	Office - Faculty	O	113				
CHE	2	262		1	Office - Faculty	O	108				
CHE	2	264		1	Office - Faculty	O	107				
CHE	2	266		1	Office - Faculty	O	114				
CHE	2	268		1	Office - Faculty	O	116				
CHE	2	256		1	Office - Faculty (Dr. Donovan-M)	O	114				
CHE	2	239G-I		3	Office - Graduate Students	O	1,475				
CHE	2	221A		1	Office - Stockrm Manager	O	108				
CHE	2	239		1	Office - Teaching Assistant	O	83				
CHE	2	237		1	Reading Room	O	718				
CHE	2	239A-F		6	Research Lab - Computational	O	1,324				
PHY	1	100		1	Office - Admin, Reception	O	113				
PHY	1	100B		1	Office - Administration	O	165				
PHY	1	100C		1	Office - Administration	O	186				
PHY	1	100E		1	Office - Administration	O	254				
PHY	1	135A		1	Office - Administration	O	311				
PHY	1	135I		1	Office - Administration	O	311				
PHY	1	135J		1	Office - Administration	O	233				
PHY	1	102		1	Office - Faculty	O	102				
PHY	1	103		1	Office - Faculty	O	101				

Dept	Flr	Original Rm ID	Vacant	No. Rms	Current Function	Exist Function Code	Net Area	Chemistry Existing Net Area	Chemistry Percent Net Area to Total	Qty FH	L.F. Fume Hoods
ALL					**TOTAL NET AREA BURSON HALL**		**78,550**	**47,923**	**61.0%**	**66**	**378**
PHY	1	104		1	Office - Faculty	O	100				
PHY	1	105		1	Office - Faculty	O	110				
PHY	1	130		1	Office - Faculty	O	88				
PHY	1	136	1	1	Office - Faculty	O	106				
PHY	1	138	1	1	Office - Faculty	O	112	O			
PHY	1	139	1	1	Office - Faculty	O	114	O			
PHY	1	140	1	1	Office - Faculty	O	114	O			
PHY	1	141	1	1	Office - Faculty	O	101	O			
PHY	1	142	1	1	Office - Faculty	O	130	O			
PHY	1	143	1	1	Office - Faculty	O	127	O			
PHY	1	144	1	1	Office - Faculty	O	124	O			
PHY	1	145	1	1	Office - Faculty	O	122	O			
PHY	1	135B		1	Office - Faculty	O	154				
PHY	1	135C		1	Office - Faculty	O	138				
PHY	1	135D		1	Office - Faculty	O	135				
PHY	1	135E		1	Office - Faculty	O	186				
PHY	1	101		1	Office - Graduate Student	O	114				
PHY	1	163	1	1	Office - Graduate Students	O	191				
PHY	1	147	1	1	Office - Teach Assistants	O	174	O			
				2	**TOTAL OFFICE SUPPORT**	**0.1%**	**112**				
PHY	1	100A		1	Storage -	OS	47				
PHY	1	100D		1	Storage -	OS	65				
				34	**TOTAL RESEARCH LABORATORIES**	**21.3%**	**16,711**			**41**	**228**
				21	**Chemistry Subtotal**			**10,784**	**13.7%**	**37**	**212**
CHE	2	214		1	Research Lab - Orgo Synthesis	RL	520			4	24
CHE	2	233		1	Research Lab -	RL	573				
CHE	2	235		1	Research Lab - Nanotech	RL	451				
CHE	2	241	1	1	Research Lab - Material Science	RL	919			3	18
CHE	2	242		1	Research Lab - Electro Chem	RL	574				
CHE	2	243		1	Research Lab - Biochemistry	RL	997			2	12
CHE	2	244		1	Research Lab -	RL	560			3	18
CHE	2	246		1	Research Lab - Orgo Synthesis	RL	574			3	18
CHE	2	247		1	Research Lab - Biochemistry	RL	569				
CHE	2	248		1	Research Lab -	RL	543			3	18
CHE	2	249		1	Research Lab - Orgo Synthesis	RL	554			3	18
CHE	2	251		1	Research Lab - Orgo Synthesis	RL	542			2	12
CHE	2	253		1	Research Lab - Orgo Synthesis	RL	559			3	18
CHE	2	255		1	Research Lab - Orgo Synthesis	RL	529			2	12
CHE	2	270		1	Research Lab - X-Ray Analysis	RL	177				
CHE	2	272		1	Research Lab - X-Ray Analysis	RL	276			2	8
CHE	2	273		1	Research Lab -	RL	554			2	8
CHE	2	274	1	1	Research Lab - Laser	RL	557			2	12
CHE	2	276	1	1	Research Lab - Laser	RL	556			2	12
CHE	B	173B		1	Research Lab- X-Ray	RL	142			0	
CHE	2	241A	1	1	Research Lab - Material Science	RL	57			1	4
PHY	1	148	1	1	Research Lab - quantum optic	RL	377			1	6

Dept	Flr	Original Rm ID	Vacant	No. Rms	Current Function	Exist Function Code	Net Area	Chemistry Existing Net Area	Chemistry Percent Net Area to Total	Qty FH	L.F. Fume Hoods
ALL					**TOTAL NET AREA BURSON HALL**		**78,550**	**47,923**	**61.0%**	**66**	**378**
PHY	1	154	1	1	Research Lab - Photonics	RL	431			0	
PHY	1	156	1	1	Research Lab	RL	819			0	
PHY	1	157	1	1	Research Lab	RL	316			0	
PHY	1	158	1	1	Research Lab	RL	316			0	
PHY	1	160	1	1	Research Lab	RL	316			0	
PHY	1	161	1	1	Research Lab	RL	380			0	
PHY	1	162	1	1	Research Lab	RL	382			0	
PHY	1	164	1	1	Research Lab- UV	RL	464			0	
PHY	1	168	1	1	Research Lab- optics	RL	377			0	
PHY	1	172	1	1	Research Lab	RL	389			1	6
PHY	1	173	1	1	Research Lab- laser	RL	960	TL		0	
PHY	1	164A	1	1	Research Lab- optic metrology	RL	401			0	
				17	**TOTAL RESEARCH SUPPORT**	**6.9%**	**5,424**				
				4	**Chemistry Subtotal**			**1,517**	**1.9%**		
CHE	2	229		1	Instrument Lab	RS	175			0	
CHE	2	231		1	Instrument Lab	RS	713			0	
CHE	2	270A		1	Preparation Lab-X-Ray Analysis	RS	114			0	
CHE	2	227		1	Instrument Lab-NMR (300 MHz)	RS	387			2	4
CHE	B	173A		1	Corridor - Egress Stair	RS	130				
PHY	1	137	1	1	Instrument Lab -	RS	726				
PHY	1	137A	1	1	Instrument Lab -	RS	123				
PHY	1	137B	1	1	Instrument Lab -	RS	120				
PHY	1	137C	1	1	Instrument Lab - SEM	RS	119				
PHY	1	137D	1	1	Instrument Lab -	RS	99				
PHY	1	137E	1	1	Instrument Lab -	RS	99				
PHY	1	159	1	1	Storage	RS	318			0	
PHY	1	165	1	1	Dark Room	RS	221			0	
PHY	1	146		1	Shop	RS	495			0	
PHY	1	170		1	Shop	RS	468			0	
PHY	1	171		1	Shop	RS	478			0	
PHY	1	171A		1	Shop	RS	639			0	
				21	**TOTAL TEACHING LABORATORIES**	**28.9%**	**22,681**			**25**	**150**
				10	**Chemistry Subtotal**			**14,865**	**18.9%**	**24**	**144**
CHE	2	201		1	Teaching Lab - Gen'l Chem	TL	1,747			2	12
CHE	2	202		1	Teaching Lab - Advanced Chem	TL	1,650			4	24
CHE	2	204		1	Balance Room	TL	368			0	
CHE	2	205		1	Teaching Lab - Gen'l Chem	TL	1,739			2	12
CHE	2	207		1	Teaching Lab - Gen'l Chem	TL	1,940			2	12
CHE	2	210		1	Teaching Lab - Biochemistry	TL	1,218			0	
CHE	2	211		1	Teaching Lab - Quant Analysis	TL	1,722			2	12
CHE	2	212		1	Teaching Lab - Inorganic Chem	TL	1,023			4	24
CHE	2	213		1	Teaching Lab - Organic Chem	TL	1,705			4	24
CHE	2	271		1	Teaching Lab - Organic Chem	TL	1,753			4	24
PHY	1	114		1	Teaching Lab - Astronomy	TL	1,316			0	
PHY	1	131		1	Teaching Lab	TL	1,163			0	

Dept	Flr	Original Rm ID	Vacant	No. Rms	Current Function	Exist Function Code	Net Area	Chemistry Existing Net Area	Chemistry Percent Net Area to Total	Qty FH	L.F. Fume Hoods
ALL					**TOTAL NET AREA BURSON HALL**		**78,550**	**47,923**	**61.0%**	**66**	**378**
PHY	1	134		1	Teaching Lab	TL	1,117			0	
PHY	1	151	1	1	Teaching Lab - Gen'l Physics	TL	1,165			0	
PHY	1	153	1	1	Teaching Lab - Gen'l Physics	TL	1,113			0	
PHY	1	166	1	1	Teaching Lab - Adv Physics	TL	521			0	
PHY	1	167	1	1	Teaching Lab	TL	906			0	
PHY	1	169	1	1	Preparation Lab	TL	199			1	6
PHY	1	134A		1	Preparation Lab	TL	96				
PHY	1	134B		1	Preparation Lab	TL	124				
PHY	1	134C		1	Preparation Lab	TL	98				
				6	**TOTAL TEACHING SUPPORT**	**3.7%**	**2,878**				
				3	**Chemistry Subtotal**			**1,518**	**1.9%**		
CHE	2	203		1	Instrument Lab-Shared, Gen Che	C	414				
CHE	2	208		1	Stockroom - Glassware	TS	494				
CHE	2	209		1	Instrument Lab - Shared, Quant	TS	197				
CHE	2	215		1	Instrument Lab - Shared, Orgo	TS	414				
PHY	1	132		1	Preparation Lab	TS	617				
PHY	1	133		1	Preparation Lab	TS	529				
PHY	1	132A		1	Preparation Lab	TS	213				

Current Function	Exist Function Code	Total Exist Net Area	Total Exist No. Rooms	Percent of Total NASF	Chemistry Existing Net Area	Chemistry Exist No. Rooms	Percent of Total NASF Chemistry	Proposed Chemistry New Net Area	Proposed Chemistry New No. Rooms	Proposed Change in ChemistryNet Area	Percent Change
TOTAL NET AREA BURSON HALL		**79,078**	**172**		**47,923**	**98**		**81,521**	**219**	**2,971**	
TOTAL NET ASSIGNABLE AREA		**72,933**	**165**		**47,135**	**91**		**74,220**	**195**		
BUILDING SUPPORT	B	6,145	7	NA	789	7	NA	7,301	24	1,156	NA
CLASSROOM	C	9,017	9	12.4%	6,437	7	13.7%	11,168	10	2,150	2.9%
CLASSROOM SUPPORT	CS	2,129	5	2.9%	1,896	3	4.0%	301	2	-1,828	-2.5%
LABORATORY SUPPORT	LS	2,044	5	2.8%	2,044	5	4.3%	2,044	5	0	
OFFICES	O	11,409	66	15.6%	7,193	38	15.3%	11,717	61	307	0.4%
OFFICE SUPPORT	OS	112	2	0.2%	0	0	0.0%	112	2	0	
RESEARCH LABORATORIES	RL	16,711	34	22.9%	10,784	21	22.9%	15,880	69	-831	-1.1%
RESEARCH SUPPORT	RS	5,424	17	7.4%	1,517	4	3.2%	6,156	16	732	1.0%
TEACHING LABORATORIES	TL	22,681	21	31.1%	14,865	10	31.5%	24,181	20	1,499	2.0%
TEACHING SUPPORT	TS	2,878	6	3.9%	1,518	3	3.2%	2,662	10	-215	-0.3%

UNC CHARLOTTE

9201 University City Boulevard
Charlotte, N.C. 28223-0001

BURSON BUILDING
ANALYSIS OF EXISTING SYSTEMS

United Project No. 206211

May 16. 2007

UNITED
Engineering Group, Inc.

UNITED ENGINEERING GROUP, INC.
CONSULTING ENGINEERS
5624 EXECUTIVE CENTER DRIVE
SUITE 200
CHARLOTTE, NORTH CAROLINA 28212

TABLE OF CONTENTS

Burson Building
Analysis of Existing Systems

A. Plumbing

Roof Drainage System (Storm Drainage)

Storm water is collected on the roof in strategically placed roof drains. These drains are connected to an interior piping system that includes rain leaders and horizontal drain lines that convey this storm water to the site collection system. The drawings are not clear as to the location of the tie-in points occur between the building system and the site storm water collection system. There are no apparent Means of emergency roof relief drainage.

After a quick review of the conditions on the roof it appears that the collection system functions adequately with the exception of the east portion of the building. Here there is standing water on the roof surface due to a clogged roof drain.

The roof drainage system is constructed using cast iron soil pipe and fittings for those portions of the system above ground. We assume that the under ground system utilizes cast iron soil pipe and fittings.

The building maintenance staff made no note of performance issues with the existing roof drainage system.

Sanitary Drainage System

The Sanitary drainage system collects waste from the toilet fixtures and the laboratory/classroom sinks. Drainage is routed through the building towards the south and exits along the south wall. The laboratory waste portion is noted as acid waste (AW) on the drawings and is tied directly into the sanitary waste system. There appears to be no facilities for any type of neutralization provided in the current system.

The acid waste (AW) portion of the system is constructed using glass pipe and fittings with mechanical joints. The materials used on the sanitary portion of the system could not be verified. We assume the above ground portions are cast iron soil pipe and fittings with no-hub joints and the under ground portions are cast iron soil pipe and fittings with push-on joints.

According to the building maintenance personnel, the drainage system has not suffered with any major operational issues. The policy of not discharging hazardous materials into the building drainage system has been monitored and enforced.

Domestic Water Distribution System

The domestic water service enters the building along the north wall in the mechanical space. The service entrance is fitted with an isolation valve and a check valve. There appears to be no backflow prevention device on this system other than the single check valve.

Hot water for the building is generated in a steam fired storage water heater with approximately 500 gallon storage capacity. The steam is supplied from the campus distribution system. A second electric water heater is provided to generate hot water during the months when the campus steam system is secured.

The domestic water distribution system is constructed using copper tube and fittings with soldered joints. The piping is insulated with fiberglass pipe insulation and covered with what appears to be an all-service jacket. Distribution piping for each floor is routed in the ceiling of that floor.

The main issue with the water distribution system is the minimal water pressure in some of the laboratories. Further investigations will be required to determine the cause of these low pressure conditions.

Natural Gas Distribution System

Natural Gas enters the building in the Mechanical room and is routed throughout the building to the laboratories. Building heating is provided by steam piped in from the campus distribution system so there is no large gas loads currently in the building. It appears that the only loads are those in each laboratory.

The natural gas distribution system is constructed using threaded steel pipe with cast iron or malleable iron fittings. All gas piping within the building uses threaded joints. Distribution piping for each floor is routed in the ceiling of that floor. There is no indication of any deficiencies with this system.

High Volume Air System

The building is fitted with a high volume air distribution system. The source equipment for this system resides in the main mechanical room on the first floor. This equipment includes an electric motor driven air compressor and it related controls. This system takes its make-up air from the mechanical room which is fitted with some type of filter unit.

High volume air drops are provided only in specific laboratories. These drops include isolation valves and large diameter hose connection. The distribution piping for each floor is routed in the ceiling of that floor. It did not appear that this system was in use in any of the laboratories. There is no indication of any deficiencies with this system.

Distilled Water System

The building is fitted with a distilled water distribution system. Source equipment for the generation of the distilled water is located in the first floor main mechanical room. This equipment includes a deionizer with acid and caustic tanks, a 150 gallon deionized water tank, a still, a distillate cooler, a 150 gallon distilled water storage tank and a distribution pump. The interconnecting piping is fabricated using polypropylene pipe and fittings with solvent cement joints. The source water is drawn from the building cold water distribution system.

The piping system throughout the building utilizes the same polypropylene piping materials as found at the source equipment. This piping system is extended to all the laboratories where it connects to the lab benches and hoods. The distribution piping for each floor is routed in the ceiling of that floor. There is no indication of any deficiencies with this system.

Miscellaneous Lab Gas Systems

Individual laboratories use several different specialty gasses in the work on going in the lab. These specialty gasses are provided at the laboratory in DOT approved compressed gas container specific for each gas or mixture used. The containers are securely supported at each point of use location.

There appears to be a need for nitrogen in both the gas and liquid form. Several portable liquid nitrogen tanks were observed on each floor. Numerous nitrogen gas containers were also observed.

B. Fire Protection

Currently the building is not fitted with any type of automatic fire protection system. There are no automatic sprinklers installed in any portion of the building.

C. Mechanical:

The following report is based on a site visit by Atul Nerurkar and Jim Giles, United Engineering Group, on April 27, 2007 and discussions with Dewey Williams, UNC Charlotte's Lab Manager.

Mr. Williams accompanied us to half-a-dozen labs that were being renovated or are expected to be renovated in the future when the staff has determined the needs in each area. Several areas that are currently being renovated will be served by a new 100% outside air unit located on the South side of the building.

The mechanical systems, including air handling unit, chiller, cooling tower, 2 pipe hot water reheat piping system, pneumatic controls, etc., are between twenty-two and twenty-three years old and are nearing their life expectancy. The main air handling unit is a variable volume built-up air handling unit with a supply fan capacity of approx. 96,000 cfm, a return fan capacity of approx. 79,000 cfm, a steam pre-heat coil and a chilled water coil. The chiller and cooling tower are rated at 330 tons. There is no means of measuring outside air quantity in order to meet IAQ requirements. We could not determine if there are pressure differential controls in the Lab areas. It did not appear that there was heat available in the summer for reheat since the campus steam is shut down all summer.

The original HVAC system, consisting of hood supply and exhaust fans, is located on the roof in a skylight-type dome enclosure with intake and exhaust louvers located at the roof line.

The original design had unconditioned make-up air supplied directly to the hoods with an air/air heat exchanger located in the hood exhaust and supply air ductwork for energy conservation. Some time after the building was occupied, changes were made to the hood make-up air and exhaust systems. Electric heat was added to the hood supply air and the air/air heat exchangers were removed. There were substantial changes made to the existing systems in 1997 which involved the addition of six (6) roof top 100% make-up air units with dual temperature water coils, an air cooled chiller steam-to-water heat exchanger and associated pumps. In addition, the existing exhaust louvers located at roof level were connected to a plenum, which in turn was connected to several large up-blast centrifugal exhaust fans which work in series with the original lab exhaust fans. Pneumatic pressure sensors in the plenum maintain negative pressure by modulating outdoor air intake dampers. This is not a recommended practice in today's technology for lab hood exhaust systems.

Mr. Williams indicated that, from time to time, UNC Charlotte Safety Department reviews the hood/exhaust fan operation and makes the necessary adjustments to fan speeds and has deemed them safe for operation. Updated hoods with more energy efficient features would be desirable if additional funding was available.

It was also noted that the main air handling unit for the building has its outside air intake located adjacent to the Loading Dock. Mr. Williams noted that this has caused some complaints from the building occupants of the smell of gas fumes from vehicles running at the Loading Dock.

The present spot exhaust systems appear to be operating at a positive pressure when the fans were off. A backdraft damper is located at the inlet of the duct. When the fan was operating, the exhaust air was flowing in the correct direction (towards the fan). However, when the fan was off, and the backdraft damper was opened manually, the air flow was into the space. The Code requires that the exhaust ductwork from the hoods upstream of fans be under a negative pressure at all times.

The existing terminal units have pneumatic controls. DDC controls were added for the dual temperature system that was installed in 1997. Pneumatic control setpoints vary over time and have to be reset every few months which is very difficult to accomplish therefore systems do not function as intended. DDC controls tend to maintain their setpoints for a long time so that the systems tend to function as designed for a much longer period. This is important for a laboratory setting where pressure differentials are critical for safety of the occupants.

The University has made substantial changes to the systems. These changes were not evaluated since drawings were not available at this time.

The chiller most likely has refrigerant that does not meet current Codes. There was no refrigerant exhaust or emergency chiller shut-down from outside the chiller room is not provided as required by ASHRAE 15 code.

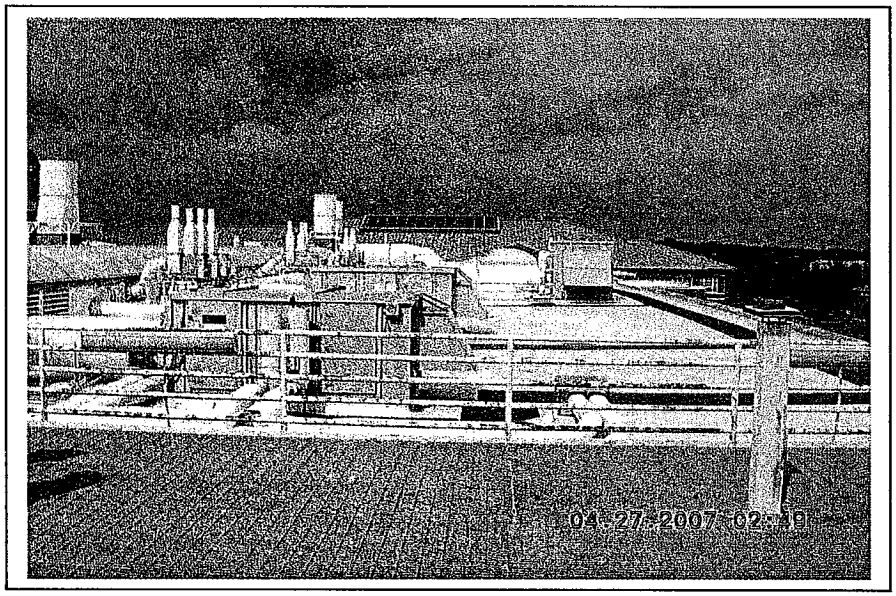
It did not appear that all hood exhaust ducts were welded. It could not be determined if there were any fire dampers in the hood exhaust ducts (the plans do not show any).

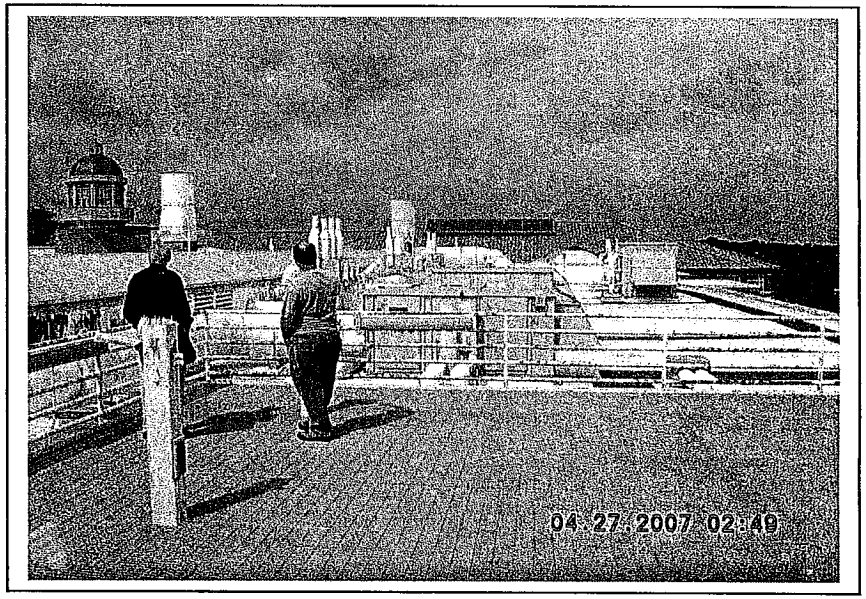
Mr. Williams noted later that the bench hoods in the teaching areas do not provide sufficient exhaust for working with most chemicals at their desks and the current design of the hoods block the instructor's and student's view of the Lab and are not included in the make-up air system. He noted that these hoods are listed by the University Safety Office to pull an average of 30 cfm, but the range is 20 to 40 cfm as measured inside the hood space. The hoods have no sash and could not be closed.

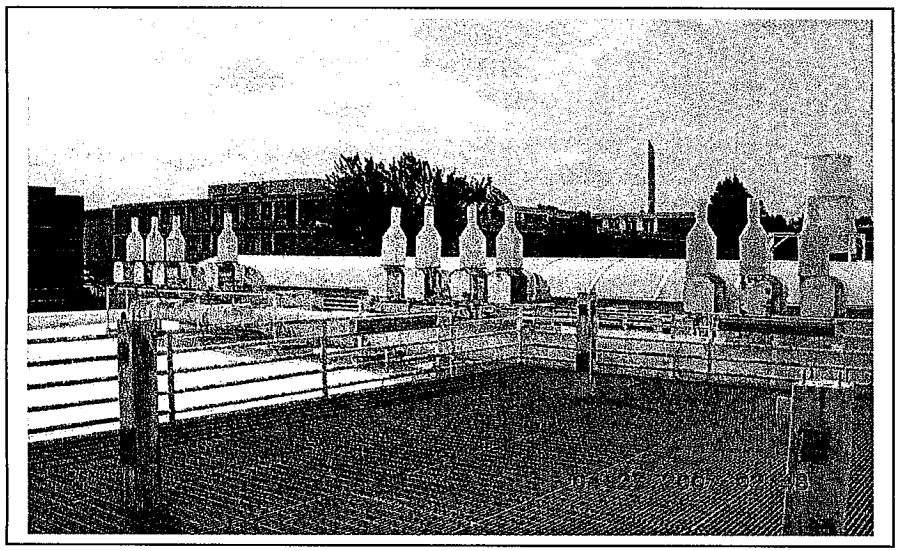
There was a process chiller in the Mechanical Room. There were no drawings that indicate backflow prevention since the chilled water piping connects to the domestic water piping. In several Labs, process water was tempered with domestic water and wasted.

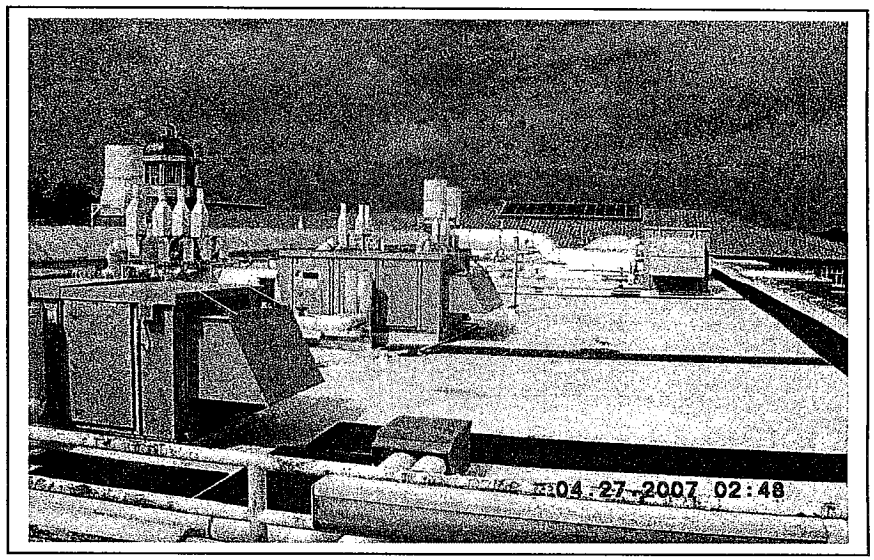
It was noted that the outside air louvers on the wall of the adjacent School of Nursing face Burson Building. We could not determine at this time if there was any carryover from the lab exhaust fans to the intake louvers.

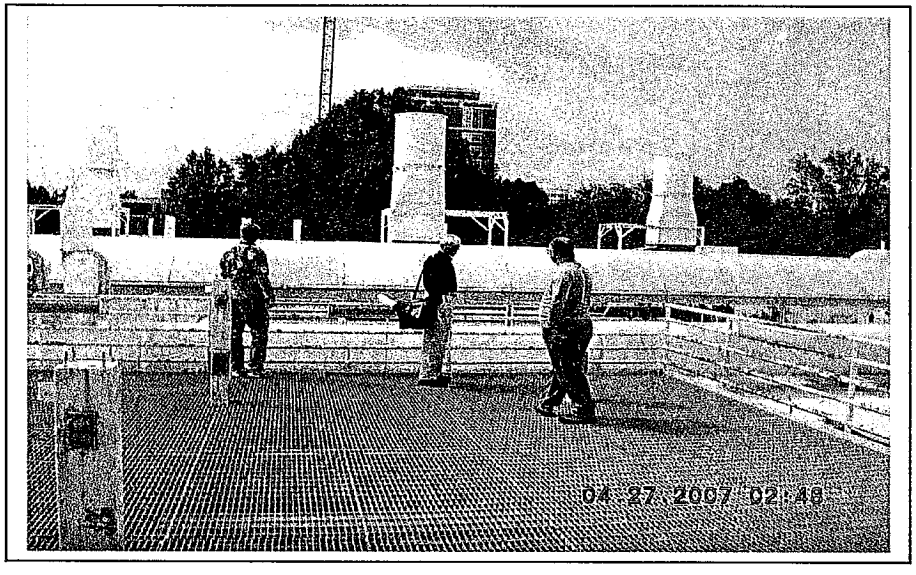
See attached miscellaneous photographs.

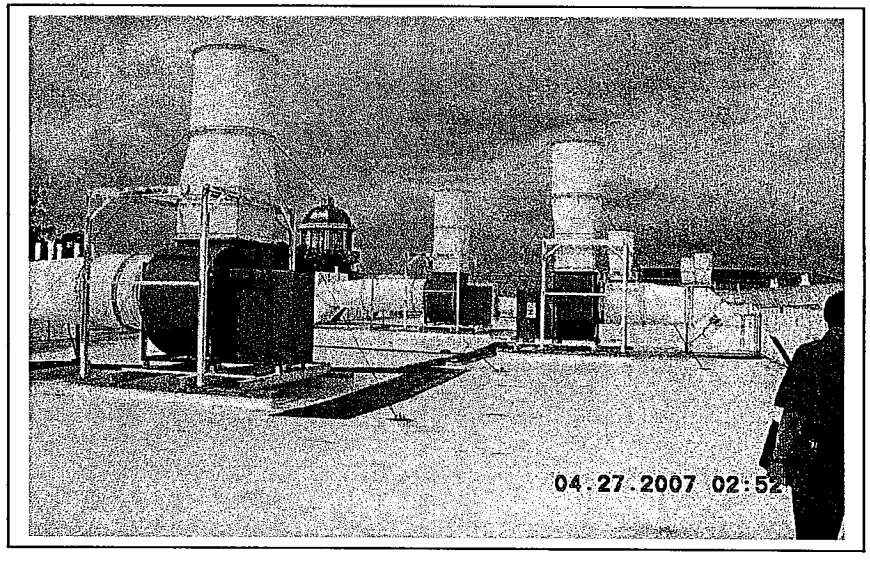

04-27-2007 02:49

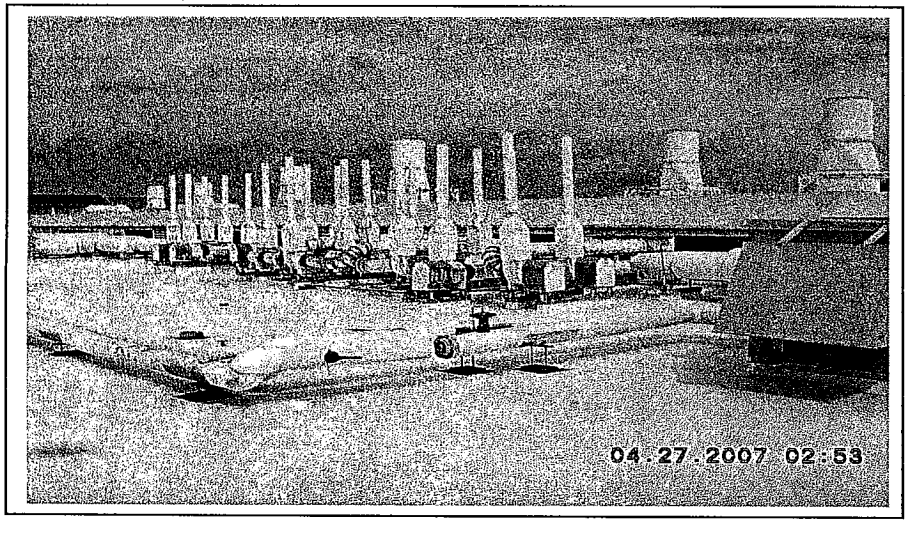

04-27-2007 02:49

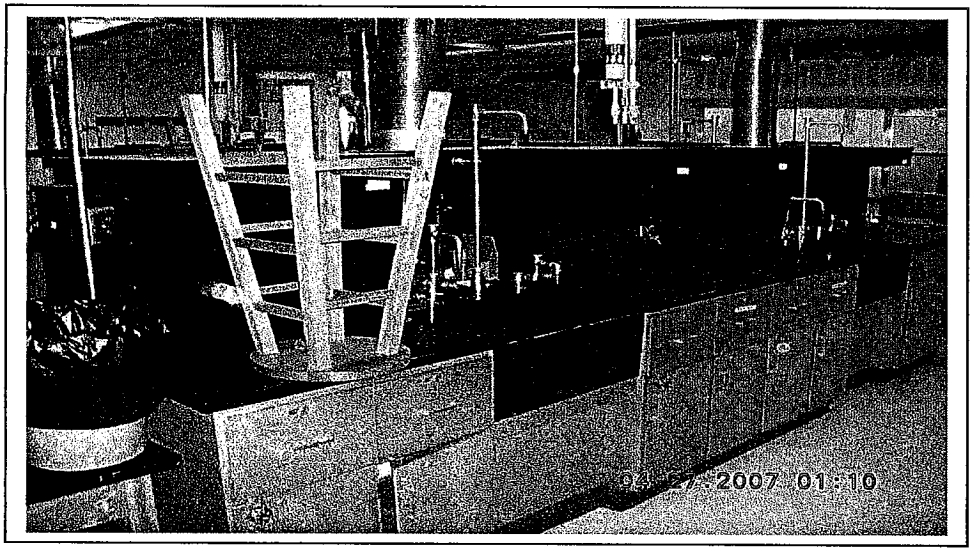


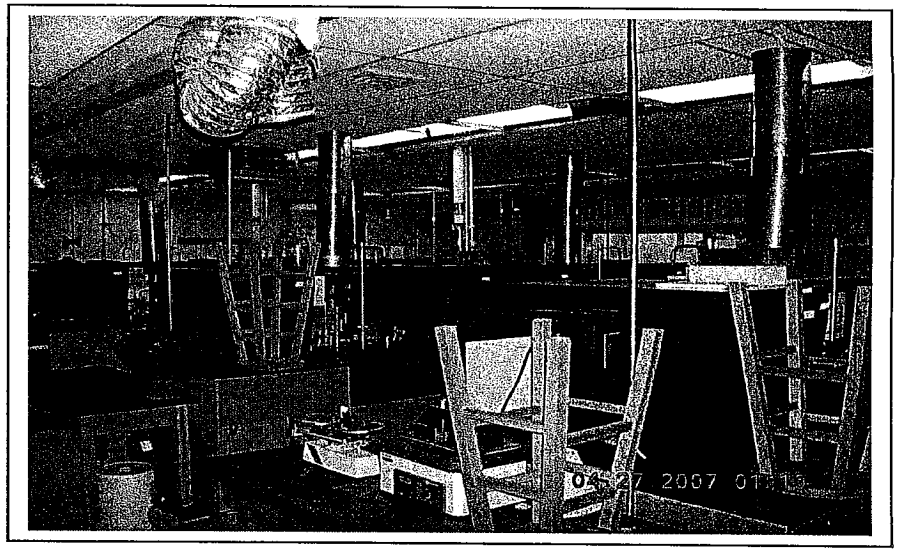

04-27-2007 02:48

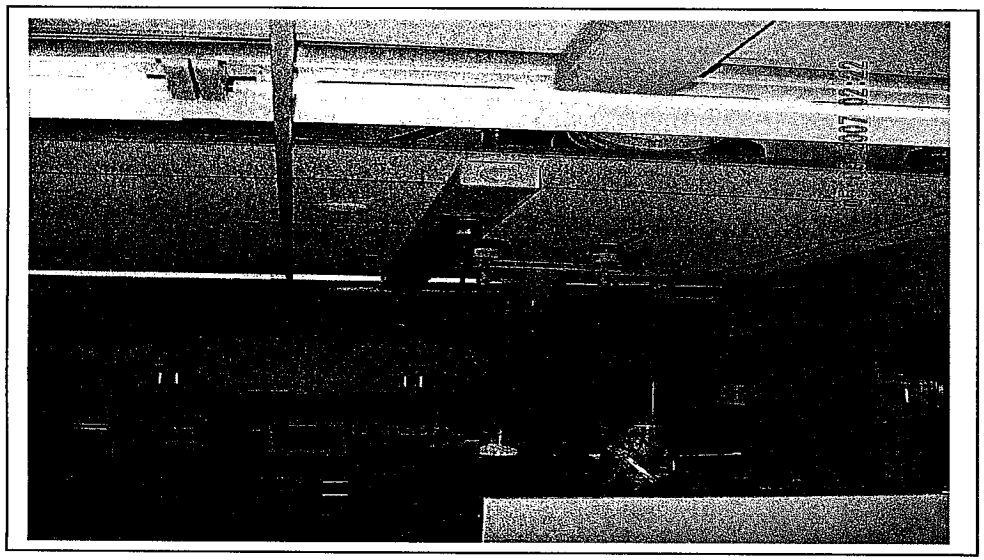

04.27.2007 02:48


04.27.2007 02:52


04.27.2007 02:53







D. Electrical:

Service Entrance Equipment

The Burson Building has three (3) pad mounted electrical service transformers that are fed from an S&C PMH-12 medium voltage pad mounted switchgear (#S-42C-A). The three transformers are fed individually underground, each using 3-350 KCMIL (15 KV) + 1-2/0, 4"C. The three transformers are as follows:

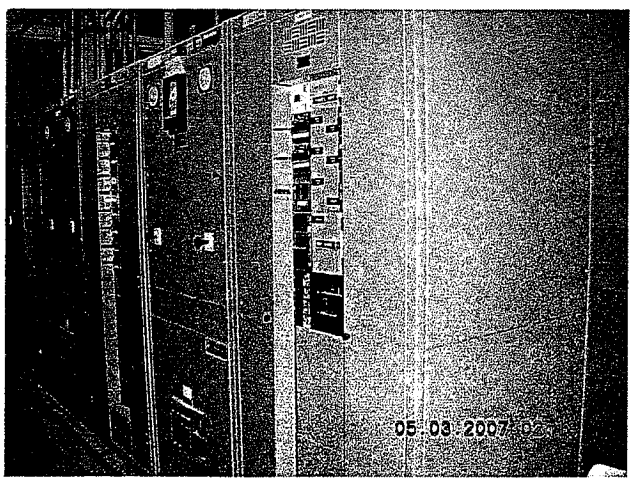
(1) 1000 KVA, 7200/12470-277/480V
(2) 750 KVA, 7200/12470-120/208V
(3) 750 KVA, 7200/12470-120/208V

Each service transformer feeds a switchboard inside the main electrical room on the first floor. The switchboards are described as follows:

(1) Switchboard SBA, 277/480V, 3-phase, 4-wire, 1600A, 1600A Main Breaker w/GFI
Westinghouse POW R LINE
Fed from transformer #1 using 4(3-500 KCMIL + 1-3/0, 3"C),
copper conductors.

(2) Switchboard SBB, 120/208V, 3-phase, 4-wire, 2500A, 2500A Main Breaker w/GFI
Westinghouse POW R LINE
Fed from transformer #2 using 7(3-500 + 1-3/0, 3"C),
copper conductors.

(3) Switchboard SBC, 120/208V, 3-phase, 4-wire, 2500A, 2500A Main Breaker w/GFI
Westinghouse POW R LINE
Fed from transformer #2 using 7(3-500 + 1-3/0, 3"C),
copper conductors.



Burson Switchboards SBA, SBB, SBC

The load readings taken on 4/27/07 @ 9:00 am at each switchboard using the on-board metering were as follows:

SBA:	Phase A – 600A	SBB: Meter not operable.	SBC: Phase A – 400A
	Phase B – 600A		Phase B – 350A
	Phase C – 600A		Phase C – 350A

The load readings measured on 5/4/07 at the transformer feeding each switchboard were as follows:

SBA:	Phase A – 534A	SBB:	Phase A – 79A	SBC:	Phase A – 287A
	Phase B – 532A		Phase B - 71A		Phase B – 293A
	Phase C – 506A		Phase C - 81A		Phase C – 334A
	Neutral – 35A		Neutral - 35A		Neutral - 106A

The switchboards were original, approximately 20 yrs old and were observed to be in fair condition. Switchboard SBA primarily serves the building mechanical equipment and lighting while switchboards SBB and SBC serve the building plug load on the 1st and 2nd floors respectively. None of the switchboards were heavily loaded. There was some space in each board for future circuit breaker installations. There was no surge protection devices observed at the main service entrance.

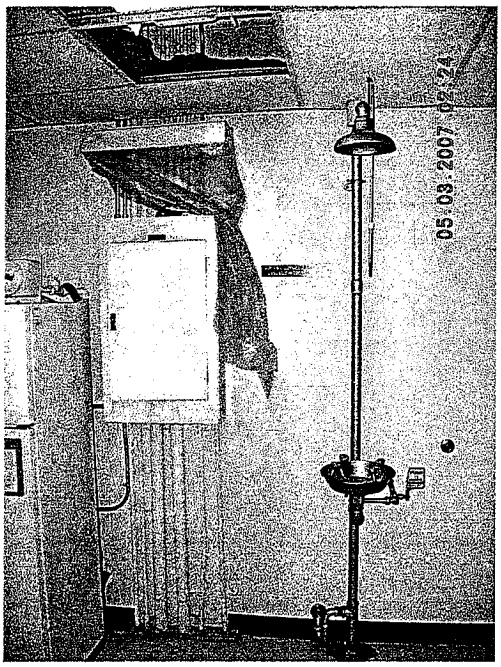
Power Distribution

Power is distributed throughout the building at 120/208V for plug loads and 277/480V for lighting and mechanical equipment. 120/208V branch circuit panelboards are located throughout the building in corridors and laboratories. Copper conductors were observed for feeder and branch circuit cabling.

The majority of branch circuit panelboards were filled close to capacity with little or no space for additional circuit breakers. Load readings were not taken at individual branch circuit panelboards. Most of the branch circuit panelboards were original, approximately 20 yrs old and appeared to be in fair condition. Many of the panels in the laboratories were located adjacent to emergency water showers. There was no surge protection devices observed on any of the branch circuit panelboards.

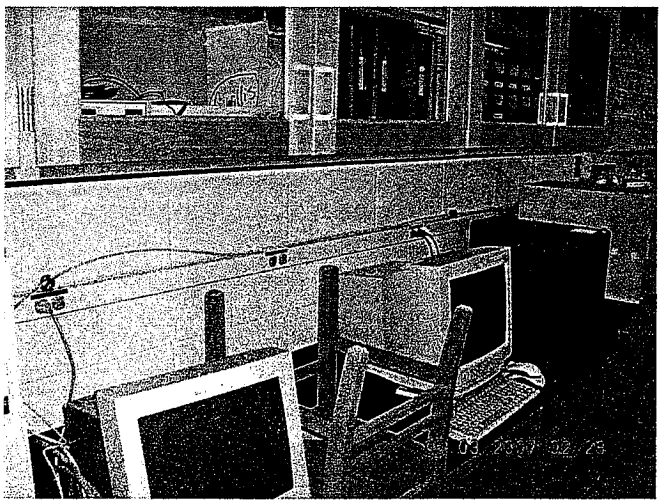
Metal surface mounted raceways were utilized in many of the laboratory areas along the walls and on the ceilings for power distribution. The condition of the branch circuit raceways and wiring was observed to be fair.

A new pad mounted dry type 75 kVA transformer was being installed on the first floor in room 163 at the time of this study. The new transformer fed two new 120/208V 3-phase, 4-wire branch circuit panelboards installed as part of the nearby lab renovations.



Laboratory Panelboard

Laboratory Ceiling Raceway



Laboratory Wall Raceway

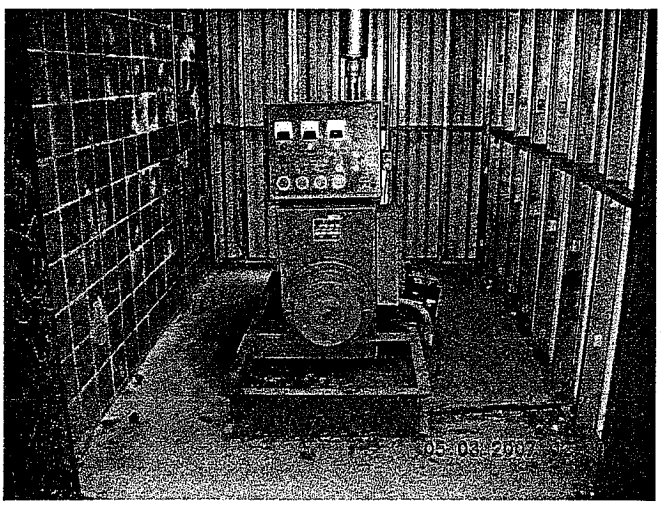
Emergency Generator

The building life safety systems (egress lighting and fire alarm panel) are served from a 3-phase, 4-wire, 277/480V, 75 FLA, ECCO diesel generator. The generator feeds a 100A, 3-pole Westinghouse Automatic Transfer Switch (ATS) via a 90A circuit breaker located at the generator. The ATS feeds a 277/480V panel EM which feeds a small transformer that serves 120/208V panel EMA. Panel EMA contains multiple branch circuit breakers feeding laboratory receptacles throughout the building.

The loading on panel EM measured on 4/27/07 @ 9:00 am at the ATS was as follows:

Phase A – 14 A
Phase B – 13 A
Phase C – 18 A

The generator, ATS and associated distribution equipment was original, approximately 20 yrs old and appeared in fair condition. The generator was not heavily loaded. Panelboards EM and EMA had very little room for future installation of circuit breakers.



Generator

Lighting

The lighting throughout most of the building utilizes T12 lamps with magnetic ballasts. The corridors contain mostly 2'x 4' (2)-lamp lay-in fluorescent fixtures. Laboratories contain mostly 4' (2)-lamp industrial fluorescent fixtures. Classrooms contain mostly 2'x 2' lay-in fixtures. Some of the laboratories and classrooms also contain 120V pendant mount incandescent lighting (dimmable) in addition to the fluorescent fixtures.

Light levels in the classrooms seem adequate measuring between 40 and 60 footcandles at desk level (IES recommends 50 footcandles minimum). Light levels in the laboratories without lay-in ceilings were measured between 30 and 45 footcandles and levels in laboratories with lay-in ceilings were measured between 20 and 40 footcandles. The laboratory lighting was below IES recommended levels of 50 – 100 footcandles.

It appeared that lay-in ceilings in some of the laboratories were added after the building came on line without changing the original industrial fluorescent lighting application. The lighting from the industrial fluorescent fixtures in laboratories with ceilings is poorly distributed and much of the light is lost above the ceiling.

Most of the lighting observed was in good condition. The lens on many of the 2'x 4' lay-in fixtures has begun to discolor.

Emergency egress lighting was run off of the generator and installed in the corridors.

Exit Signs were in excellent condition and appeared to utilize LED technology.

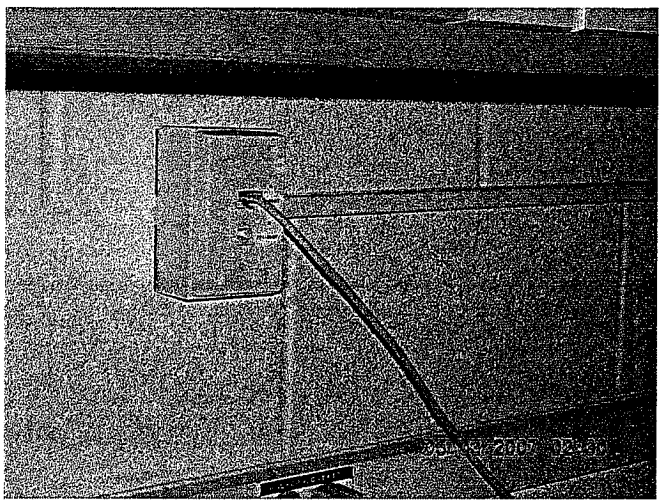
Industrial Fluorescents in Laboratory Ceiling

Data

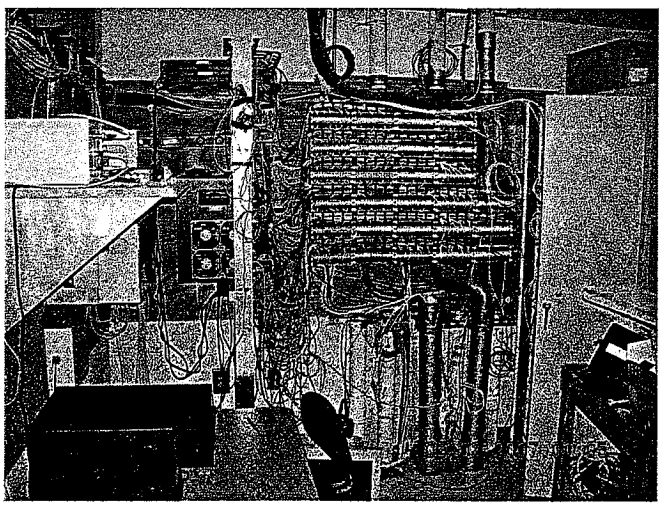
The telecom building entrance equipment is located in the main electrical room on the first floor behind the switchboards. There are no telecom rooms on the first floor of the building. Individual data cabling for both the first and second floors is run to two telecom rooms on the second floor. One of the telecom rooms has air conditioning the other does not. One of the rooms is a shared storage room. Each telecom room has one rack. The switching equipment is outdated in both rooms. Appropriate grounding in the telecom rooms was not evident. Both rooms are insufficient in size and would need to be enlarged or moved to support

additional cabling requirements.

The data cabling is predominantly Category 5 with some Category 5e. Voice cabling is Category 1 and 3. Most of the cabling is tie-wrapped above the lay-in ceilings. There is very little cable pathway (cable tray, conduit, etc.) in the building. The metallic raceways used for power distribution inside the laboratories do not contain dividers that would support data cabling. Most of the data cabling is installed in surface mount boxes as shown below.



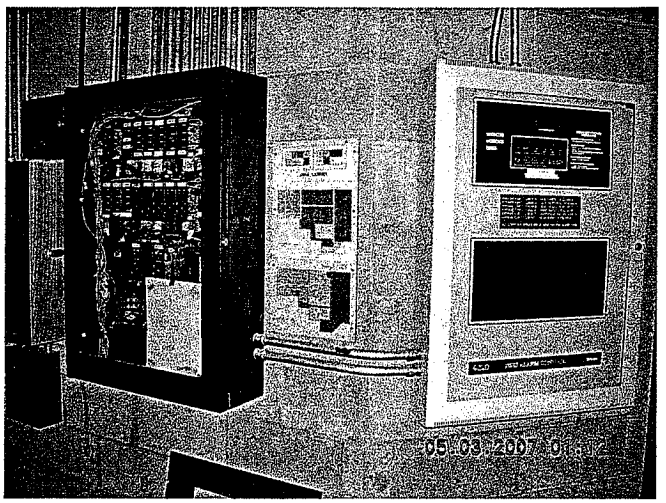
Typical Laboratory Data Outlet



Second Floor Telecom Room

Fire Alarm

The Fire Alarm Control Panel (FACP) is located in the mechanical room on the first floor. An annunciator panel is located at the main entrance on the second floor of the building. The FACP is a Simplex 4020 zoned system. There are notification devices located in the corridors. Heat detectors are located throughout the laboratory spaces. Smoke detectors are located in the corridors.



Fire Alarm Control Panel

Misc.

The drawings indicated that the building was constructed with a ground ring (counterpoise) encircling the building. There was no structural lightning protection observed on the building roof. There were no surge protection devices observed anywhere in the building.

Recommendations for Upfitting Existing Systems/New Systems

A. Plumbing

Roof Drainage System

This system will require modification if the interior partitions require modifications or the building size is changed. The only apparent issues with this system relate to simply maintenance and timely routine inspections.

Sanitary Drainage System

Currently the sanitary drainage and the laboratory or acid waste combine into the same piping within the building. This was originally done to insure that any acid waste entering the system would be diluted by the sanitary waste in the same system. This however is not considered neutralization.

There is no evidence that issues exist with this system as a result of acidic wastes. The University has been very diligent in its enforcement of the collection of hazardous wastes in proper containers and no discharges into the drainage system. The assumption is that this level of enforcement will continue in the future as additional research and teaching facilities are provided in this building. If the enforcement will not continue the waste systems will need to be separated into purely sanitary and acid wastes and the acid waste will require proper neutralization.

Domestic Water Distribution System

This system appears to be satisfactory with a couple of exceptions. One is the reduced of for these pressure drops. The solution could be as simple as cross-tying the main branch lines together to provide loops and flows from multiple directions to the low pressure areas. Another solution would be to provide a water pressure booster pump to increase water pressure building wide.

The second issue is the generation of hot water. The hot water source equipment should be evaluated relative to the potential of this building becoming more research oriented. Hot water of sufficient capacity is generated by a steam fired water heater during the portions of the year that the campus steam system is active. When that system is secured during the summer months this steam service is not available. A secondary electric water heater has been installed to provide a minimum of hot water during these times. This concept needs to be reviewed based of the projected future occupancy of this building.

Natural Gas System

The natural gas system appears to be adequate at the present time. As long as the only gas demands within the building are those similar to the current laboratory demands the system will be acceptable. If larger natural gas users are planned for the building in the future the natural gas service will need modification.

High Volume Air System

There is no evidence that this system is inadequate for the current building use. If the future occupancies change this system may require re-evaluation.

Distilled Water System

This system should be reviewed in its current configuration. There is no evidence that this system is a circulation system. This is an issue because the purity of the water can not be maintained without constant refreshment. If the water is allowed to stand in the piping for a length of time it will leach impurities out of the pipe causing the water to no longer meet the standards of purity that required the deionizing and distillation in the first place.

Prior to any modifications to the building the quality of the high purity water should be determined and agreed to so that the system can be modified to provide that level of purity. Maintenance personnel have indicated that the only current use for this water is to clean lab utensils.

Miscellaneous Lab Gas Systems

The current philosophy relative to these specialty gasses is to provide containers locally at points of use as necessary. This is an acceptable way to accomplish the needs in each lab. This could be included in discussions of future fit-out of the building as the proposed occupancies are modified.

B. Fire Protection

Future fit-out plans for this building need to include the addition of automatic sprinkler protection. Consideration should be given to developing a plan for the entire building that could be implemented in phases as the building occupancies are modified.

It is assumed at this time that a fire pump to support the proposed automatic sprinkler system would not be needed. This is based on the data developed during the recent design of the adjacent new buildings. However, given the changing demands on the current campus water distribution system as the campus expands, this issue will require more intense evaluation at a later time.

C. Mechanical:

Replace the existing built-up air handling unit, including supply and return fans, coils, controls, etc. Relocation of outside air intake should be a high priority. A separate unit should be provided for the Labs.with redundant fans

Replace the existing pneumatic control system with a DDC system tied into the present Campus control system.

Replace the chiller and cooling tower, including pumps. Consideration should be given to installing 2 chillers to have some redundancy. Provide a refrigerant exhaust system that meets ASHRAE 15 requirements.

Provide a new hot water piping system with new convertor and parallel pumps in order to create a four-pipe system to the six (6) hood make-up roof top air handling units. A gas fired boiler should be provided for summer reheat when the campus steam system is shut down.

Provide new laboratory hoods throughout the facility provided with variable air volume supply systems and variable air volume exhaust systems with Phoenix type pressure differential controls to maintain negative pressure between the labs and adjacent spaces at all times.

If new hoods are proposed or provisions are made for additional hoods on the First Floor, rated chases on the Second Floor should be considered to facilitate the running of new supply and exhaust ductwork in the future.

Rework the present spot exhaust systems.

A study needs to be completed to provide exhaust air flow modeling to determine if the roof mounted exhaust fans on Burson have any effect on the intake louvers at the School of Nursing.

A comprehensive study of the entire building exhaust air/supply air systems needs to be completed to determine that all Labs are negative and that none of the Labs are returning air to the main air handling system.

If additions to the existing building are considered, one option might be to construct a new mechanical room in the new addition to serve the existing building and the new addition. The existing mechanical room could then be converted to laboratory spaces.

If the existing mechanical systems are replaced as recommended, it would be advisable to shut down the entire building while this work was being completed.

D. Electrical:

Replace existing lighting utilizing new fixtures with T8 or T5 lamps and electronic ballasts. Select appropriate fixtures for the application. Eliminate the industrial fluorescent fixtures in the laboratory spaces with lay-in ceilings.

Provide for dedicated telecommunication rooms on each floor. Each room to be air conditioned with sufficient space for multiple racks. Provide cable tray/pathway throughout building for current and future data cabling installations

Replace the existing generator with a larger unit capable of supporting all of the building life safety and other "generator backed" equipment applications. Separate life safety power distribution equipment from the other "generator backed" distribution equipment.

Add surge protection devices at the main service entrance and at critical power panel locations.

Tobin+Dudley
Architecture / Planning
1523 Elizabeth Avenue
Charlotte, NC 28204
704 377-5200
fax 704 377-5201

PROJECT: 0651_UNCC Burson

UNC Charlotte Burson Chemistry

Ground Floor Plan Study

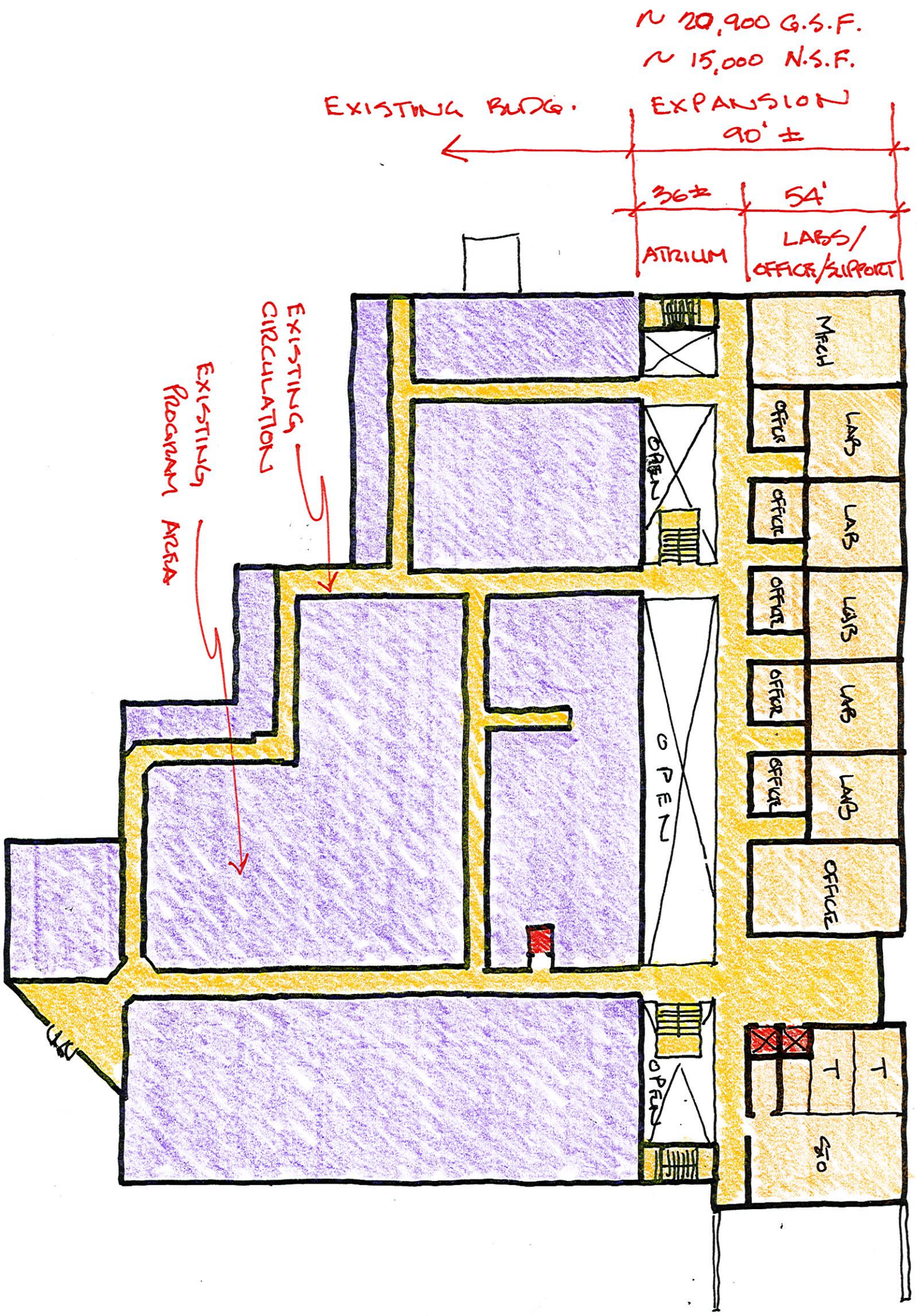
1"=40'

N

UNC Charlotte Burson

SKA-1

7/16/07



Tobin+Dudley
Architecture / Planning
1523 Elizabeth Avenue
Charlotte, NC 28204
704 377-5200
fax 704 377-5201

PROJECT: 0651_UNCC Burson

UNC Charlotte Burson Chemistry

2nd Floor Plan Study

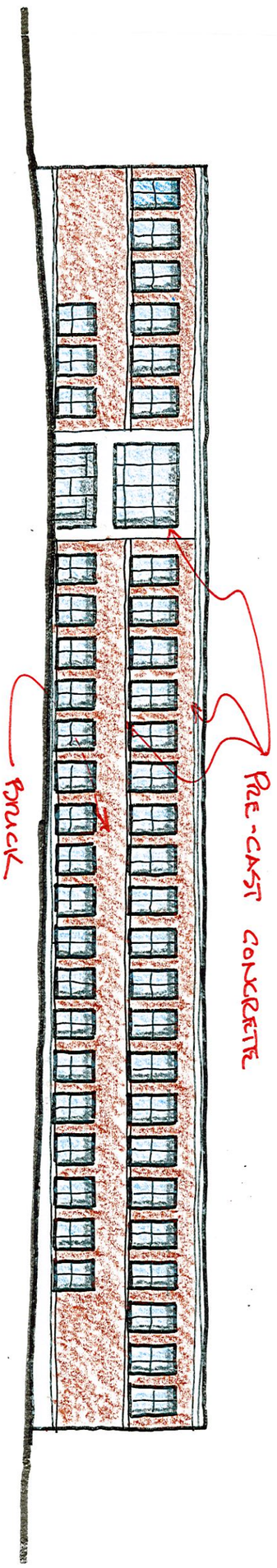
1"=40'

UNC Charlotte Burson

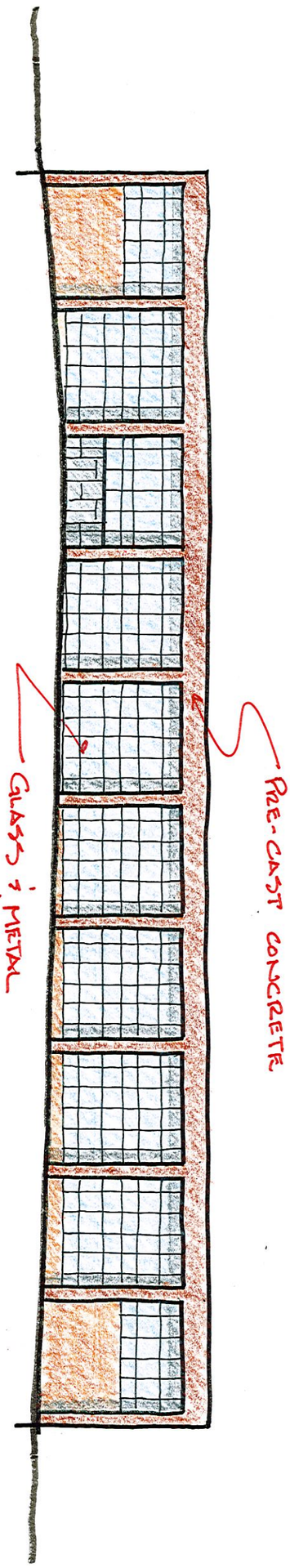
SKA-2

7/16/07

SCHEME 'B'



SCHEME 'A'



Tobin+Dudley
Architecture / Planning
1523 Elizabeth Avenue
Charlotte, NC 28204
704 377-5200
fax 704 377-5201

PROJECT: 0651_UNCC Burson

UNC C Burson Chemistry

Elevation Studies

1"=40'

UNC Charlotte Burson

SKA-3

7/16/07

UNC Charlotte Burson

SKA-4

7/16/07

UNC Charlotte Burson Chemistry

Exterior Perspective Massing Study

no scale

Tobin+Dudley
Architecture / Planning
1523 Elizabeth Avenue
Charlotte, NC 28204
704 377-5200
fax 704 377-5201

PROJECT: 0651_UNCC Burson

UNC Charlotte Burson

SKA-5

7/16/07

UNC Charlotte Burson Chemistry

Exterior Perspective Massing Study

no scale

Tobin+Dudley
Architecture / Planning
1523 Elizabeth Avenue
Charlotte, NC 28204
704 377-5200
fax 704 377-5201

PROJECT: 0651_UNCC Burson