Board of Regents
2008 Letter of Intent
Quarterly Report on Bonds Approved by the Legislature during the Eighty-third Legislative Session
November 2008

The 2008 Legislature approved HB1085 that allowed the Board to bond for the construction, reconstruction, and modernization of science facilities and laboratories at public universities. The debt service for the projects will be paid for with an annual state appropriation that will cover $32.5M of the debt with the Board implementing a student fee to cover the remaining $42.0M. The legislation also incorporated the $10.0M for the South Dakota School of Mines and Technology chemistry building replacement part of the 2005 ten-year plan, HB1025, paid with Higher Education Facilities Funds.

The responses to the 2008 Letter of intent questions follow.

a) A description of the project to be funded.

The descriptions were provided to the Appropriations Committee as part of our FY2009 budget documents and are attached to this document (Attachment IA). These are still the best descriptions we have for the projects until the design of the facilities is finalized and approved by the Building Committees and Board.

The specific projects authorized were as follows:

Project	HB1085 new bonding authorized	HB1025 authorized
Science building BHSU	$8,078,400	
Chemistry & Bio Engineering building SDSMT	$7,957,700	$10,000,000
Paleontology building SDSMT	$7,063,963	
Agricultural Hall SDSU	$8,006,275	
Pardee Lab USD	$3,792,104	
Churchill-Haines renovation USD	$6,751,145	
Akeley Lawrence Science Center USD	$5,256,751	
Habeger Science Center DSU	$6,038,670	
Dairy Microbiology Building SDSU	$8,259,250	
MeWaldt-Jensen Hall/Krikac Admin building NSU	$2,701,900	
Health Sciences Simulation Center USDSU	$10,593,842	
Totals	**$74,500,000**	**$10,000,000**

b) The actual and anticipated bond issuance schedule through completion, including actual and planned interest rates.

The bonds are fixed rate bonds. The final financial statistics are included (Attachment IB) which includes the serial/term bond maturities and terms.

c) The disposition of bond proceeds, including an expenditure plan and reinvestment plan, if applicable (reinvestment plan should include interest rates together with a demonstration of compliance with federal limitations on arbitrage).

The bond proceeds will be used as follows.

Project	HB1085 new bonding authorized	HB1025 authorized	Series 2008 Bonds
Science building BHSU	$8,078,400		$8,078,400
Chemistry & Bio Engineering building SDSMT	$7,957,700	$10,000,000	$17,957,700
Paleontology building SDSMT	$7,063,963		$7,063,963
Agricultural Hall SDSU	$8,006,275		$8,006,275
Pardee Lab USD	$3,792,104		$3,792,104
Churchill-Haines renovation USD	$6,751,145		$6,751,145
Akeley Lawrence Science Center USD	$5,256,751		$5,256,751
Habeger Science Center DSU	$6,038,670		$6,038,670
Dairy Microbiology Building SDSU	$8,259,250		$8,259,250
MeWaldt-Jensen Hall/Krikac Admin building NSU	$2,701,900		$2,701,900
Totals	**$63,906,158**	**$10,000,000**	**$73,906,158**

The Health Sciences Simulation Center was not bonded and has been put on hold. This will be addressed during the 2009 legislative session.

The drawdown schedules that are required as part of the bonding documentation are attached (Attachment 1C). In this market I doubt that we would earn more than the interest cost of the bonds and run into arbitrage issues. If that were a problem, it would be addressed by the South Dakota Building Authority and not the Board of Regents. I believe the proceeds are held by the South Dakota Investment Council.

d) Plans for proceeds from gains on any arbitrage earnings.

Interest earnings on the M&R fee would accrue to that fund and not the individual projects – this has always been the direction of SDBA.

e) Plans for proceeds from refunding of previously issued bonds.

No bonds were refinanced with this issue. SDBA is responsible for managing the bond portfolio and would handle refinancing.

f) Cost of issuance (fees charged by financial advisors, underwriters, rating agencies, bond insurers, bond counsel, trustees, arbitrage rebate consultants, etc.).

The total cost of issuance can be found on page 1 and page 19 of the financial statistics attachment 1b. This would include the issuance cost except for the 3% charge by the SDBA which is added to our payments.

g) Indicate whether the bond was sold using the negotiated or competitive method.

With the blessing of the Building Authority and the Bureau of Finance and Management we were fortunate to time the market and work with Bank of America on a negotiated sale to get what we believe were very favorable rates given the volatility in the market.

h) Indicate whether bond insurance was purchased, and if so, include the cost of the insurance.

The cost of the bond insurance is identified on page 1 of the financial statistics (Attachment IB).

i) Include an amortization schedule with the revenue streams pledged to meet debt service – including all fund sources.

Our lease payment schedule from SDBA is attached (Attachment 1D). Each schedule indicates the fund source for the debt service, i.e. State Supported, HEF and M&R Fee Supported, HEFF Supported). The issuance also included some revenue bonds for Game, Fish and Parks which are obviously not related to BOR.

SOUTH DAKOTA BOARD OF REGENTS
JOINT APPROPRIATIONS COMMITTEE BUDGET REQUEST HEARINGS
JANUARY 2008

BLACK HILLS STATE UNIVERSITY
Board of Regents Science Facility Construction
New Science Facility

a. Project Overview:

Black Hills State University is requesting funds for a new 26,928 gross square foot science facility to house our biology and chemistry programs. BHSU has dramatically increased our scientific research during the past decade. Through aggressive efforts of the science faculty and staff, external grants have increased tenfold during this period from $519,046 to $5,191,546. While faculty have been successful in procuring state of the art equipment through grant sources, the labs and other research space have not been upgraded to accommodate the demand for power or adequate ventilation.

In addition to the increase in federal research funding, BHSU has experienced an extraordinary 310% increase in science majors since 1992. The new science facility will provide the physical resources necessary for BHSU to prepare students in science and science education programs. Biology and chemistry majors and minors, science education majors, and students enrolled in science general education courses will all benefit directly from the new building (approximately 900 students annually).

Scientific Research at BHSU

The South Dakota Public Higher Education System Opportunities Plan that was presented to the Legislature in November 2006, identifies policy goal #3: South Dakota public universities shall engage in activities designed to enhance the state's long-term economy. This goal is supported by enhancing research and development productivity through grants and contracts, with a specific charge of increasing grant activity at all public universities and enhancing research and development activity in select graduate programs in science. It goes on to stress the concentration of research investments in areas important to the state, of which SUSEL is paramount. BHSU is striving to meet this opportunity for the State of South Dakota and is a major player in research activities with over $5 million in federal research dollars awarded in 2007. In order to be successful, appropriate space and infrastructure must be provided. Some of the major research activities occurring at BHSU are identified below.

WestCore

Over the past four years, funding from the National Science Foundation and other sources has enabled Black Hills State University to equip an ecological and molecular genetics laboratory that supports research in the areas of conservation genetics, molecular systematics, molecular ecology and basic genetic research primarily using genotyping and gene sequencing. This facility has been designated as the Western South Dakota DNA Core Facility (WestCore) and conducts research for the South Dakota Department of Game Fish & Parks, Lawrence County Department of Weed & Pest Control, private businesses and organizations, and area ranchers as well as collaborate with university researchers from across the nation.

Center for the Conservation of Biological Resources (CCBR)
The CCBR is the only facility of its kind in South Dakota and one of only fourteen state-of-the-art DNA facilities in the nation. The CCBR's mission is broader than WestCore in that it was established to provide research infrastructure to serve a five-state region (SD, ND, MT, WY, and NE) in order to apply DNA research and analysis to conservation and management efforts. The CCBR facility focuses on a wide variety of animal and plant species and provides a rare opportunity for undergraduate students to gain valuable and practical experience.

Together, WestCore and the CCBR provide important opportunities for cross-disciplinary research and collaboration and for training undergraduate students in conservation, genetics, cell biology, microbiology, ecology, and molecular genetics.

Biomedical Research Infrastructure Network (INBRE)
Black Hills State University was awarded a $2.6M subaward in the fall of 2004 in collaboration with the University of South Dakota School of Medicine to participate in a National Institute of Health (NIH) INBRE project. This award will enable the collaborating universities to enhance research capacity at a nationally competitive level to study cellular growth control. The INBRE award to BHSU supports eight undergraduate fellows and twelve faculty research fellows each year through 2009, along with undergraduate Teaching Assistants, a speaker series, DNA core facility enhancements, and a new genetics lab.

Scanning Electron Microscope
BHSU has the only scanning electron microscope in the state system. This powerful instrument is used by undergraduate and graduate students, faculty, and collaborating researchers from other universities. Results of research using the scanning electron microscope appear in state and national publications and presentations.

The high resolution digital or photographic images are excellent for viewing innumerable types of specimens. The microscope can magnify objects from 15 to 100,000 times. In addition to standard applications the microscope can also be used for low vacuum applications, increasing its versatility, and allowing observation of specimens with little or no preparation. Attached to the microscope is an energy dispersive x-ray spectrometer that allows simultaneous observation of a specimen and determination of its elemental composition. The elemental analyses include mapping the position of elements within the specimen.

Herbarium
The Herbarium at Black Hills State University currently holds about 30,000 specimens of vascular plants from around the globe and maintains the world's most extensive collection of Black Hills plants. Some specimens are over 100 years old and provide extraordinary records of changes in biodiversity, as well as a storehouse of genetic information. The Herbarium is also home to a large number of fossil plants, especially fossils from the Great Plains of North America. The unique biogeology and biodiversity of the Black Hills make this data an invaluable resource in the study of human impact on the environment. Recent

funding from the National Fish and Wildlife Association enabled researchers to develop an online database of catalogued specimens, for which access will be granted to other research-oriented organizations.

Other research activities include:

- National Aeronautics and Space Administration (NASA); 3-year, $162,660 grant for Mars Fundamental Research
- National Institutes of Health (NIH); 3-year, $1,050,000 grant for Project EXPORT: Developing Health Research Infrastructure with American Indian Tribes in MT and WY
- Centers for Disease Control (CDC); $190,088 in year one for Fetal Alcohol Syndrome Strategies
- Environmental Protection Agency (EPA); 3-year, $610,000 grant to establish a self-sustaining Center for the Conservation of Biological Resources
- National Science Foundation (NSF); 3-year, $400,000 grant for Advanced Technological Education, and $20,000 conference grant for a Math and Science Showcase
- US Forest Service (USFS); $48,000 grant for Fire Prevention and Management
- National Fish & Wildlife Foundation (NFWF); $22,500 grant for Development of Online Herbarium Database
- South Dakota Game Fish & Parks; $64,781 for various projects involving genetic analysis and environmental impact on the smooth green snake, Topeka shiner, walleye, Custer State Park bison herd, and American dipper
- Diamond V Mills; $20,000 for Yeast Supplementation Trials
- Robert Wood Johnson Foundation; $60,000 for Community-Based Diabetes Prevention

In addition to the research activities mentioned above, the proposed space will create enhanced opportunities to collaborate with SUSEL scientists in the areas of microbiology, genomics, and chemistry as space for microbial and cellular research is included in this facility. BHSU scientists foresee vast research opportunities in conjunction with SUSEL.

Undergraduate Research at BHSU

BHSU's mission puts emphasis on providing research opportunities to undergraduate students as part of the educational experience. Whereas most students don't receive such an opportunity until they are at a graduate level, BHSU focuses its research efforts on the undergraduate student who may move on to graduate programs or other professional fields of study including nursing, medicine, dentistry, ophthalmology, pharmacy, chiropractic, veterinary medicine, podiatry, physician assistant, physical therapy, occupational therapy and others. There is no exclusive research space for faculty and graduate students as all research space at BHSU supports undergraduate science education.

SRI International conducted a study for The National Science Foundation, July 2006 (Susan H. Russell, 2006, www.nsf.gov/news/news_summ.jsp?cntn_id=108939). The report states the major finding that only half of all science and math graduates have participated in hands-on research at their respective institutions. Those that have participated in such research are significantly more likely to go to graduate school and pursue research related careers. The study also found a positive correlation between the number of months involved in

undergraduate research and the number of individuals going on to complete a doctoral program. This confirms previous National Science Foundation studies that emphasized the importance of mentored research to undergraduate education in science.

Undergraduates participate in research activities in numerous ways at BHSU. Last year, twenty-two BHSU students had their research abstracts accepted by the National Council on Undergraduate Research for the annual conference, more than any other university in the state and the second highest in the nation for all universities. Science faculty publish an average of one paper per year and/or present at one to two conferences per year, many of which have student or recent graduates as co-authors. Our new graduate program in Integrative Genomics, accredited this year, requires all students to be involved in research with faculty mentors. Research and involvement of undergraduate students in mentored research has been an institutional priority for salary enhancement for the past four years and scholarly research is a curricular component for all BHSU majors. More than twenty undergraduate students participate in the Annual Research Symposium hosted by BHSU each year. It is particularly noteworthy that students and faculty at BHSU are currently conducting research for one of the first research projects at SUSEL as water is being pumped from the mine.

BHSU science students compete well for acceptance into professional schools. During the last three years, twenty-nine students were accepted into professional health schools and 275 students have entered a nursing program in South Dakota.

Science Education at BHSU

BHSU has the largest teacher education program in the State of South Dakota. Over 120 teachers graduate from BHSU each year. BHSU is aggressively pursuing its goal to increase the number and quality of math and science teachers, which has been identified as a critical need for the state. Nearly $1M in grants has been received to support students pursuing degrees in these disciplines.

The SUSEL will create many opportunities in our ongoing efforts to provide innovative educational opportunities in science and math for elementary, secondary, and college students as well as for teachers. BHSU is instrumental in the development and operation of the educational and outreach center at the SUSEL. BHSU currently has a memorandum of understanding with the South Dakota Science and Technology Authority to develop a highly innovative center for science education associated with the underground laboratory.

BHSU leads the Science on the Move project, which allows South Dakota's teachers and students in high schools and middle schools to conduct specialized science experiments in the Mobile Science Lab. Experiments are being developed that highlight research potential at the SUSEL lab.

Space Needs

The combination of our significant successes in federal research and science major enrollments has put considerable strain on our current facilities. A recent study of the

campus master plan revealed numerous deficits in Jonas Science to meet the needs of scientific research and education. Considerable re-modeling as well as new space for the sciences was recommended. The proposed building is one of several upgrades needed to meet our increased demands.

BHSU has the lowest number of academic gross square feet per student in the Regental system, approximately 11% behind the system average of 205 GSF per student. If the 26,928 square feet are added as requested, 192 GSF per student will be available at BHSU, still 6% behind the system average. Furthermore, enrollment in the sciences has increased 310% since 1992 with no additional space for institution or research facilities.

Space is so limited in the science area that faculty have actually had to turn down scientific equipment for research purposes. Most recently, the Chemistry department declined a donation of an atomic absorption spectrophotometer and an ICP mass spectrometer. The loss in value to BHSU, our students, and the State of South Dakota of these pieces of equipment, not only from a financial perspective, but also from an opportunity cost for research gain, is a grave misfortune. It is also noteworthy that BHSU lost one of its top faculty in geology last year because he could not increase research productivity due to space restrictions.

b. Facility to be Replaced - or - Need for New Space:

Built in 1968, the one-story Jonas Science wing on the Black Hills State University campus is 40 years old and no longer meets the needs of the institution. Its 23,261 gross sq. ft. area is too small to handle the rapidly growing science programs and new graduate degree in Integrative Genomics, and is not designed to support the research of faculty and students. Recent upgrades include replacing aging chemistry fume hoods and correcting installation problems, renovation of the ventilation system supporting our chemical storage rooms, development of a cell and genetics laboratory, conversion of a storage room into faculty research space, installation of a compact storage system for the herbarium, and the addition of computers and computer supported instruments to most of the science laboratories. Inadequate, aging facilities such as Jonas Science can hurt both student recruitment and retention.

The key concerns with the present science building are as follows:

a. The science laboratories are too small to handle the number of students in classes using modern science pedagogy, which emphasize group work in wet labs, inquiry-based learning activities, team learning, and multiple activities including both wet lab and computer-based exercises.

b. Laboratory size does not adequately address ADA requirements for wheelchair accessibility.

c. The science building was built before research was expected of faculty and before it became accepted practice at BHSU to involve students in research. Thus research

space for faculty, undergraduate students, and now graduate students was carved out of storage rooms, old offices, and classrooms, which does not provide a learning environment that prepares students well for working in a modern laboratory or professional programs.

d. Because storage areas are all being used for other purposes, animal specimens, microscopes and teaching materials must be stored in the already too small teaching laboratories or hallways. This situation creates cluttered, crowded conditions in the laboratories. Ideally preserved specimens should not be stored in the teaching laboratories, but rather in a well ventilated storage room to prevent fumes and fire hazards.

e. Even improvised research space is limited and lacks back-up power for freezers and equipment, and heating and cooling problems in the aging science facility cause problems for sensitive instruments. Currently, a refrigerator is located in the hallway of the classroom building and our scanning electron microscope sits in a room that is so small the door cannot be shut if proper ventilation is to occur, posing security risks to the equipment and the specimens.

Based on architectural analysis, it is not in the best interest of BHSU, the State of South Dakota, or our students to renovate the existing facility. Not only do we need additional square footage, the Jonas Science facility has too many significant issues to effectively overcome without making a renovation for the sciences more costly than a new facility.

The building is over forty years old and was built during a period when air movement inside a building was not a significant health concern as it is today, especially for a science facility. The space between the ceiling and the roof is too small to insert new air handling equipment to address these concerns. It is believed that a new space on top of the building would have to be added just to circulate air throughout the building. Because the rooms have unit ventilators, not a central mechanical space, it is not believed that there is enough space within the building envelope to circulate the proper amount of air for science education and research.

The efficiency of renovated space will be far less in an old building than in a new facility that is designed with science education and research in mind. It will take more gross square feet to get the same functionality in a renovated building than in a new one. Consultants have suggested that renovation may be more costly than a new building since the building was not designed for ventilation needed to meet current science requirements. In summary, even with a renovation, a state-of-the-art science facility will not exist as the facility is not suitable for this use.

c. Location and Site Analysis:

BHSU completed a facility master plan in 2001 and is currently in the process of updating that plan. The master plan calls for the new science structure to be located to the west or to

the south of the existing 1968 science building. Further analysis will be done to determine the exact location and whether the structure will be attached to the existing building.

d. Space Allocation and Uses of Current Facility:

The new building will largely replace an aging, science facility that has outlived its original design function. The existing science facility, Jonas Science, has had ongoing renovations to increase safety and address urgent space needs for faculty and student research, but these modifications and upgrades have further eroded the original functional design, creating additional storage and teaching issues. The science teaching laboratories are not large enough for present student numbers and modern science pedagogy, and they do not adequately accommodate students in wheelchairs. Storage rooms, offices, and classrooms have been used to create research space for faculty, undergraduate students, and graduate students, thus creating a shortage of storage space, offices and classrooms. The aging, cramped spaces hurt student recruitment and retention and do not prepare students adequately for graduate school and the modern laboratory work environment.

The following table provides the space breakdown for Biology and Chemistry in the current Jonas Science facility using a 35% grossing factor. It does not include other space in Jonas Science that is used for purposes other than Biology and Chemistry in order to provide a direct comparison to the new facility, which will house Biology and Chemistry only.
The current Jonas Science building will be renovated for dry labs and instructional space for areas including geology, physical sciences, the Center for the Advancement of Math and Science Education (CAMSE), and the Center for the Conservation of Biological Resources (CCBR) after the new facility is constructed.

Current Jonas Science Facility – Biology & Chemistry Only

Space Use	Count	Discipline	Level	Net Square Feet	Gross Square Feet
First Floor					
Class Lab	7	Biology and Chemistry	Undergraduate and Graduate	6,404	8,645
Research Lab	1	Biology	Undergraduate and Graduate	500	675
Support Space	4	Biology and Chemistry	Undergraduate and Graduate	1,123	1,516
Chemical & Glassware Storage	2	Biology and Chemistry	Undergraduate and Graduate	468	632
Faculty & Graduate Student Offices	8	Biology and Chemistry	Undergraduate and Graduate	798	1,077
First Floor				**9,293**	**12,545**

Subtotal					
Total				9,293	12,545

e. Space Allocation and Uses of Replacement Facility:

A new science building will address the teaching and research laboratory space needs, while providing for instructional and research support spaces and training areas for undergraduates and graduate students. Biology and chemistry majors and minors, science education majors, and students enrolled in science general education courses will benefit directly from the new building (approximately 900 students annually). In addition, the new space will support enrollment growth in programs preparing students for the health sciences and create greater opportunity to collaborate with SUSEL scientists in the areas of microbiology, genomics and chemistry.

With the exceptional growth in the number of biology students has come a growth in those interested in health related careers. During the five year period from 1996 to 2000, BHSU averaged five graduates per year who subsequently entered health-related professional programs; during the past five years, this number has more than doubled to over ten per year on average. These figures do not include the pre-nursing students in our program. We have an average of sixty-four students per year who go on to nursing programs within the state. Placement rates to health programs and graduate school since 1990 are: 20 to medical school, 8 to dental school, 3 to osteopathic programs, 14 to chiropractic programs, 3 to veterinary school, 1 to a podiatry program, 10 to optometry schools, 1 to an optician program, 9 to physician assistant programs, 17 to physical therapy programs, 7 to occupational therapy programs, 12 to pharmacy schools, and 37 have gone on to graduate programs in biology.

The new space will include eight new teaching laboratories that will replace and enhance existing space, adjoining prep rooms, two dedicated faculty research spaces, a greenhouse, an electron microscopy facility, a chemical storage area with adjacent holding area for hazardous wastes waiting for pick-up, and faculty office space adjacent to teaching laboratories and research space.

The net square feet for each space has been identified through our planning process; however, generic spaces such as restrooms, mechanical space, and circulation spaces are not specifically identified, but rather are included in an overall 60% grossing factor based on the recommendation in the completed study.

In 1992, two of BHSU's eight science faculty were involved in doing research. In 2007, all twelve science faculty and a post-doctoral fellow are doing research. Thus the percent has increased from 25 to 100%.

New Science Facility

Space Use	Count	Discipline	Level	Net Square Feet	Gross Square Feet
First Floor					
Class Labs	9	Biology & Chemistry	Undergraduate and Graduate	8,388	13,421
Research Labs	3	Biology & Chemistry	Undergraduate and Graduate	2,628	4,205
Support Space	11	Biology and Chemistry	Undergraduate and Graduate	3,654	5,846
Chemical & Glassware Storage	2	Biology and Chemistry	Undergraduate and Graduate	810	1,296
Faculty & Graduate Student Offices	14	Biology and Chemistry	Undergraduate and Graduate	1,350	2,160
First Floor Subtotal				**16,830**	**26,928**
Total				**16,830**	**26,928**

f. Initial costs estimated based on gross square footage and types of space:

Space Use	Net Square Feet	Gross Square Feet	Per Square Foot Cost	Estimated Costs
Total	16,830	26,928	$300	$8,078,400

g. Additional services to be offered or benefits of the renovation:

Construction of a new science building will address an increasingly critical problem for Black Hills State University. The new facility will provide a larger, cleaner and thus healthier learning environment that will address both safety and ADA regulation issues. Dedicated research space will support the graduate program in integrative genomics and foster increased undergraduate involvement in mentored research. Well designed space will provide students with a better learning experience that will prepare them to work for research companies and health care facilities or go on to graduate and professional study. Recruitment of biology, chemistry and science education majors and student retention in these programs will be positively impacted by the new facility.

The proposed science facility will have space specific for supporting microbial and cellular research, which will support collaborative work with SUSEL scientists. The greenhouse will

support classroom instruction and the ongoing research of our ecophysiologist, whose investigation of plant responses to stress factors such as drought may have direct value for South Dakota ranchers and farmers. Instructional space for anatomy and physiology will support improved preparation of students entering the state nursing programs and other health programs such as medical and dental school.

Faculty in the sciences are contributing to research conducted at SUSEL; plant response to drought; DNA sequencing (only equipment of this type in the state) for genomic analysis to control invasive plants; genetic analysis of Native bison, South Dakota fish, resistance to mad cow disease, and other research projects important to South Dakota's economy.

h. Analysis of student body, function or constituents to be served:

Approximately 425 biology and chemistry majors and minors (including 75 pre-nursing students) and 450 students taking science general education courses per year will benefit from the new facility and the resulting renovation of the original space. Biology and chemistry faculty will have research and teaching facilities that reflect changes in the disciplines which have occurred since 1968. Graduate students will have private desks and workspace for their research, where they can also help mentor undergraduate researchers.

i. Illustrative floor plans:

A detailed program plan for this building has been completed. Floor plans are currently being drafted.

j. Impact to Maintenance & Repair:

The additional square feet and replacement value will be included in the HEFF pool for M&R funding. Based on FY07 figures the additional space will have less than one tenth of one percent impact. The additional gross square feet of space is estimated to cost an additional $25,000 per year.

k. Impact to operational costs:

BHSU expends approximately $.95 / GSF for all utilities on campus. Based on this average, an increased cost of approximately $26,000 is projected. It is anticipated that this building will be constructed using Leadership in Energy and Environmental Design (LEED) silver certification criteria, which will make the building more energy efficient than some older facilities.

Additional gross square feet of buildings to maintain will also require additional custodial and maintenance staff. One and a half custodians and a half-time maintenance staff will require approximately $52,000 in ongoing staff costs.

BLACK HILLS STATE UNIVERSITY
Board of Regents Science Facility Construction
New Science Facility

l. Proposed funding sources for costs of:

1. **Construction** - The $8 million cost of construction will be funded from state and student dollars.

2. **Ongoing operations** - Ongoing operations costs will be funded through alignments of current funds and the additional overhead recoveries that will be realized with increased research activity.

3. **Maintenance and repair** - Maintenance and repair costs will be funded through the Higher Education Facilities Fund. Contributions to this fund should increase as additional students participate in science courses.

DAKOTA STATE UNIVERSITY
Board of Regents Science Facility Renovations
HABEGER SCIENCE CENTER

a. Project Overview:

The proposed project would provide a complete renovation of the Habeger Science Center, the primary science facility at Dakota State University. The building was constructed in 1972 at a cost of $1,070,000 and has never been renovated. The renovation is needed to provide space for faculty research, for upgrading the teaching labs and for adding additional teaching lab space, particularly for scientific forensic technology and physics.

The renovation is critical for three reasons: safety, recruitment and retention of students, and support for new research initiatives.

b. Current Facility Description:

The Habeger Science Center is a one-story brick building and currently houses classrooms and laboratories to support the university's science, math, and technology curriculum. It was constructed in 1972 at a cost of $1,070,000. It consists of 35,700 square feet: 5 classrooms, a 200-seat auditorium, 6 teaching labs for chemistry, biology, microbiology and physics and a greenhouse/herbarium. Currently, there is no building space set aside for faculty research and no teaching laboratory space set aside for scientific forensic technology.

The facility has not been upgraded or renovated since the building was built in 1972 and does not provide adequate teaching or research space to support the institution's technology-intensive degree programs. The renovation is also specifically intended to provide additional space for teaching and research in scientific forensic technology and in theoretical physics as related to neutrino research.

c. Proposed Renovations:

The building provides office space and teaching / research space for the university's science and math faculty. The project will consist of a complete renovation of the classrooms and the laboratory spaces in the Habeger Science Center, with the goal of both expanding and modernizing those spaces to accommodate the university's academic focus on informatics, scientific forensics, computer technology and theoretical physics. It is our intention to develop faculty research space. The renovation of the facility will also make it possible to upgrade the HVAC systems.

Science has changed in the past thirty years, and the configuration of modern science labs is significantly different from the configuration of science labs built thirty years ago. In addition, because of DSU's technology mission, its science laboratories need to support and incorporate its mission-driven, technology focus.

Specific changes include:

- Chemistry teaching lab space: redesign to accommodate easy and safe access to spectrometer and other equipment, improved ventilation (fume hoods), and redesigned storage space.

- Chemistry research lab space: no space currently set aside for advanced chemistry research and/or for faculty-student research.

- Biology and microbiology teaching lab space: redesign to increase storage and sterile environments / growth spaces (controlled temperature and humidity) that will accommodate a focus on molecular biology, bio-monitoring and image analysis.

- Biology and microbiology research lab space: redesign to accommodate research in water quality, plant micro-organism interaction/invasive species and related bio-monitoring research, including sterile environments, "clean" rooms (with biometric access) and a growth chamber.

- Greenhouse: facility update to support bio-monitoring research.

- Scientific Forensic Technology teaching lab space: no space currently set aside for scientific forensic technology instruction. Instead, that instruction is occurring in corners of existing chemistry, physics and biology labs.

- Physics teaching lab: redesign to accommodate group work stations, additional computer / technology / power requirements, easier and safer access to equipment and the addition of sensor-computer equipment.

- Physics research lab: no space currently set aside for advanced physics research and / or for faculty-student research.

- Classroom spaces: redesign to accommodate work in pods / diamonds to support collaborative learning.

- Laboratory prep spaces: spaces need to be completely reconfigured to support new teaching and research focus areas and to provide safe and efficient storage of equipment.

- Updated gas, vacuum, air, and water systems – piping to lab spaces that need it and removal of piping in others.

The DSU server room, located in the Habeger Science Center, houses the university's high-security server facility as well as the K-12 Data Center. This location will also be the site of the REED Data Center (Research, Education and Economic Development Data Center) and is one of three core sites for the Digital Dakota Network (DDN), which serves state government, K-12 public school districts, and higher education. Renovation of this area is the first phase of creating a "single, state of the art and state-wide research data center" (as proposed in Governor Rounds' FY09 Budget Address).

d. Location and Site Analysis:

The Habeger Science Center is located in the northwest corner of the campus, next to the Karl E. Mundt Library. The planned renovation will not change the current footprint of the building. No issues regarding site or location are anticipated.

e. Space Allocation and Uses of Current Facility:

As indicated above, the footprint of the building will not be changed by the proposed renovation. However, the space within the building will be reconfigured with additional space devoted to teaching and research labs. To accomplish that space reallocation, classroom space adjacent to the labs will be absorbed and lab prep spaces will be redesigned.

Space Use	Count	Discipline	Level	Gross Square Feet
Auditorium	1	Lecture Hall for Biology, Microbiology, Chemistry, Physics, Scientific Forensic Technology	Undergraduate	2,656
Circulation	NA	NA	NA	5,518
Teaching Labs	6	Biology, Microbiology, Chemistry, Physics	Undergraduate	7,860
Custodial	1	NA	NA	202
General Classroom	5	Biology, Microbiology, Chemistry, Physics, Mathematics	Undergraduate	6,005
Lab Service	16	Biology, Microbiology, Chemistry, Physics	Undergraduate	4,634
Mechanical	1	NA	NA	1,562
Office	18	NA	NA	2,873
Restroom	2	NA	NA	428

Server Room	2	NA	NA	1,541
Net to Gross	NA	NA	NA	2,429
Total				35,708

f. Space Allocation and Uses of Renovated Facility:

As indicated above, the renovation will focus on a reconfiguration of classroom, laboratory and lab prep spaces, with additional space devoted to teaching and research lab space after the renovation. In addition, the HVAC of the building will be updated to reduce building moisture and to modernize ventilation in the lab spaces.

Space Use	Count	Discipline	Level	Gross Square Feet
Auditorium	1	Lecture Hall for Biology, Microbiology, Chemistry, Physics, Scientific Forensic Technology	Undergraduate	2,656
Circulation	NA	NA	NA	5,518
Teaching Labs	6	Biology, Microbiology, Chemistry, Physics, Scientific Forensic Technology	Undergraduate/ Student Research	7,860
Custodial	1	NA	NA	202
General Classroom	5	Biology, Microbiology, Chemistry, Physics, Mathematics, Scientific Forensic Technology	Undergraduate	6,005
Lab Service	16	Biology, Microbiology, Chemistry, Physics, Scientific Forensic Technology	Undergraduate/ Student Research	3,176
Mechanical	1	NA	NA	1,562
Office	18	NA	NA	2,873
Restroom	2	NA	NA	428
Data Center	1	NA	NA	1,541
Research Labs	2	Physics, Scientific Forensic Technology	Research/ Graduate	1,458
Net to Gross	NA	NA	NA	2,429
Total				35,708

g. Initial costs estimated based on gross square footage and types of space:

Total space estimated to be renovated within the Habeger Science Center is 30,400 square feet with a total cost of $6,038,670.

Space Use	Square Feet	Per Square Foot Cost	Estimated Costs
Auditorium	2,656	$150	$398,400
Circulation	4,414	$150	$662,160
Teaching Labs	7,860	$275	$2,161,500
Custodial	202	$150	$30,300
General Classrooms	4,804	$150	$720,600
Lab Service Areas	3,176	$200	$635,200
Mechanical	1,562	$200	$312,400
Office	2,298	$150	$344,760
Restroom	428	$150	$64,200
Data Center	1,541	$200	$308,200
Research Labs	1,458	$275	$400,950
Total	30,400		$6,038,670

h. Additional services to be offered or benefits of the renovation:

Virtually all students will benefit from the renovated facilities, since an up-to-date science education should be part of every student's general education experience. However, the renovation will have the greatest impact on students majoring in the sciences, since the current teaching lab facilities have not been upgraded since the building was built in 1972. For example, the renovation will provide teaching and research lab space specifically for scientific forensic technology and will support the use of high-tech equipment such as the spectrometer and the new DNA Sequencing System. And, it will provide lab space to support more sophisticated experimentation and research in theoretical physics, biology, chemistry and informatics. The renovation of the major science teaching auditorium will also provide power and data at every seat in the auditorium and will enhance the use of high-level information technology in the teaching and learning environment.

These renovated facilities will also increase student recruitment and retention into science majors. In the last year, the university has developed a targeted recruitment activity, focused primarily on women in science and technology (WIST program), and these renovations will complement those student development activities.

i. Analysis of student body, function or constituents to be served:

All students at DSU spend considerable time in the Habeger Science Center, since it is home to both the science and math programs (both integral parts of the system-wide general education requirements).

DAKOTA STATE UNIVERSITY
Board of Regents Science Facility Renovations
HABEGER SCIENCE CENTER

General Education Courses	Course Enrollments Fall '07	Spring '08 (Preliminary)
BIOL 101/101L	110	82
BIOL 103/103L	58	65
BIOL 151/151L	59	Not offered
BIOL 165/165L	Not offered	30
BIOL 201/201L	16	Not offered
CHEM 112/112L	73	Not offered
CHEM 114/114L	Not offered	16
PHYS 111/111L	Not offered	50
PHYS 113/113L	4	Not offered
PHYS 211/211L	Not offered	11
PHYS 213/213L	3	Not offered
ELED 303	21	25
MATH 021	157	22
MATH 101	156	42
MATH 102	307	96
MATH 104	Not offered	Not offered
MATH 120	26	7
MATH 121	91	37
MATH 123	37	Not offered
MATH 125	Not offered	34
MATH 225	14	Not offered
MATH 281	32	29

In addition, DSU offers majors in these undergraduate science and math disciplines:

Major	Fall '07 Enrollments
B.S. in Biology for Information Systems	Enrollment = 20
B.S.Ed. in Biology Education	Enrollment = 7
B.S. in Math for Information Systems	Enrollment = 16
B.S.Ed. in Math Education	Enrollment = 10
B.S. in Physical Science	Enrollment = 10
B.S. in Scientific Forensic Technology	Enrollment = 21

DSU faculty have developed research interests in water quality, bio-monitoring, theoretical physics, informatics and applications of scientific forensic technology – research interests that did not exist when the Habeger Science Center was built in 1972. In addition, the university has an increased emphasis on undergraduate faculty-student research which will clearly be enhanced by these renovated facilities.

Finally, the renovation of the secure server room will benefit the constituents who are served by the REED Data Center, by state government, and by the K-12 Data Center.

j. Impact to Maintenance & Repair:

Since this proposal is for the renovation of an existing building with no new square footage added, there's minimal impact to Maintenance and Repair. The impact is linked to the increased value of the building because of the renovation, which is true for any major renovation of any building on any campus.

k. Impact to operational costs:

Since this proposal is for the renovation of an existing building with no new square footage added, there's minimal impact to operating costs. In fact, improved HVAC and more efficient lighting may actually reduce some university utility costs.

l. Proposed funding sources for costs of:

1. **Construction** - Funding for the construction will come from state and university resources as outlined in the Governor's FY09 Budget Address.

2. **Ongoing operations** - Current OE budget for the Habeger Science Center will provide for the on-going operations and utilities.

3. **Maintenance and repair** - Maintenance and Repair will be handled through the HEFF allocation.

NORTHERN STATE UNIVERSITY
Board of Regents Science Facility Renovations
New Labs/Krikac Administration Building

a. Project Overview:

NSU currently has six biology and four chemistry labs on campus for four full-time biologists, two chemists, two adjunct faculty, and one full-time lab manager. Approximately 665 undergraduate students take 17 biology and 9 chemistry classes every year. In addition to the four Biology and Chemistry surveys, Northern offers science lab courses in:

Biology
Human Anatomy
Invertebrate Biology
Plant Systematics
Ecology
Physiology
Microbiology
Cell and Molecular Biology I and II
Plant Structure and Function
Ornithology
Vertebrate Zoology
Genetics
Immunology
Parasitology
Scientific Imaging
Developmental Biology
Environmental Science and Conservation
Medical Microbiology

Chemistry
Organic Chemistry I and II
Analytical Chemistry
Physical Chemistry
Advanced Lab Techniques
Instrumental Analysis
Inorganic Chemistry
Biochemistry
Environmental Chemistry

Criminalistics
Physical Geography
Geology

All of Northern's existing science labs do dual--and often triple--duty by serving as teaching and research labs for multiple classes. All of these science labs are located in MeWaldt-Jensen (MJ) Hall where multiple classes, often needing very different equipment and facilities, currently are forced to meet in each lab. For example, Room 208 in MeWaldt-Jensen Hall houses labs in Cell and Molecular Biology, Microbiology, Medical Microbiology, Parasitology, Immunology, and Criminalistics. Growing student interest in our biology and pre-health programs and the increasingly sophisticated and technological demands of quality science teaching and research necessitate additional dedicated laboratory space. More specifically, NSU needs three new dedicated labs in (1) Cell and Molecular Biology, (2) Biochemistry, and (3) the Geosciences. Northern's geosciences programs are growing rapidly, especially with the addition of a new Geography minor in 2007. In addition to Geology 101, we will now be offering GEOG 131: Physical Geography every semester and need to create lab space for this 4-credit lab course. Enrollments in these general education lab courses are strong and we anticipate significant growth with planned courses and certificates in GIS and other applied programs. There is also a need for more "dry," general-purpose science classrooms.

NORTHERN STATE UNIVERSITY
Board of Regents Science Facility Renovations
New Labs/Krikac Administration Building

An ideal location for a new Geosciences Lab and a new science classroom is the newly vacated spaces in the basement of the Krikac Administration Building. These spaces once held the NSU Computing Center and computer labs and were vacated with the construction of the Technology Center addition to MeWaldt-Jensen Hall in 2006-07. The four projects for the Krikac Building are: (1) a new Geosciences Lab in AD 103, (2) a new Geosciences Prep Room in AD 101 and 102, (3) a new science classroom in AD 106 and 107, and (4) related mechanical services upgrades to AD 104 and 105.

A summary of current science lab usage at NSU:

BIOLOGY	Courses	Research Lab
MJ 201	Ecology	X
	Plant Structure	
	Plant Systematics	
	Ornithology	
	Biochemistry	
	Scientific Imaging	
MJ 203	General Biology	X
	Physiology	
	Invertebrate	
	Vertebrate	
MJ 206	Genetics	X
	Developmental Bio	
	Human Anatomy	
MJ 208	Cell & Molecular	X
	Microbiology	
	Medical Microbiology	
	Parasitology	
	Immunology	
	Criminalistics	
MJ 238	Biology Survey	N/A
	Env. Sci/Cons.	
MJ 239	Biology Survey	N/A

CHEM	Courses	Research Lab
MJ 301	Chemistry Survey	N/A
MJ 303	Physical Chemistry	
	Inorganic Chemistry	
MJ 304	Analytical Chem	X
	Instrumental Chem	
	Environmental Chem	
MJ 305	Advanced Lab Tech.	X
MJ 308	Organic Chem	N/A
	General Chem	

b. Current Facility Description:

Krikac Administrative Hall was built in 1907 and is one of the original buildings on the NSU campus. It has three floors including the basement. The proposed new science lab, prep room, and classroom would be located in the basement of the building. The first floor of Krikac houses the Finance Office, Institutional Research, Purchasing, and Human Resources. The second floor consists of an auditorium and stage.

One potential problem is the unknown utility layout and construction in the basement and below of this nearly 100 year-old building. The new Geosciences rooms will not need fume hoods, but will need electrical and water lines run to sinks, student workstations, wall service benches, etc. Substantial HVAC work is also anticipated as this floor of the Admin. Building does not have central air conditioning.

c. Proposed Renovations:

The overall plan is to renovate five rooms in the basement of Krikac Administrative Building to create a new Geosciences Lab, Geosciences Prep Room, and a science classroom seating ca. 45 students. The new labs will include an instructor's demonstration table, student tables, wall service benches, and cabinetry. All of these items will be fixed and permanently attached. Additional details on the specific projects follows: (1) new Geosciences Lab, (2) new Geosciences Lab Prep and Storage Room, (3) new Science Classroom, and (4) mechanical services upgrade to AD 104 and 105.

1. New Geosciences Lab in AD 103: Beginning in Spring 2008, we will be offering additional courses in our new Geography minor. Foremost among these new courses will be Geography 131: Physical Geography, a 4-credit lab course that also meets the science lab requirement in general education. A new geography lab is needed for these classes and to house dedicated student computers loaded with ARCINFO software linked to large-bed scanning and plotting tables to use with a variety of GIS applications. No one in the Aberdeen area is currently teaching any GIS applications and we routinely field a dozen requests for assistance and training in this field every year. A new Geography Lab will also allow us to offer a variety of applied GIS courses and certificates.

2. New Geosciences Lab Prep and Storage Room in AD 101, 101A, and 102: AD 101 and 102 are two small rooms adjacent and attached to AD 103. These rooms will become lab prep and storage rooms for the new Geosciences Lab. Room 101A, essentially a closet in AD 101, is included in this space. Foremost among the storage needs here is room for Northern's geology collections and physical geography equipment. In addition to new cabinets and storage facilities, this room will include a wet service bench for lab preparation and clean up.

3. New Science Classroom in AD 106 and 107: A new 1,027 square foot science classroom is needed to replace space lost in Mewaldt-Jensen Hall and for larger survey and upper-level science classes.

4. Mechanical Services Upgrade to AD 104 and 105: AD 104 and 105 are two small mechanical services rooms between AD 103 and AD 106. Mechanical upgrades to these areas are anticipated, especially for the HVAC needs of the new Geosciences lab, prep room, and science classroom.

d. Location and Site Analysis:

The Krikac Administration Building is located on the east-central side of the NSU campus. Krikac is the closest building to MeWaldt-Jensen Hall (where the Biology, Chemistry, and History/Geography departments are located) with available space.

e. Space Allocation and Uses of Current Facility:

Currently, the basement level of the Krikac Administration Building is vacant. Historically, this area was used by the NSU Computing Center for offices, a help desk, and multiple student computer labs. All of these areas were vacated in Spring 2007 when these services were moved to the new Tech Center addition to MeWaldt-Jensen Hall.

Space Use	Count	Discipline	Level	Gross Square Feet
Basement Level				
AD 101, 101A, 102	1	Vacant		370
AD 103	1	Vacant		903
AD 104 & 105	1	Mechanical		243
AD 106 & 107	1	Vacant		1,027
Total				**2,543**

f. Space Allocation and Uses of Renovated Facility:

The following proposed renovations will allow NSU to expand and specialize teaching and research facilities in three areas:

1. AD 101, 101A, and 102: New Geosciences Lab Prep and Storage Room: AD 101 and 102 are two small rooms adjacent and attached to AD 103. These rooms will become a lab prep and storage area for the new Geosciences Lab. Room 101A (essentially a closet in AD 101) is included in this space. Foremost among the storage needs here is

room for Northern's geology collections and physical geography equipment. In addition to new cabinets and storage facilities, this room will include a wet service bench for lab preparation and clean up.

2. AD 103: New Geosciences Lab: A new Geosciences Lab will be created in AD 103. This lab will be the primary lab for classes in Physical Geography and Geology. Northern's new full-time professor of Geography will be assigned to these labs. These courses are currently taught in two non-lab classrooms in MeWaldt-Jensen and the Tech Center addition. These rooms would return to simple classroom use after a new geosciences lab is built.

3. AD 104 and 105: Mechanical Services: AD 104 and 105 are two small mechanical services rooms between AD 103 and AD 106. Mechanical upgrades to these areas are anticipated, especially for the HVAC needs of the new Geosciences lab, prep room, and science classroom. AD 104 currently houses the primary phone connections for campus. This function is not expected to change.

4. AD 106 and 107: New Science Classroom: A new 1,027 square foot science classroom is needed to replace space lost in Mewaldt-Jensen Hall and for larger survey and upper-level science classes. This classroom will be a "smart" room seating at least 45 students.

Space Use	Count	Discipline	Level	Gross Square Feet
Basement Level				
AD 101, 101A, 102	1	Geosciences Lab Prep and Storage	Undergraduate	370
AD 103	1	Geosciences Lab	Undergraduate	903
AD 104 & 105	1	Mechanical		243
AD 106 & 107	1	Science Classroom	Undergraduate	1,027
Total				**2,543**

g. Initial costs estimated based on gross square footage and types of space:

Initial costs, based on gross square footage, are estimated to be approximately $552,725.

Space Use	Gross Square Feet	Per Square Foot Cost	Estimated Costs
Teaching and Research Labs	1,273	$275.00	$350,075
Classroom	1,027	$150.00	$154,050
Mechanical Services	243	$200.00	$48,600

Total	2,543		$552,725

h. Additional services to be offered or benefits of the renovation:

These projects will improve teaching and research in five ways. First, students in general education classes in Physical Geography and Geology will benefit by having their own specialized lab. Second, adding another science classroom will help to alleviate space problems in Mewaldt-Jensen Hall. Third, students in our elementary and secondary science education programs will benefit from expanded lab opportunities. Fourth, various collections of geoscience and earth-space science materials on campus will be consolidated into one storage area available to faculty from both the College of Arts and Sciences and the School of Education.

The fifth benefit is in the area of research. Currently geology and geography faculty do not have lab space and are forced to teach labs in "regular" classrooms. There is also an opportunity to expand our geography offerings into highly popular GIS classes and workshops.

i. Analysis of student body, function or constituents to be served:

Both faculty and students would be served by these improvements. The new Geosciences Lab will benefit the approximately 100 students that take introductory Geology and Geography classes every year. Moving these classes from the existing multi-purpose classrooms and labs in MeWaldt-Jensen where they are currently taught will also benefit the approximately 500 majors and non-major students taking other classes in these over-burdened rooms. Lab safety will be improved for all affected students and faculty.

j. Impact to Maintenance & Repair:

Since this is the renovation of an existing building, impact to Maintenance and Repair will only be from the increased value of the building based on a major renovation and change of use from Computer Center Classroom to Science Labs. Future maintenance and repair will be funded with the campus HEFF M&R allocation.

k. Impact to operational costs:

Since this is the renovation of an existing building there will be no significant changes in operating costs.

l. Proposed funding sources for costs of:

1. **Construction:** 2008 Legislative Laboratory Improvement Bill
2. **Ongoing operations:** Science Lab Fees and Physical Plant Operating Budget
3. **Maintenance and repair:** HEFF M&R

NORTHERN STATE UNIVERSITY
Board of Regents Science Facility Renovations
Lab Upgrades/MeWaldt-Jensen Hall

a. Project Overview:

NSU currently has six biology and four chemistry labs on campus for four full-time biologists, two chemists, two adjunct faculty, and one full-time lab manager. Approximately 665 undergraduate students take 17 biology and 9 chemistry classes every year. In addition to the four Biology and Chemistry surveys, Northern offers science lab courses in:

Biology
Human Anatomy
Invertebrate Biology
Plant Systematics
Ecology
Physiology
Microbiology
Cell and Molecular Biology I and II
Plant Structure and Function
Ornithology
Vertebrate Zoology
Genetics
Immunology
Parasitology
Scientific Imaging
Developmental Biology
Environmental Science and Conservation
Medical Microbiology

Chemistry
Organic Chemistry I and II
Analytical Chemistry
Physical Chemistry
Advanced Lab Techniques
Instrumental Analysis
Inorganic Chemistry
Biochemistry
Environmental Chemistry

Criminalistics
Physical Geography
Geology

All of Northern's existing science labs do dual--and often triple--duty by serving as teaching and research labs for multiple classes. All of these science labs are located in MeWaldt-Jensen (MJ) Hall where multiple classes, often needing very different equipment and facilities, currently are forced to meet in each lab. For example, Room 208 in MeWaldt-Jensen Hall houses labs in Cell and Molecular Biology, Microbiology, Medical Microbiology, Parasitology, Immunology, and Criminalistics. Growing student interest in our biology and pre-health programs and the increasingly sophisticated and technological demands of quality science teaching and research necessitate additional dedicated laboratory space. More specifically, NSU needs three new dedicated labs in (1) Cell and Molecular Biology, (2) Biochemistry, and (3) the Geosciences. Northern's geosciences programs are growing rapidly, especially with the addition of a new Geography minor in 2007. In addition to Geology 101, we will now be offering GEOG 131: Physical Geography every semester and need to create lab space for this 4-credit lab course. Enrollments in these general education lab courses are strong and we anticipate significant growth with planned courses and certificates in GIS and other applied programs. The ideal location for the Geosciences Lab is in the Krikac Administration Building.

NORTHERN STATE UNIVERSITY
Board of Regents Science Facility Renovations
Lab Upgrades/MeWaldt-Jensen Hall

The ideal location for dedicated Biochemistry and Cell and Molecular Biology labs is Mewaldt-Jensen Hall. This building already houses all of the science labs, office, and classrooms and would be one of the easiest buildings on campus to add the mechanical services necessary for new labs. One possible location for a Biochemistry Lab is room 304 in Mewaldt-Jensen Hall. This room is currently an under-utilized chemistry lab that with new student workstations, "wet" service benches, fume hoods, and new storage could become a much more effective teaching and research lab. A possible location for a dedicated Cell and Molecular Biology Lab is MJ 238, an under-utilized Biology and Scientific Imaging Lab. Improvements in the smart classroom and imaging technology will allow us to reduce substantially the equipment and space needed for scientific imaging lab in this lab. Locating these two specialized labs in Mewaldt-Jensen Hall will also improve the efficiency of all our other Biology and Chemistry labs by freeing up additional teaching and research space in existing labs.

The proposed renovations for Mewaldt-Jensen Hall are:

(1) Renovating the Scientific Imaging Lab in MJ 238 to include Cell and Molecular Biology;
(2) Renovating MJ 304 into a new Biochemistry Lab;
(3) Upgrading the science lecture classroom in MJ 204;
(4) Upgrading the chemical storage areas in MJ 313, MJ 314, and associated MJ 308; and
(5) Upgrading four existing science labs in Biology (MJ 201, MJ 203, MJ 206, and MJ 208), the lab prep room in MJ 207, and the Chemistry lab in MJ 305. The total cost of these proposed projects in Mewaldt-Jensen Hall is approximately $2,149,175.

A summary of current science lab usage at NSU:

BIOLOGY	Courses	Research Lab
MJ 201	Ecology	X
	Plant Structure	
	Plant Systematics	
	Ornithology	
	Biochemistry	
	Scientific Imaging	
MJ 203	General Biology	X
	Physiology	
	Invertebrate	
	Vertebrate	
MJ 206	Genetics	X
	Developmental Bio	
	Human Anatomy	
MJ 208	Cell & Molecular	X
	Microbiology	
	Medical Microbiology	
	Parasitology	

	Immunology Criminalistics	
MJ 238	Biology Survey Env. Sci/Cons.	N/A
MJ 239	Biology Survey	N/A

CHEM	Courses	Research Lab
MJ 301	Chemistry Survey	N/A
MJ 303	Physical Chemistry Inorganic Chemistry	
MJ 304	Analytical Chem Instrumental Chem Environmental Chem	X
MJ 305	Advanced Lab Tech.	X
MJ 308	Organic Chem General Chem	N/A

b. Current Facility Description:

All of Northern's existing biology and chemistry labs are located in MeWaldt-Jensen Hall. MJ Hall was built, and its science labs initially equipped, in 1964. The current student workstations, instructor's tables, lab tables, service benches, fume hoods, and cabinetry/storage units date to the initial outfitting of the rooms in the 1960s. A Title III grant updated the computers, desks, lighting, and flooring in six labs (MJ 201, 203, 206, 208, 238, and 305) in 2001. Approximately 650 students use these classes every week.

c. Proposed Renovations:

The five proposed renovations are:

1. New Cell and Molecular Biology Lab in MJ 238 (Biology and Scientific Imaging Lab): Cell and Molecular Biology is currently taught in MJ 208, a Microbiology Lab already shared by labs in Microbiology, Parasitology, Immunology, Medical Microbiology, and Criminalistics. The present lab only has space for 20 students each semester and barely has room for all of the Microbiology equipment. Cell Biology, Microbiology, Parasitology, Immunology, and Criminalistics could enroll approximately 24 students each if room could be found for them. Moving Cell and Molecular Biology Lab out of MJ 208 would allow more students to be taught per semester in all other courses (especially Cell and Molecular Bio., Microbiology, Parasitology, and Immunology). MJ 208 is also the primary research lab of one faculty member and moving Cell and Molecular Biology to MJ 238 will leave her with more, and safer, room for research. The scientific imaging equipment in MJ 238 will be consolidated.

2. New Biochemistry Lab in MJ 304 (Chemistry Lab): NSU also needs a new Biochemistry Lab to support our growing Biology, Chemistry, and related Forensic Science programs. Since 2000, enrollments in our Chemistry program alone have tripled to 33 majors. Enrollments in Biology and Biochemistry are also strong. Forensic Science is an important part of our Chemistry program and attracts students from multiple disciplines, especially Sociology and Criminal Justice. Classes in Forensic Science and Criminalistics are limited by existing lab space already needed for the specialized equipment used in chemistry research and upper-level classes in organic and inorganic chemistry. There is simply not enough room for the equipment needed and a preferred class size of 24 students per lab. Forensics classes also need a number of specialized pieces of equipment including fume hoods, DNA fingerprinting equipment & software, tool marks equipment, blood spatter models & software and forensic photography equipment. Moreover, much of the analytical equipment in our other Chemistry and Biology labs runs continuously and presents a safety hazard to Forensics students not trained as chemists and biologists.

3. Renovated Science Classroom in MJ 204: The primary science lecture room at Northern is MJ 204, an amphitheater-style classroom seating approximately 84 students. MJ 204 has not been updated since initial construction in 1964 and the fixed seating is inefficient and in poor condition. New student seating and instructor's table will improve the function and capacity of the room allowing larger lecture sections to be taught in this room.

4. Upgraded Chemical Storage in MJ 313, MJ 314, and associated MJ 308: NSU's primary chemical storage areas are in MJ 313 and 314, two small rooms off a large Chemistry Lab in MJ 308. A 2007 Risk Management survey identified a number of improvements to be made, including new fixed fire/safety storage cabinets, improved ventilation and exhaust, and additional utility shut-offs. This work will also affect the adjacent large teaching lab in MJ 308 where mechanical work will need to be done. Improved storage will improve the safety and efficiency of MJ 308 and all NSU science labs. These improvements will also complement planned changes to our chemical inventory control system.

5. Upgraded Existing Science Labs in Biology (MJ 201, MJ 203, MJ 206, and MJ 208), the Lab Prep Room in MJ 207, and Chemistry (MJ 305): Each of the renovated science labs would receive new instructor's demonstration tables, new student workstations, new fume hoods, new "wet" service benches and new cabinetry/storage units. All of these units would be fixed and permanently attached. The Biology Lab Prep room in MJ 207 would receive new storage units, wet and dry service benches, and ancillary improvements.

d. Location and Site Analysis:

MeWaldt-Jensen Hall is located in the south-central part of the NSU campus. The building, and its associated Technology Center addition, is the primary classroom building on campus and

houses the offices of the College of Arts and Sciences. The second and third floors of MJ house the offices, classrooms, and labs for the College of Arts and Sciences. Every student on campus takes the majority of their general education classes in this building.

e. Space Allocation and Uses of Current Facility:

Currently, the Biology labs in MJ 201, 203, 206, and 208 and the Chemistry Lab in MJ 304 are heavily utilized as both teaching and research labs. The Scientific Imaging Lab in MJ 238 is used less frequently for biology surveys and environmental science classes. More specifically, six lab courses are taught in MJ 201 (Ecology, Plant Structure, Plant Systematics, Ornithology, Biochemistry, and Scientific Imaging); four in MJ 203 (General Biology, Physiology, Invertebrate Bio., and Vertebrate Bio.), three in MJ 206 (Genetics, Developmental Bio., and Human Anatomy), six in MJ 208 (Cell and Molecular Bio., Microbiology, Medical Microbiology, Parasitology, Immunology, and Criminalistics), and two in MJ 238 (Biology Survey and Environmental Science/Conservation). Three chemistry courses are taught in MJ 304: Analytical Chemistry, Inorganic Chemistry, and Environmental Chemistry. Only one course, Advanced Lab Techniques, is taught in MJ 305. MJ 305 is the primary research lab for our two chemists.

Space Use	Count	Discipline	Level	Gross Square Feet
Second Floor				
MJ 201 Lab Upgrade	1	Ecology, Plant Structure, Plant Systematics, Ornithology, Biochemistry, and Scientific Imaging	Undergraduate	930
MJ 203 Lab Upgrade	1	Gen Biology, Physiology, Invertebrate Bio, Vertebrate Bio	Undergraduate	901
MJ 204 Classroom Upgrade	1	Biology and Chemistry survey lectures and other large CAS surveys	Undergraduate	1,003
MJ 206 Lab Upgrade	1	Genetics, Developmental Bio, Human Anatomy	Undergraduate	909
MJ 207 Lab Prep Upgrade	1	Lab Preparation for MJ 208 (Cell and Molecular Bio., Microbiology, Parasitology, Immunology, and Criminalistics)	Undergraduate	410
MJ 208 Lab Upgrade	1	Cell and Molecular Bio., Microbiology, Medical Microbiology, Parasitology, Immunology, and Criminalistics	Undergraduate	909
MJ 238 Lab Upgrade	1	Biology Survey, Environmental Science/Conservation	Undergraduate	544

Second Floor Subtotal				**5,606**
Third Floor				
MJ 304 Lab Upgrade	1	Analytical Chemistry, Inorganic Chem, Environmental Chem	Undergraduate	713
MJ 305 Lab Upgrade	1	Advanced Lab Techniques	Undergraduate	800
MJ 308 Mechanical Work	1	Chemistry Surveys, Organic Chem	Undergraduate	1,129
MJ 313 Storage Upgrade	1	Organic Chemical Storage		254
MJ 314 Storage Upgrade	1	Inorganic Chemical Storage		77
Third Floor Subtotal				**2,973**
Total				**8,579**

f. Space Allocation and Uses of Renovated Facility:

The five proposed MeWaldt-Jensen projects are:

1. Mewaldt-Jensen 238: New Cell and Molecular Biology Lab: Cell and Molecular Biology is currently taught in MJ 208, a Microbiology lab already shared by labs in Cell and Molecular Biology, Parasitology, Medical Microbiology, Immunology, and Criminalistics. The present lab only has space for 20 students and does not have room for all the necessary equipment to teach this range of classes. Cell Biology, Microbiology, Parasitology, and Criminalistics could easily 24 students per semester which we currently cannot accommodate in this lab. A new Cell and Molecular Biology lab would relieve congestion in MJ 208 and allow more students to be taught per semester in all courses. The scientific imaging equipment in MJ 238 will be consolidated and the surveys moved to MJ 239 and other rooms. Environmental Biology will be moved to MJ 201.

2. MeWaldt-Jensen 304: Biochemistry Lab: NSU also needs a new Biochemistry Lab to support our growing Biology, Chemistry, and related Forensic Science programs. Since 2000, enrollments in our Chemistry program alone have tripled to 33 majors. Enrollments in Biology and Biochemistry are also strong. Forensic Science is an important part of our Chemistry program and attracts students from multiple disciplines, especially Sociology and Criminal Justice. Classes in Forensic Science and Criminalistics are limited by existing lab space already needed for the specialized

equipment used in chemistry research and upper-level classes in organic and inorganic chemistry. There is simply not enough room for the equipment needed and a preferred class size of 24 students per lab. Forensics classes also need a number of specialized pieces of equipment including fume hoods, DNA fingerprinting equipment & software, tool marks equipment, blood spatter models & software and forensic photography equipment. Moreover, much of the analytical equipment in our other Chemistry and Biology labs runs continuously and presents a safety hazard to Forensics students not trained as chemists and biologists.

Two faculty, one from Biology and one from Criminal Justice, will be assigned to this new Biochemistry lab. Creating this new lab will allow us to move Biochemistry from MJ 201 and create a dedicated botany and ecology lab in that room. We will also be able to move Criminalistics out of MJ 208, another over-worked lab where currently six different labs are taught. More dedicated lab space for fewer lab classes will also help us to improve lab safety in these science labs.

3. Mewaldt-Jensen 204: Renovated Science Classroom: MJ 204 has not been updated since initial construction in 1964 and the amphitheater-style fixed seating for approximately 84 students is inefficient and in poor condition. New student seating and instructor's table will improve the function and capacity of the room allowing larger lecture sections to be taught in this room. This room will continue to be the primary site for large science class lectures and other CAS classes as needed.

4. MeWaldt-Jensen 313, 314, and 308 (Upgraded Chemical Storage): NSU's primary chemical storage areas are in MJ 313 and 314, two small rooms off a large Chemistry Lab in MJ 308. This work will also affect this room (MJ 308) where mechanical work will need to be done. A 2007 Risk Management survey identified a number of improvements to be made, including new fixed fire/safety storage cabinets, forced ventilation and exhaust, and additional utility shut-offs. Although access to these chemical storage rooms is restricted to faculty and staff, improved storage and inventory control will improve the safety and efficiency of all NSU science labs.

5. MeWaldt-Jensen 201, 203, 206, 207, 208, and 305 (Upgraded Biology and Chemistry Labs and Biology Prep Room): These five labs and one prep room currently support 19 lower and upper-level undergraduate lab courses in Biology and Chemistry. These labs also serve as research labs for four biology faculty (MJ 201, 203, 206, 208) and two chemists (MJ 305). MJ 207 is a lab prep room associated with MJ 208. The goal of renovations is to reduce the number of labs taught in each class and to increase student and research capacity by making the most efficient use of existing space and resources. For example, Ornithology is currently taught in MJ 201, a Botany room, and Human Physiology is taught in MJ 203, a invertebrate and vertebrate zoology room. A better use of resources would be to move Ornithology to the zoology lab and Human Physiology to the Human Anatomy Lab in MJ 206. Upgrading the Lab Prep room in MJ 207 will also make these labs safer and more efficient. In general, the proposed renovations for each lab will be to upgrade improve student

workstations and lab service benches to allow additional space for more students and more student research. The renovated rooms will also allow more space for specialized research equipment and for safer and more efficient lab conditions for the approximately 700 students that use these five labs every semester.

Space Use	Count	Discipline	Level	Gross Square Feet
Second Floor				
MJ 201 Lab Upgrade	1	Ecology, Plant Structure, Plant Systematics, and Environmental Bio	Undergraduate	930
MJ 203 Lab Upgrade	1	Gen Biology, Ornithology, Invertebrate Bio, and Vertebrate Bio	Undergraduate	901
MJ 204 Classroom Upgrade	1	Biology and Chemistry survey lectures and other large CAS surveys	Undergraduate	1,003
MJ 206 Lab Upgrade	1	Human Anatomy, Physiology, Developmental Bio	Undergraduate	909
MJ 207 Lab Prep Upgrade	1	Lab Preparation for MJ 208 (Microbiology, Parasitology, and Immunology)	Undergraduate	410
MJ 208 Lab Upgrade	1	Microbiology, Parasitology, and Immunology	Undergraduate	909
MJ 238 Lab Upgrade	1	Cell and Molecular Biology	Undergraduate	544
Second Floor Subtotal				**5,606**
Third Floor				
MJ 304 Lab Renovation	1	Biochemistry, Analytical Chemistry, Environmental Chemistry, Inorganic Chemistry, and Criminology	Undergraduate	713
MJ 305 Lab Upgrade	1	Advanced Lab Techniques and Research	Undergraduate	800
MJ 308 Mechanical Work	1	Chemistry Surveys, Organic Chem	Undergraduate	1,129
MJ 313 Storage Upgrade	1	Organic Chemical Storage		254
MJ 314	1	Inorganic Chemical Storage		77

Storage Upgrade				
Third Floor Subtotal				**2,973**
Total				**8,579**

g. Initial costs estimated based on gross square footage and types of space:

Space Use	Gross Square Feet	Per Square Foot Cost	Estimated Costs
Class Labs	5,706	$275.00	$1,569,150
Classroom	1,003	$150.00	$150,450
Lab Prep Room	410	$275.00	$112,750
Chemical Storage	331	$275.00	$91,025
Chemical Storage Mechanical	1,129	$200.00	$225,800
Total	**8,579**		**$2,149,175**

h. Additional services to be offered or benefits of the renovation:

These projects in Mewaldt-Jensen Hall will benefit teaching and research in five ways. First, the two new Biochemistry and Cell/Molecular Biology labs will move students and equipment into their own dedicated lab spaces. These moves will improve lab safety and increase the number of students that can be taught in these classes and in the labs they vacated. The classes held in MJ 210 and MJ 208 will benefit the most. The need for more microbiology equipment and research space in MJ 208 is increasing as the relationship grows between NSU and IKOR Life Sciences, a new biomedical research firm starting up in Aberdeen. Second, the renovated classroom in MJ 204 will allow students to be taught more effectively and efficiently. Third, improving the chemical storage in MJ 313 and 314 (and related MJ 308) will improve lab safety and efficiency in all biology and chemistry classes and research activities. Fourth, upgrading the labs in MJ 201, 203, 206, 208 and 305 with new storage and student workstations will allow us to use lab space more efficiently.

The fifth benefit is in the area of research. Reducing the number of different lab courses in existing labs will allow faculty more room for research and specialized research equipment. Currently science faculty are forced to share research space with the demands of multiple lab classes. Often these labs come with their own specialized equipment that even further restricts available space and lab resources. This problem is especially acute in MJ 208 where currently six very different courses are taught (Cell and Molecular Bio., Microbiology, Medical Microbiology, Parasitology, Immunology, and Criminalistics). Upgrading the Lab Prep room in MJ 207 will also help.

i. Analysis of student body, function or constituents to be served:

Both faculty and students would be served by these improvements. The new and upgraded labs will serve approximately 155 science majors each year and approximately 650-700 non-majors each semester (approximately 1,200 non-science majors each year). Lab safety will be improved for all affected students and faculty.

j. Impact to Maintenance & Repair:

Since this is the renovation of an existing building, impact to Maintenance and Repair will only be from increased value of the building based on a major renovation. Future maintenance and repair will be funded with the campus HEFF M&R allocation.

k. Impact to operational costs:

Since this is the renovation of an existing building there will be no significant changes in operating costs.

l. Proposed funding sources for costs of:

1. **Construction:** 2008 Legislative Laboratory Improvement Bill.
2. **Ongoing operations:** Science Lab Fees and Physical Plant Operating Budget.
3. **Maintenance and repair:** HEFF M&R.

SDSM&T
Board of Regents Science Facility Construction
Chemical & Biological Engineering/Chemistry Building

a. Project Overview:

The Chemical and Biological Engineering/Chemistry Building (CBE/C) will replace existing spaces housed in a 40,000 gross square foot building constructed in 1957. Almost every School of Mines student will attend a class or lab in this facility.

Overarching programmatic justification includes:

- Replacement of existing spaces with spaces comparable in use which are higher quality, safer, more flexible, and more conducive to contemporary teaching methodologies.
- Incorporation of new and changing programs. SDSM&T has joined other competitive programs across the country by incorporating Biological Engineering in their Chemical Engineering curriculum. This combination of biology and chemistry in engineering provides access to new material regimes; and is especially critical for emergent technologies such as ethanol fuel production, food and agricultural processing, and environmentally friendly plastics and coatings.

b. Facility to be Replaced - or - Need for New Space:

The existing building houses SDSM&T's Chemistry and Chemical Engineering Departments on three floors. It was built in 1957 and no major upgrades or additions have been completed. It is a multi-use facility housing classrooms, academic and research laboratories, offices, and a small auditorium.

This building would require major updates to continue as a chemistry/chemical engineering facility for 21st Century science and engineering. There is no air conditioning or proper HVAC controls for comfort in the building. Chemical storage is inefficient and inadequate. Maintenance costs on the existing fume hoods have become unmanageable and the codes under which they were installed are not optimal for preserving the health of the users. The building has reached a point where it is prudent to replace it rather than investing additional resources in the chemistry and chemical engineering functions for which it was designed more than 50 years ago.

c. Location and Site Analysis:

This site is located just off of the campus green, in the parking lot above the athletic field and adjacent to the Old Gymnasium Building. This site offers prime visibility from areas of town to the north and east, as well as strong connection to the campus.

The design team tested various locations with concept footprints, and this site was recommended for the following reasons:

1. There is adequate site area for the proposed building and also a future building.

2. The site allows the new building to easily connect to the campus vehicular and pedestrian circulation paths. It also allows for multiple entry points for student, faculty and service access.

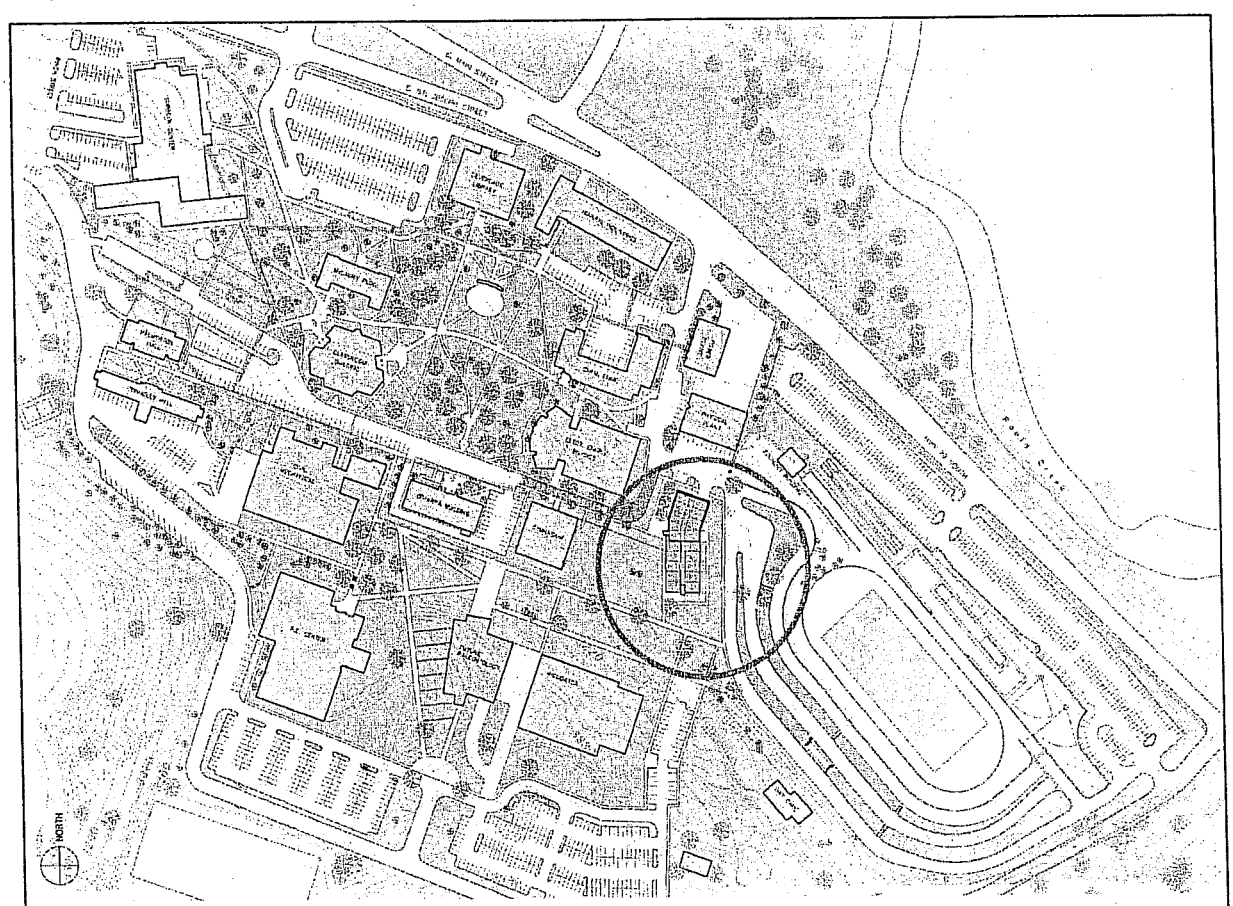
3. Adjacency to the existing campus buildings is strong, especially the existing Chem/Chem E building. This is important if that building is retained and used for research and related activities.

4. This location affords prime visibility from outside the confines of the campus. This is very important as this building is a signature building that needs to project the forward looking image of the campus to the community.

5. Utility infrastructure is readily available.

6. The proximity of this site to the proposed Paleontology Center site offers the potential for simultaneous construction of both buildings by the same contractor to reduce construction costs.

The following site plan illustrates the location of the proposed Chemical & Biological Engineering/Chemistry Building.



Campus Plan; Initial Phase for the CBEC Building and Paleontology, and Road Reconfigurations

SDSM&T
Board of Regents Science Facility Construction
Chemical & Biological Engineering/Chemistry Building

The Chemical and Biological Engineering/Chemistry Building (CBE/C) will replace existing spaces housed in a 40,000 gross square foot building constructed in 1957. This building would require major updates to continue as a chemistry/chemical engineering facility for 21st Century science and engineering. There is no air conditioning or proper HVAC controls for comfort in the building. Chemical storage is inefficient and inadequate and building maintenance costs have become unmanageable The building has reached a point where it is prudent to replace it rather than investing additional resources for the chemistry and chemical engineering functions for which it was designed more than 50 years ago.

Our current Chemistry/Chemical Engineering Building has a number of space inadequacies, most of which occur in the areas of lab and general support and adequate space for graduate students and faculty offices, and interaction space. Also, the existing building does not accommodate SDSM&T's growing Biological Engineering curriculum and research endeavors.

Details of space allocations for the existing building follow.

Space Use	Count	Discipline	Level	Gross Square Feet
First Floor				
Class Labs	3	Chem/ChemE	Undergraduate and Graduate	3,475
Research Labs	5	Chem/ChemE	Graduate/Doctoral	1,157
Lab Service	24	Chem/ChemE	Undergraduate and Graduate	4,699
Office	2	Chem/ChemE	Undergraduate and Graduate	502
Mech	2	NA	NA	266
Restrooms	2	NA	NA	176
Circulation	6	NA	NA	2,978
First Floor Totals				**13,253**
Second Floor				
Class Labs	2	Chem/ChemE	Undergraduate and Graduate	2,549
Research Labs	4	Chem/ChemE	Graduate/Doctoral	2,327
Lab Service	4	Chem/ChemE	Undergraduate and Graduate	1,015
Office	12	Chem/ChemE	N/A	2,242

Study	3	Chem/ChemE	All	567
Restrooms	3	NA	NA	418
Circulation	3	NA	NA	2,635
Classroom	1	Chem/ChemE	Undergraduate and Graduate	2,050
Second Floor Totals				**13,804**
Third Floor				
Class Labs	4	Chem/ChemE	Undergraduate and Graduate	1,857
Research Labs	6	Chem/ChemE	Graduate/Doctoral	1,414
Lab Service	2	Chem/ChemE	Undergraduate and Graduate	310
Office	6	Chem/ChemE	N/A	2,711
Conference Room	1	Chem/ChemE	All	322
Circulation	1	NA	NA	1,485
Classrooms	3	Chem/ChemE	Undergraduate & Graduate	3,974
Third Floor Totals				**12,073**
Existing Biological Engineering Space		**Biology**	**Undergraduate & Graduate**	**8,000**
Total				**47,129**

e. Space Allocation and Uses of Replacement Facility:

Teaching Labs

The new building will include six dedicated teaching laboratories, which is a reduction in quantity from the current state. But these labs will provide increased teaching capacity through more intense utilization based on dynamic programming. This will be supported by a campus-wide transformation in classroom and laboratory scheduling.

Labs will be rolled-over from class to class throughout the day, rather than utilizing the more traditional static model of the lab switched in purpose at the end of the semester. These labs will

be designed to create an environment where students can directly apply theory from the classroom through hands-on application and experience real world results.

In order to support this teaching model and allow for the setup of various lab configurations, student workstations will be movable. Chemical fume hoods will be provided as required and will generally be located at the perimeter of the room to allow maximum flexibility.

Academic/Research Labs

The faculty or academic, research laboratories have been developed based upon an "open" laboratory concept and on a standardized lab module. The module establishes a grid by which walls and partitions are located. As modifications occur, partitions can be relocated and laboratories expanded into larger laboratory units or contracted into smaller laboratory units without requiring reconstruction of structural or mechanical building elements. The planning modules may be combined to produce large, open laboratories or subdivided to produce small instrument or special-use laboratories. Laboratory benches will be assigned based on the 'population' of the groups working in a given area.

Six modules will be fitted out, and eleven modules will be shelled space for completion as funding allows.

Lab Support

Both teaching and research labs require lab support space. Lab support ranges broadly per institution and research focus, generally ranging from 2% to 45% of the total laboratory (combined teaching, research, and support space). This facility is currently programmed at 33%, which is appropriate given the high degree of laboratory utilization. These support spaces provide the environment for activities which can be shared between labs, or would otherwise require dedicated space within a lab.

Office

Offices will utilize a standardized module. This module will allow for the assignment of one, two, or three individuals per space depending on responsibilities. Offices are configured to provide access to natural light and views, and are grouped to encourage collaboration among faculty. Additionally, the offices are positioned near the research and teaching labs

Classrooms and Interactive Spaces

The program includes one small 25-student and one medium 50-student sized classroom in addition to four multi-function meeting/team-based learning spaces. The small and medium sized classrooms are located at grade level, and are well-proportioned for excellent viewing angles. Additionally, the shape will allow for reconfiguration, and the location will promote use of the small meeting rooms as "break-out" rooms.

Interaction is critical for education of scientists and engineers. Interaction spaces have been included to promote opportunities for synergy between faculty, staff, and students. Resource spaces have been included for faculty and students, and multi-purpose conference rooms have been included to accommodate a variety of uses.

General Support

The general support category includes programmed spaces such as dry storage, receiving and small work rooms.

Building Layout and Design

Ultimately, the preferred planning diagram was the "razor back" option, named for the transparent grouping of offices aggregated at the top floor. This scheme resonated with individuals on campus for the following reasons:

- Proximity of the classroom spaces to campus and the entry is advantageous;
- Organization of the technical spaces is efficient;
- Offices grouped together on one floor is synergistic;
- The diagram offers horizontal expansion capabilities;
- The east facing terrace on the third floor is considered desirable; and
- The entrance is positioned to receive a primary pedestrian path, and permit passage through to the athletic quadrant of campus.

The architectural character this diagram supports is sensitive to the campus context, while taking on aspects of a signature building on a pivotal site. This is accomplished through the use of compatible material, appropriate scale, contextual detail, and a clear expression of internal organization. Activities within the building are intended to be showcased; the general chemistry lab is positioned to reveal itself to visitors to the lobby, and the high bay lab has been clad with glass, expressing itself to campus under nighttime illumination. This building will seat itself comfortably within the existing campus fabric while strongly establishing a character all its own.

The following table lists the detailed space allocations for the new Chemical & Biological Engineering/Chemistry Building.

Space Use	Count	Discipline	Level	Gross Square Feet
First Floor				
Teaching Labs	2	CBE/C	Undergraduate/Graduate	6,545
Storage	8	CBE/C	Undergraduate/Graduate	7,361
Unit Operations	1	CBE/C	Undergraduate/Graduate	2,182
Instrument Room	1	CBE/C	Undergraduate/Graduate	1,364
NMR	1	CBE/C	Undergraduate/Graduate	545
High Temp Reaction	1	CBE/C	Undergraduate/Graduate	545
Classrooms	2	CBE/C	Undergraduate/Graduate	2,858
Small Conference	1	CBE/C	Undergraduate/Graduate	175
Student Resource & Study Room	2	CBE/C	Undergraduate/Graduate	880
Receiving	1	CBE/C	Undergraduate/Graduate	263
First Floor Totals				**22,718**

Second Floor				
Teaching Labs	4	CBE/C	Undergraduate/Graduate	4,909
Academic/Research Fitted	6	CBE/C	Undergraduate/Graduate	3,270
Academic/Research Shelled	11	CBE/C	Undergraduate/Graduate	5,996
Instrument Room	1	CBE/C	Undergraduate/Graduate	545
Cold Room	1	CBE/C	Undergraduate/Graduate	180
Glasswash/Autoclave	1	CBE/C	Undergraduate/Graduate	545
Team Meeting Room	1	CBE/C	Undergraduate/Graduate	545
Second Floor Totals				**15,990**
Third Floor				
Offices	37	CBE/C	Undergraduate/Graduate	8,717
Faculty Resource	2	CBE/C	Undergraduate/Graduate	351
Team Meeting Rooms	3	CBE/C	Undergraduate/Graduate	950
Workrooms	2	CBE/C	Undergraduate/Graduate	526
Third Floor Totals				**10,544**
Total				**49,252**

f. Initial costs estimated based on gross square footage and types of space:

Space Use	Gross Square Feet	Per Square Foot Cost	Estimated Costs
Construction Costs	49,252	$311.72	$15,352,719
Soft Costs			$2,604,981
Total		**$364.61**	**$17,957,700**

An extensive design and estimation process was conducted by the architectural team of TSP, Smithgroup and RFD under the direction of the Office of the State Engineer. Their total cost for this building is estimated at $18 million, with a base construction cost of $311.72/square foot. The details are contained in the following table.

	ITEM	%	COST	COST/SF
A.	Land Acquisition Costs		not applicable	
B.	Construction Costs			
	Site Development Allowance		$700,000	
	Building Construction Cost		$12,395,931	$251.68

C.	Construction Contingency	5%	$619,797	
D.	Escalation to Spring 2009 Bids (5% per year)	10%	$1,309,593	
E.	Design Contingency	2.5%	$327,398	
	SUBTOTAL- BUILDING CONSTRUCTION COSTS		**$15,352,719**	$311.72
F.	Professional Services & State PM Fee			
	Professional Services & Reimbursable Expenses	8.5%	$1,304,981	
	Indirect Construction Costs (Geotech, survey, testing, insurance, State PM fee, etc.)		$300,000	
G.	Fixtures, Furnishings, & Equipment (FF&E) & Tele/Data Allowances			
	Telecommunications / Data Transfer		$250,000	
	FF&E		$750,000	
	SUBTOTAL- SOFT COSTS		**$2,604,981**	
	TOTAL- PROJECT BUDGET		**$17,957,700**	$364.61

g. Additional services to be offered or benefits of the renovation:

The Chemical and Biological Engineering/Chemistry Building (CBE/C) will replace existing spaces housed in a 40,000 gross square foot building constructed in 1957. This building would require major updates to continue as a chemistry/chemical engineering facility for 21st Century science and engineering. There is no air conditioning or proper HVAC controls for comfort in the building. Chemical storage is inefficient and inadequate and building maintenance costs have become unmanageable The building has reached a point where it is prudent to replace it rather than investing additional resources for the chemistry and chemical engineering functions for which it was designed more than 50 years ago.

Overarching programmatic justification includes:

- Replacement of existing spaces with spaces comparable in use which are higher quality, safer, more flexible, and more conducive to contemporary teaching methodologies.

- Incorporation of new and changing programs. SDSM&T has joined other competitive programs across the country by incorporating Biological Engineering in their Chemical Engineering curriculum. This combination of biology and chemistry in engineering provides access to new material regimes; and is especially critical for emergent technologies such as ethanol fuel production, food and agricultural processing, and environmentally friendly plastics and coatings.

The new building, when fully completed, incorporates state of the art graduate and undergraduate research space. The building will have modern laboratory space that will serve as the vehicle for conducting research for the enhancement of undergraduate and graduate education while enhancing the potential for economic development for the state of South Dakota.

- SDSM&T has joined other competitive programs across the country by incorporating Biological Engineering in their Chemical Engineering curriculum. This combination of biology and chemistry in engineering provides access to new material regimes; and is especially critical for emergent technologies such as ethanol fuel production, food and agricultural processing, and environmentally friendly plastics and coatings.

- SDSM&T has recently started a Ph.D. program in chemical and biological engineering which will be housed in this new structure. When fully operational, a total of eight new faculty and support staff will eventually be housed in this facility.

- The disciplines housed in this facility are positioned to accomplish explosive growth in support of research and economic development efforts for SDSM&T and the State of South Dakota. One example of this prominent position is the awarding of an NSF I/UCRC planning grant to SDSM&T. This effort will concentrate on bioprocessing fuels and lubricants and is very likely to lead to a permanent I/UCRC. This center will be led by SDSM&T. South Dakota State University, North Carolina State University, Kansas State University, Iowa University, Northern Iowa University, University of New York-Stony Brook, and the University of Hawaii are collaborating on this exciting endeavor.

h. Analysis of student body, function or constituents to be served:

Clearly, this facility will have a significant impact on current and prospective SDSM&T students. There are nearly 200 students enrolled in the Chemistry and Chemical & Biological Engineering programs at SDSM&T. Additionally, all of SDSM&T's degree seeking students are required to take one or more Chemistry classes as part of their curriculum and will be utilizing the proposed building.

Numerous faculty and research assistants involved in externally funded research will also benefit. SDSM&T's research program is experiencing tremendous growth, with research revenues doubling over the last five years. In many cases, this rapid growth has made it necessary for research faculty and graduate assistants to utilize less than adequate space for their research initiatives. A modern interdisciplinary research facility is critical to the expansion of SDSM&T's research future.

i. Illustrative floor plans:

Illustrative floor plans are included as Exhibit A-1 to A-3.
An artist's rendering of the exterior design is included as Exhibit B-1.

j. Impact to Maintenance & Repair:

The Chemical & Biological Engineering/Chemistry Building is designed to meet or exceed durability and energy performance standards set forth in current codes. It is anticipated that these standards will result in maintenance and energy costs per square foot that are significantly less than the maintenance and energy costs per square foot of the existing Chemistry/Chemical Engineering Building.

k. Impact to operational costs:

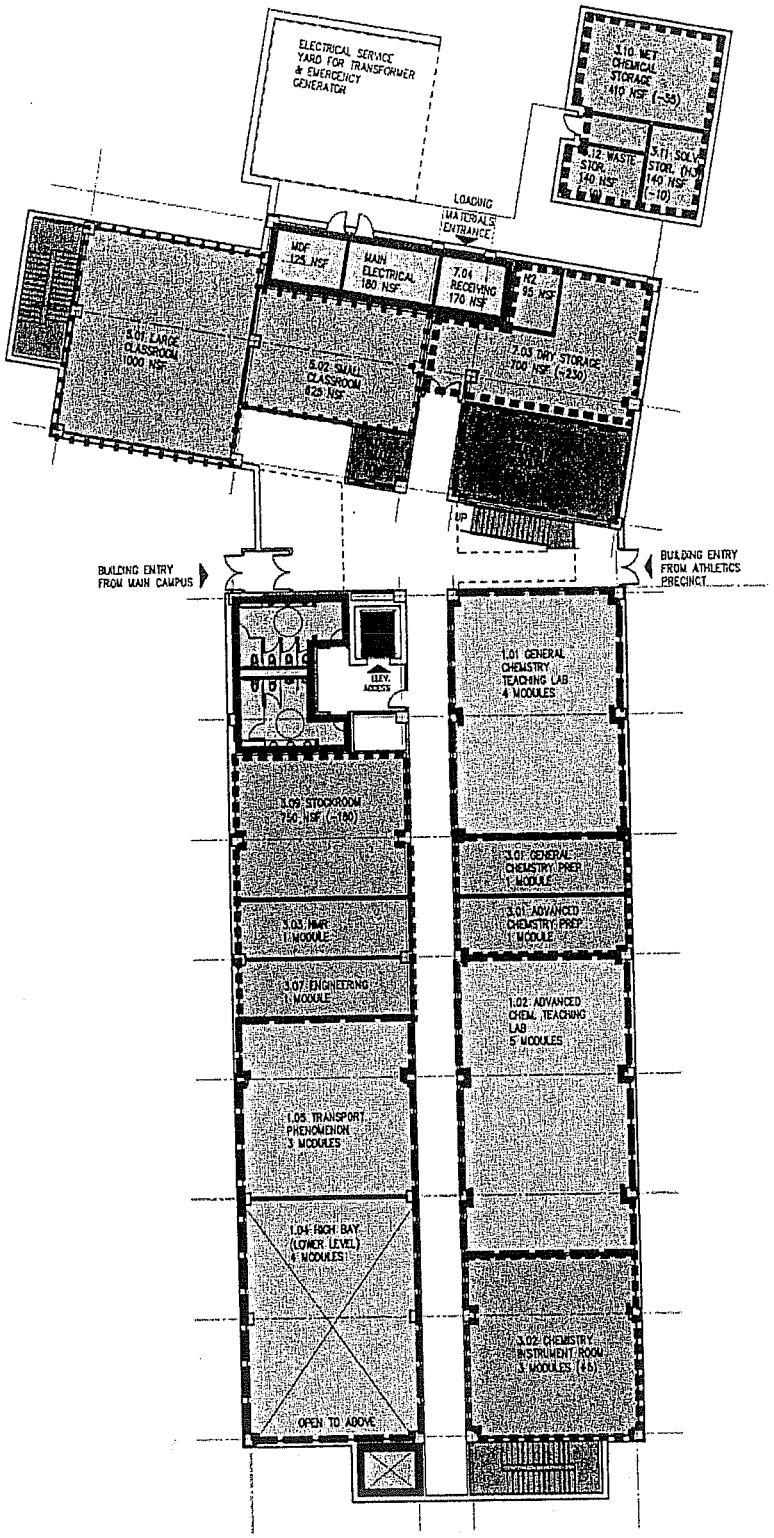
Ongoing operational facilities costs for this building are estimated at $3.60.square foot and will be provided by the existing Chem/ChemE Building budget for operational costs. Significant utility efficiencies will be realized in comparison to the existing fifty year old facility.

l. Proposed funding sources for costs of:

1. **Construction**
   $10 million – HEFF allocation
   $ 8 million – 2008 Science Facility Bond
   $18 million – Base construction costs
   $ 2 million – finish shelled labs from Private Fundraising.

2. **Ongoing operations** – Institutional Facilities & Services - (replacement from funds previously designated towards old Chem/ChemE Bldg).

3. **Maintenance and repair** – HEFF Maintenance & Repair (replacement from funds previously designated towards old Chem/ChemE Bldg).



LEVEL ONE

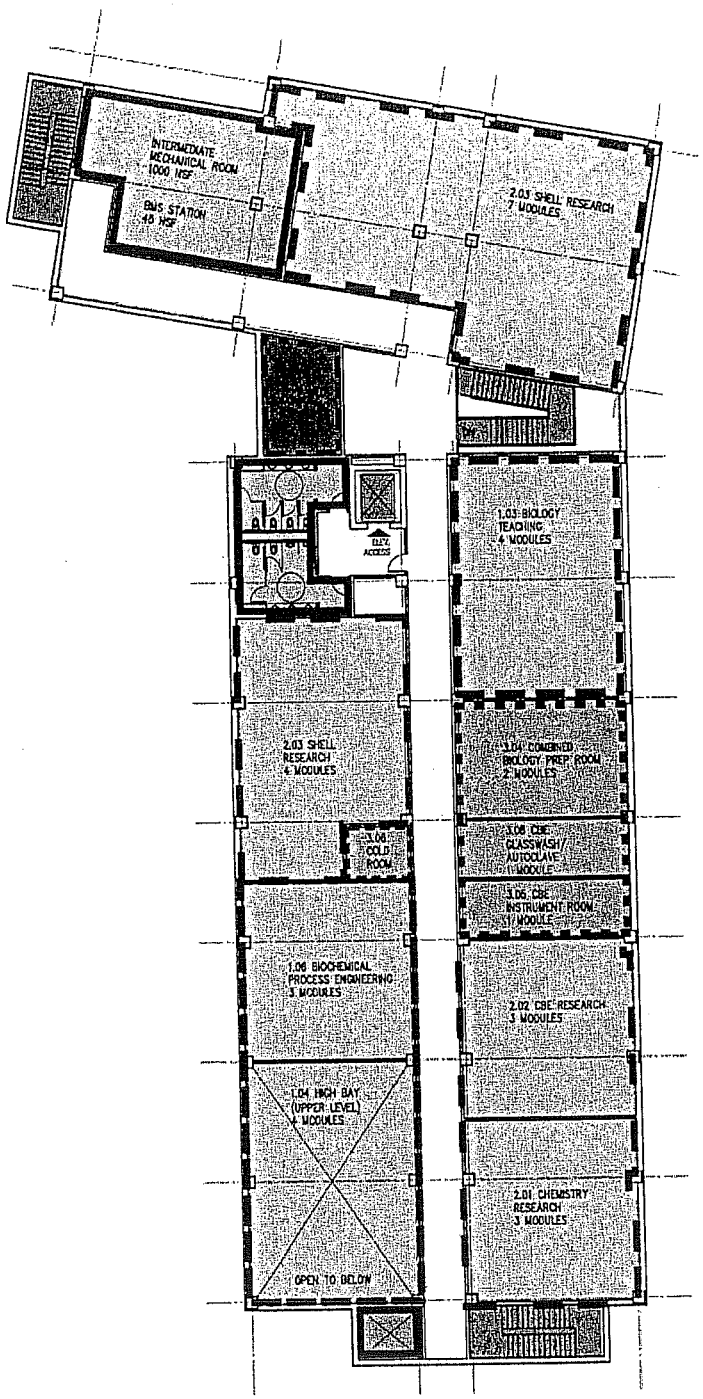
KEY

- OFFICE
- TEACHING LABS
- RESEARCH LAB
- INTERACTION SPACE
- LAB SUPPORT
- GENERAL BUILDING SUPPORT
- VERTICAL CIRCULATION

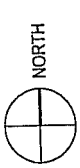
NORTH

SDSM&T CHEMICAL + BIOLOGICAL ENGINEERING + CHEMISTRY
NOVEMBER 21, 2007

RFD SMITHGROUP
architecture engineering interiors planning

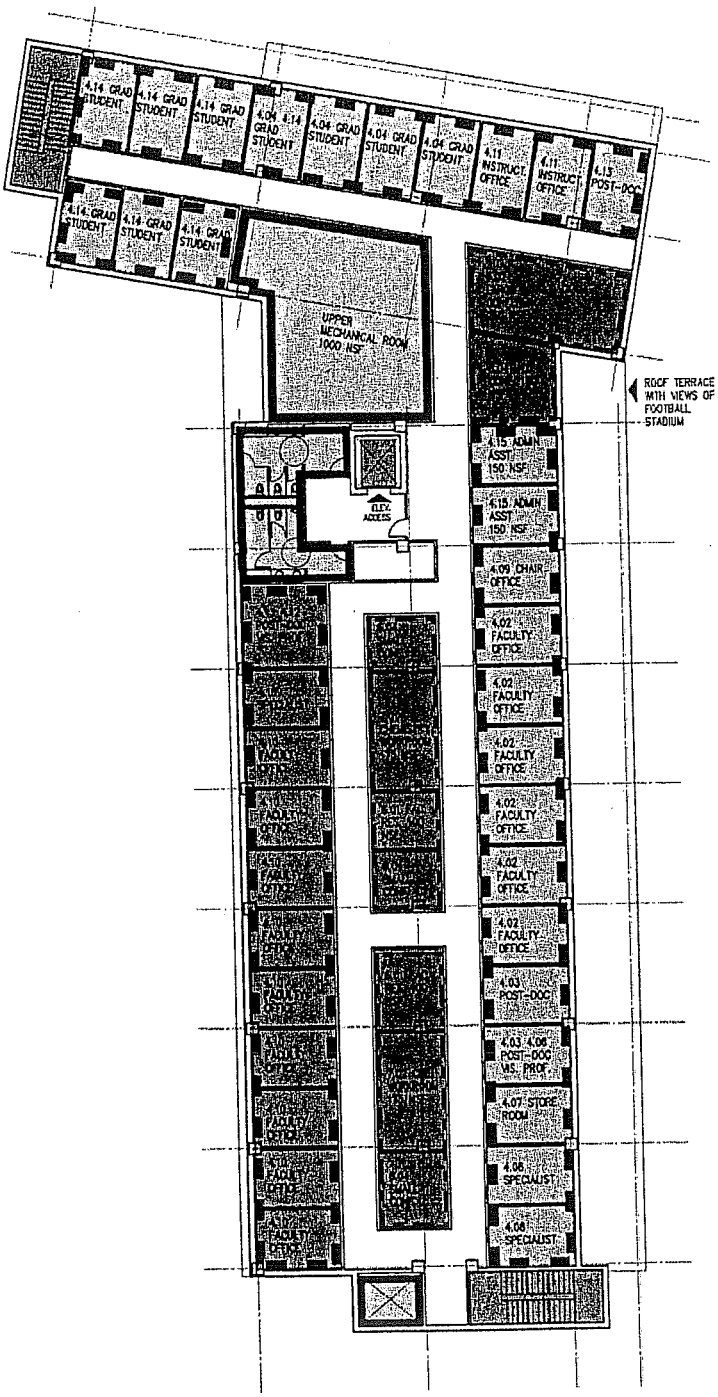


LEVEL TWO



SDSM&T CHEMICAL + BIOLOGICAL ENGINEERING + CHEMISTRY
NOVEMBER 21, 2007

SMITHGROUP
architecture engineering interiors planning



LEVEL THREE

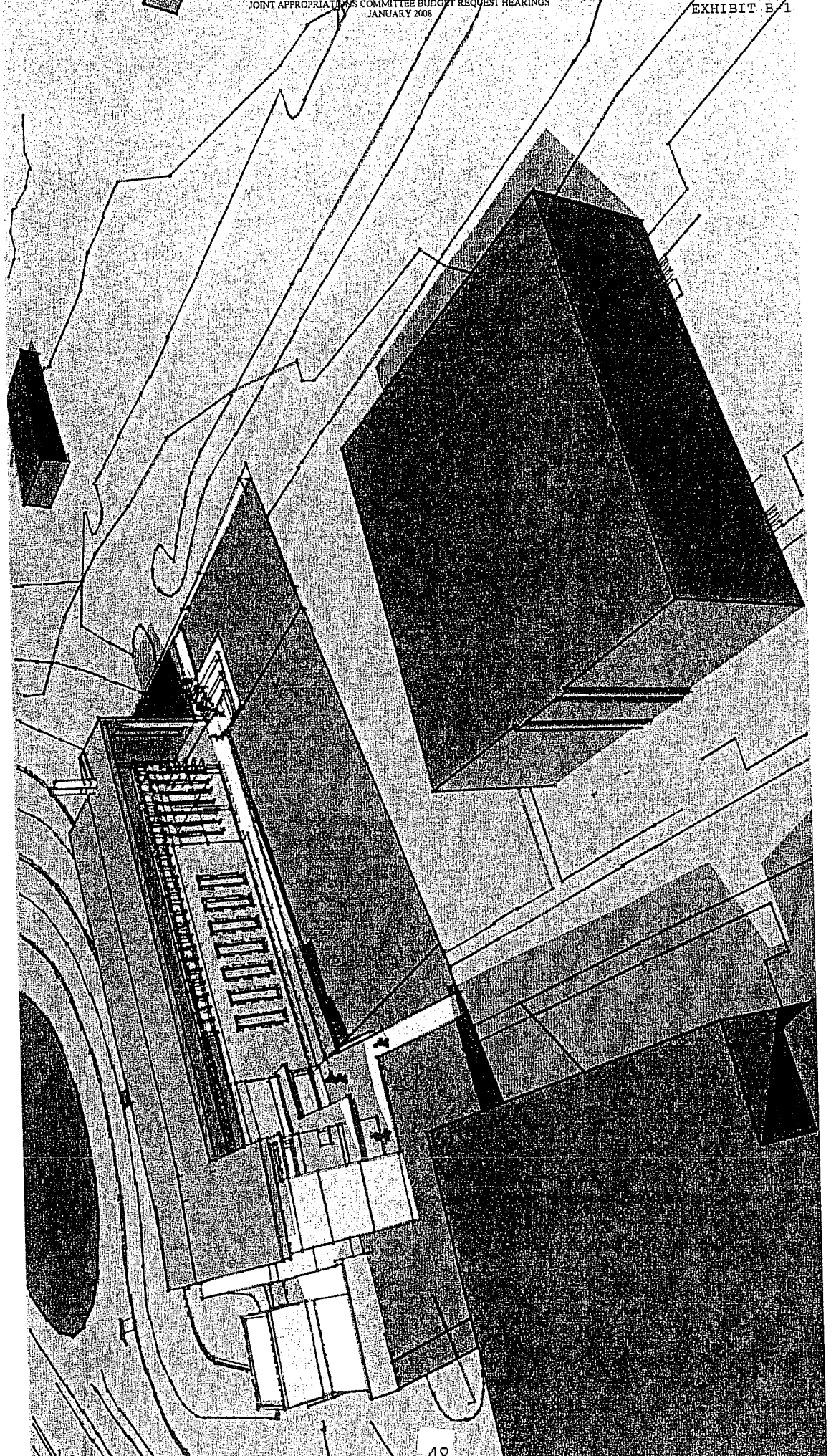
KEY

- OFFICE
- TEACHING LABS
- RESEARCH LAB
- INTERACTION SPACE
- LAB SUPPORT
- GENERAL BUILDING SUPPORT
- VERTICAL CIRCULATION

NORTH

SDSM&T CHEMICAL + BIOLOGICAL ENGINEERING + CHEMISTRY
NOVEMBER 21, 2007

RFD SMITHGROUP
architecture engineering interiors planning



SDSM&T
Board of Regents Science Facility Construction
Paleontology Building

a. Project Overview:

The Paleontology Program at SDSM&T is responsible for receiving, preparing conserving and maintaining the specimens that comprise the Museum of Geology collections. The program is currently located in the Old Gym building on the SDSM&T campus. That space is exceedingly overcrowded and was not designed for museum activities and needs. The conditions are unacceptable for long-term care of resources and make accessibility to the collections difficult at best.

Researchers around the world are studying fossil specimens in an attempt to better understand some of the most pressing issues in the world today including global warming, overpopulation, and extinction of species. For over a hundred years, the Museum of Geology at SDSM&T has been recognized for its research and its vast collection of fossil and mineralogy specimens. The Museum houses approximately 300,000 specimens, many of which were collected from Federal property, Indian reservations, State land, and private holdings. The collection is one of the most important natural resource collections in the United States.

The principle goal for the Paleontology Center project is to provide a suitable repository for these specimens, so that they can be properly maintained and so that the collection can be made accessible for research and study.

b. Facility to be Replaced - or - Need for New Space:

This building will replace portions of the Old Gym that are currently being used to house the activities of the Paleontology program and SDSM&T's paleontological and geological specimens. The Old Gym was built in 1928 and current operations of the Paleontology program are inefficiently located over portions of all four floors.

Most of the Paleontology collection and laboratory activity had been located in the basement of the Old Gym. In April, 2007 the State Fire Marshall and Office of Risk Management directed SDSM&T to eliminate all classroom and laboratory activities taking place in the basement of the Old Gym and to restrict access to the collections on a monitored and limited basis. SDSM&T was forced to lease a 2,400 square foot facility to temporarily house classroom and laboratory functions on a temporary basis.

c. Location and Site Analysis (Explain the location of the building and other site issues):

The Paleontology Center will be located in the southeast section of the SDSM&T campus, between the King Center and the Black Hills Business Development Center (BHBDC).

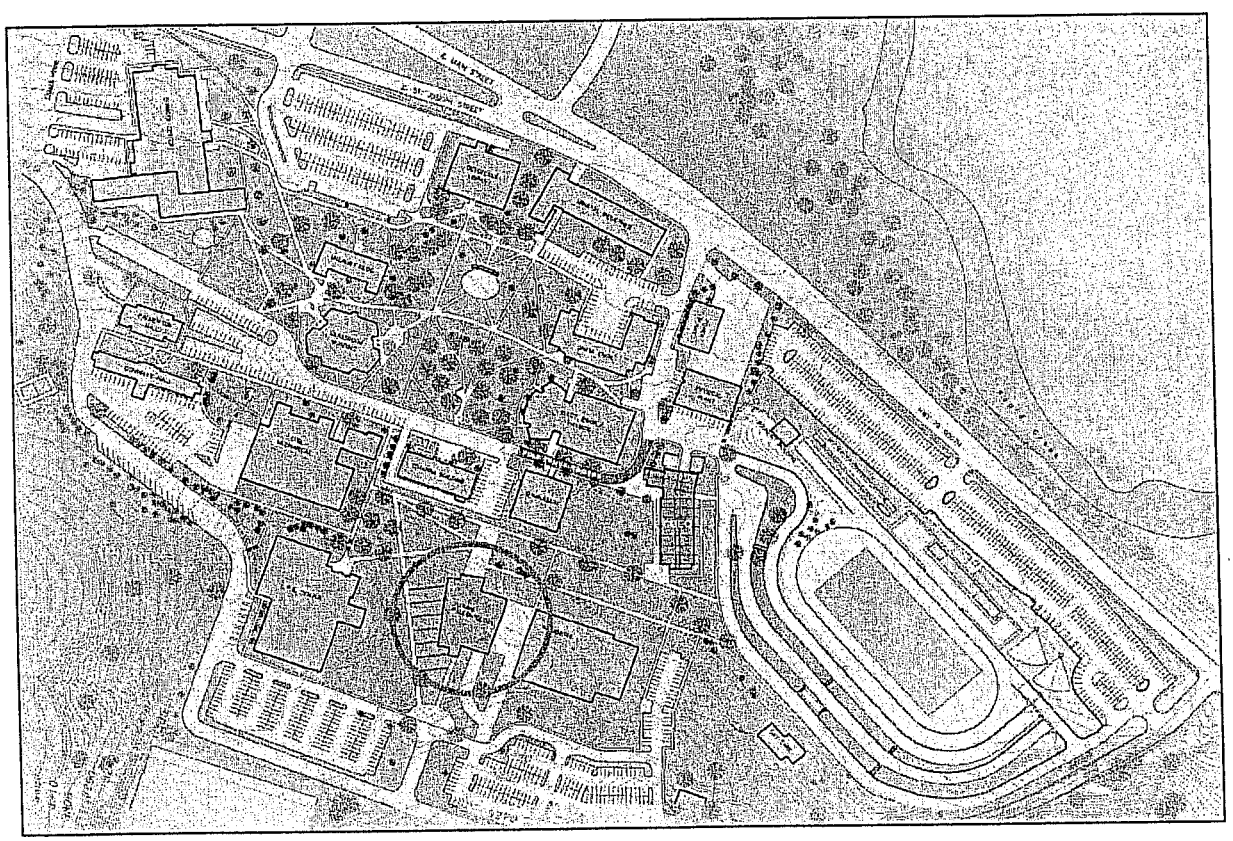
- Topography: There is approximately 18' of drop between the south end of the site and the north end. We propose to take advantage of this slope to provide access from grade at a lower level on the north side and at an upper level on the south side.

- Connections to Campus Pedestrian Paths: The site is between major campus parking lots and the entry to the campus Quad. We propose to create a path from the parking lots, through the building, to the Quad. This path will be one device for increasing the visibility of the Paleontology program.

- Accessibility: For the Paleontology site, we propose to create an outdoor sloped accessible path connecting parking to the campus Quad. The Paleontology Building elevator would provide a second means of access from the lower level to the upper level of the site.

- The proximity of this site to the proposed Chemical & Biological Engineering/Chemistry Building site provides the opportunity for simultaneous construction of both buildings by the same contractor to reduce construction costs.

The following site plan depicts the exact location of the proposed Paleontology Building.



d. Space Allocation and Uses of Current Facility:

The current paleontology operations are housed in parts of a four floor gymnasium structure built in 1928. This facility is woefully inadequate for the academic and research activities that surround a program of this stature. Furthermore, the State Fire Marshall has prohibited all laboratory and day-to-day functions in the basement of the Old Gym, limiting our activities to

access of the collections only. Listed below is the allocation of space for all functions currently housed in the Old Gym.

Space Use	Count	Discipline	Level	Gross Sq Feet
First Floor				
Storage	1	Business & Admin.	N/A	468
Research Labs	3	Paleontology	Graduate & Doctoral	1,055
Collections	6	Paleontology	Graduate & Doctoral	6,094
Lab Service	4	Paleontology	Graduate & Doctoral	1,561
Restroom	1	N/A	N/A	152
Mechanical	2	N/A	N/A	198
Circulation	4	N/A	N/A	1,120
First Floor Totals				**10,648**
Second Floor				
Office	1	SD Engr Society	N/A	378
Office	1	Environmental Health & Safety	N/A	172
Collections	6	Paleontology	Graduate & Doctoral	2,448
Gymnasium	1	Athletics/Intramurals	N/A	6,402
Circulation	1	N/A	N/A	652
Second Floor Totals				**10,052**
Third Floor				
Offices	4	Administration	N/A	643
Storage	4	Administration	N/A	767
SDSD	1	N/A	N/A	264
Research Lab	1	Paleontology	Graduate & Doctoral	264
Circulation	3	(Includes balcony)	N/A	2655
Restroom	1	N/A	N/A	29
Third Floor Totals				**4,622**
Fourth Floor				
Office	1	Paleontology	Graduate & Doctoral	230
Storage	1	Administration	N/A	230
Circulation	1	N/A	N/A	71
Fourth Floor Totals				**531**
Total				**25,853**

e. Space Allocation and Uses of Replacement Facility:

The Vertebrate Fossil Systematic Collections may be the most important function of the repository. This area will be designed to maintain, in a controlled atmosphere, the prepared vertebrate fossil specimens in an orderly fashion for research and education. Room for storage of present collections and for future expansion is required. This space should be adequate for future additions to the collections.

The Recent Vertebrate Systematic Collections will be isolated from other collections, particularly due to their susceptibility to pests. These collections will be utilized in many research capacities, including comparison with fossil specimens.

The Mineralogy Collections will house the School's world-class collection of rocks and minerals. Proper cases, compactors, and environmental conditions are required.

The Paleobotany Collections will be maintained for fossil plants, as well as for teaching and research casts.

The Invertebrate Fossil Systematic Collections is required for the preservation of invertebrate fossils and their accompanying documentation, including large collections of clams, snails, ammonites, and decapods. The latter must be segregated from the other invertebrates according to the dictates of the donation.

The Fossil Preparation Laboratory will be a large facility that includes a number of components. In this facility, the fossils, principally vertebrate fossils, will be cleaned of all rock adhering to the fossil. This facility will be the primary laboratory area in the building.

The Analytical Geochemistry Laboratory will be a chemical laboratory in which sedimentary rocks and contained fossils from land, ice, and other records of the Earth's history will be analyzed for fossil chemical evidence of past environments. Precise and accurate analytical methods for determining the isotopic and elemental composition of the samples will be critical.

The Chemical/Wet Laboratory will be a multi-purpose facility to include screen washing, chemical treatments, recent vertebrate preparation, microfossil preparation, and rock and mineral preparation.

The Casting Laboratory will house the functions of molding and casting of specimens for research, teaching, sale, and/or exhibition. To accomplish these ends, a large area for housing necessary equipment, storage of casts, and space for replicating specimens as large as dinosaurs will be needed.

The Archival Storage Map Storage, Locality Storage, and Computation Center is a multi-purpose area for the maintenance of contextual data for the fossil specimens, including locality data, field documentation, field maps, preparation notebooks, etc.
The Study Laboratory Lay-out, and Visitor Space is a multi-purpose area adjacent to the systematic collections. Specimens from the collections may be brought to this area for instruction, for visitor inspection and research, and as an area where specimens, particularly large specimens, may be laid out for study.

A key feature of the building will be a circulation lobby. The lobby is central to the Paleontology program's goals of opening the collection and preparation process to the public. Paleontologists will be able to lead tours of the facility by circulating through the lobby, looking through interior windows into rooms in which various stages of the specimen preparation process will be underway.

Listed below are the specific space allocations as currently designated for the new building.

Space Use	Count	Discipline	Level	Gross Square Feet
First Floor				
Collections	6	Paleontology	Undergraduate/Graduate	14,957
Study Lab & Visitor Space	1	Paleontology	Undergraduate/Graduate	837
First Floor Totals				**15,794**
Second Floor				
Receiving	1	Paleontology	Undergraduate/Graduate	1,531
Storage	2	Paleontology	Undergraduate/Graduate	4,771
Archival, Map, Computing	1	Paleontology	Undergraduate/Graduate	1,531
Museum, Library	1	Paleontology	Undergraduate/Graduate	1,531
Labs	4	Paleontology	Undergraduate/Graduate	6,096
Offices	4	Paleontology	Undergraduate/Graduate	1,701
Second Floor Totals				**17,161**
Total				**32,955**

f. Initial cost estimate based on gross square footage and types of space:

Space Use	Gross Square Feet	Per Square Foot Cost	Estimated Costs
Construction Costs	32,955	$172.94	$5,907,013
Soft Costs			$1,156,950
Total		$214.35	**$7,063,963**

An extensive design and estimation process was conducted by Anderson, Mason, Dale Architects under the direction of the Office of the State Engineer. The total cost for this building is

estimated at $7 million with a base construction cost of $179.24/square foot. The details are contained in the following table.

SDSM&T Paleontology Center			
Facility Program Plan and Construction Cost			
	Gross Sq. Ft.	Total Sq. Ft.	Total Cost
Receiving Garage	1,531		
Field supplies/Equip. Storage	1,531		
Field Jacket Receiving & Initial Storage	3,240		
TOTAL RECEIVING		6,302	$1,016,638
Chemical/Wet Lab	1,016		
Fossil Preparation Lab	2,032		
Casting Lab	2,032		
Analytical Geochemistry Lab	1,016		
Study Lab, Lay-out and Visitor Space	837		
TOTAL PREPARATION		6,934	$1,375,973
Vertebrate Fossil Systematic Collections	8,882		
Recent Vertebrate Systematic Collections	1,531		
Mineralogy Collections	2,296		
Paleobotany	324		
Invertebrate Fossil Systematic collections	1,276		
Archival, Map, Locality, Storage	1,530		
Type Specimen Collection	648		
Museum Library/Clerical Office	1,531		
Offices, Research Areas, Specimen Storage	1,701		
TOTAL CATALOGING & CONSERVATION		19,719	$3,514,402
		32,955	$5,907,013
Professional Services & Expenses			$655,200
Indirect Construct. Costs, surveys, testing, etc.			$49,250
Fixed Furnishings and Equipment			$120,000
Telecommunications/Data Transfer			$40,000
Contingency			$292,500
			$7,063,963

g. Additional services to be offered or benefits of the renovation:

The program manages a large fossil repository. The repository functions as a library of fossil resources, and is an integral portion of the undergraduate and graduate programs in paleontology. The current collections, not entirely accessible, are world renowned, and numerous researchers from around the world utilize the collections to understand the history of life. The collection library forms the basis for comparison of fossils, particularly those brought by the public for identification.

Since 1899, SDSM&T has been a national leader in the collection, preservation, conservation, and study of fossil resources. Today our repository houses more than 300,000 specimens, many collected from Federal and State property, Indian reservations, and private holdings. The repository's responsibility includes data and specimen maintenance associated with fossils from these lands. Currently, approximately 9000 square feet are allocated to this function. In order to properly house current fossil specimens and provide for future discoveries, analysis of space requirements has been undertaken to satisfy Federal collection storage standards, provide laboratory space for students and staff, and house specimens integral to the paleontology degree, a wide array of researchers, and the public.

A modern facility that meets and exceeds today's collection standards will allow SDSM&T to grow its Paleontology research and academic programs and preserve the collections that have been entrusted to this university and the State of South Dakota.

h. Analysis of student body, function or constituents to be served:

The School of Mines has one of the largest undergraduate paleontology programs in the U.S. based upon student enrollment, and boasts the only master's degree in Paleontology in the U.S. Students are attracted to the program due to its uniqueness and it location in the midst of the great western fossil beds. The collection also is the basis for numerous educational programs from K-12 outreach to television programs.

The proposed building would house the program in Paleontology. Currently, the program enrolls 16 masters' students led by three full time faculty. Additionally, four support personnel manage the collection.

i. Illustrative floor plans:

Illustrative floor plans are included in Exhibit A-1 and A-2.
An artist's rendering of the exterior design is included as Exhibit B-1.

j. Impact to Maintenance & Repair:

The new Paleontology Building will be designed to meet or exceed durability and energy performance standards set forth in current codes. It is anticipated that these standards will result in a project whose maintenance and repair costs per square foot are significantly less than the

maintenance and repair costs per square foot of the existing Paleontology program space in the Old Gym.

k. Impact to operational costs:

Ongoing operational facilities costs for this building are estimated at $3.60/square foot. The budget for ongoing operational costs will be transferred from the budget currently allocated to maintain the inefficient storage and lab operations conducted in the Old Gym.

l. Proposed funding sources for costs of:

1. **Construction**
   $7,000,000 – 2008 Science Facility Bond
   $3,000,000 – Federal & Private sources to complete automated storage systems and lab furnishings.

2. **Ongoing operations** – Institutional Facilities & Services (replacement from funds previously designated for Old Gym).

3. **Maintenance and repair** – HEFF Maintenance & Repair (replacement from Funds previously designated for Old Gym).

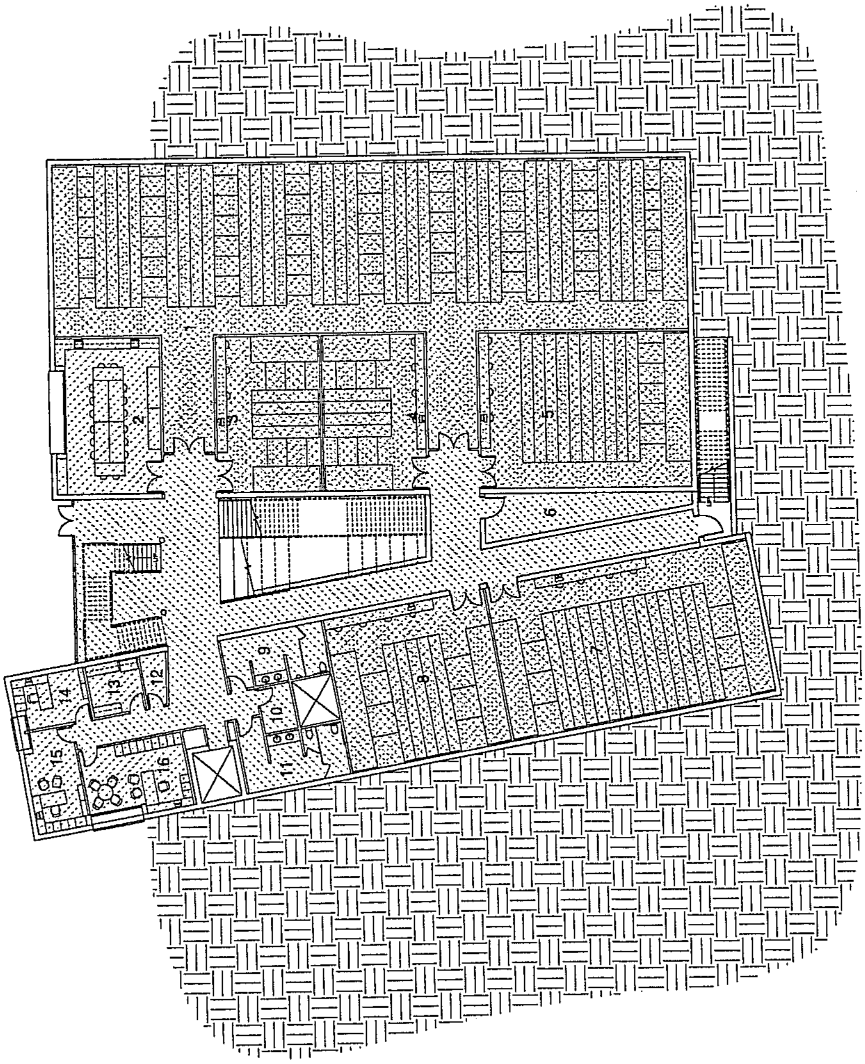
EXHIBIT A-1

SDSM&T
Board of Regents Science Facility Construction

LEGEND

1. VERTEBRATE FOSSIL COLLECTIONS
2. STUDY LAB/VISITOR CENTER
3. SPECIMEN COLLECTIONS
4. PALEOBOTANY COLLECTIONS
5. RECENT VERTEBRATE COLLECTIONS
6. MECHANICAL
7. MINERALOGY COLLECTIONS
8. INVERTEBRATE COLLECTIONS
9. MEN'S ROOM
10. JANITOR
11. WOMEN'S ROOM
12. DATA
13. COPY/MAIL/STORAGE
14. COLLECTIONS MANAGER
15. VERTEBRATE PALEONTOLOGY CURATOR
16. DEAN'S OFFICE / CONFERENCE AREA
17. GARAGE
18. INITIAL STORAGE/FIELD STORAGE
19. CHEMICAL WET LAB
20. FOSSIL PREP
21. CASTING
22. MUSEUM/LIBRARY
23. ARCHIVAL MAPS/LOCALITY STORAGE/COMPUTING CENTER
24. ANALYTICAL CHEMISTRY LAB
25. MEN'S ROOM
26. JANITOR
27. WOMEN'S ROOM
28. TEL/DATA
29. GRADUATE STUDENTS
30. HASELM POSTDOCTORAL FELLOW
31. CLERICAL
32. LOUNGE

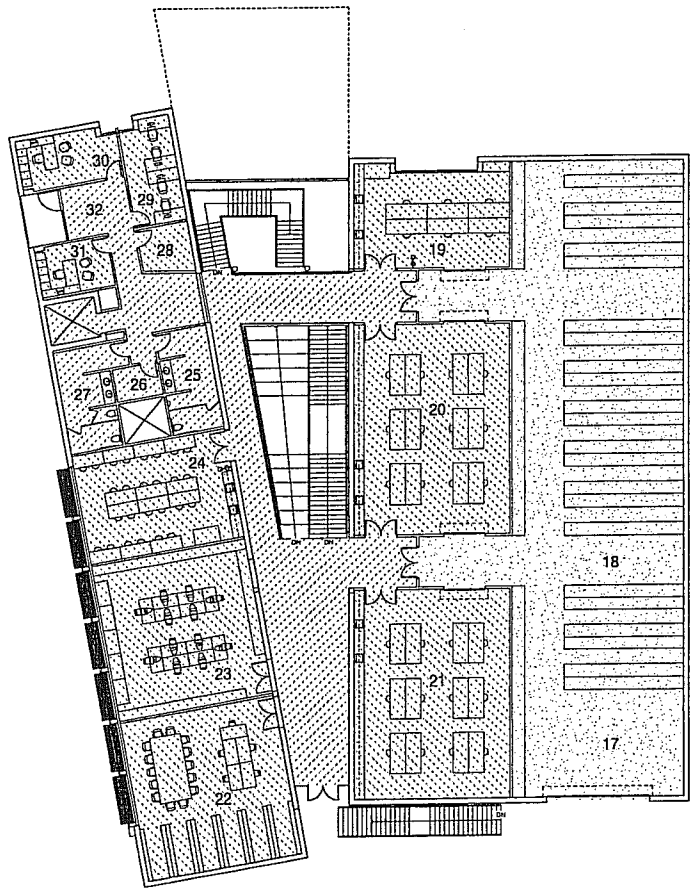
- LOADING
- COLLECTION SPACES
- PEOPLE SPACES
- PUBLIC SPACE



AndersonMasonDale Architects

PLAN DIAGRAM - LEVEL ONE
SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY
OCTOBER 25, 2007

0' 10 25' 50' 100'



LEGEND

1. VERTEBRATE FOSSIL COLLECTIONS
2. STUDY LAB/VISITOR CENTER
3. SPECIMEN COLLECTIONS
4. PALEOBOTANY COLLECTIONS
5. RECENT VERTEBRATE COLLECTIONS
6. MECHANICAL
7. MINERALOGY COLLECTIONS
8. INVERTEBRATE COLLECTIONS
9. MEN'S ROOM
10. JANITOR
11. WOMEN'S ROOM
12. DATA
13. COPY/MAIL/STORAGE
14. COLLECTIONS MANAGER
15. VERTEBRATE PALEONTOLOGY CURATOR
16. DEAN'S OFFICE / CONFERENCE AREA
17. GARAGE
18. INITIAL STORAGE/FIELD STORAGE
19. CHEMICAL WET LAB
20. FOSSIL PREP
21. CASTING
22. MUSEUM/LIBRARY
23. ARCHIVAL MAPS/LOCALITY STORAGE/COMPUTING CENTER
24. ANALYTICAL CHEMISTRY LAB
25. MEN'S ROOM
26. JANITOR
27. WOMEN'S ROOM
28. TEL/DATA
29. GRADUATE STUDENTS
30. HASELM POSTDOCTORAL FELLOW
31. CLERICAL
32. LOUNGE

LOADING
COLLECTION SPACES
PEOPLE SPACES
PUBLIC SPACE

PLAN DIAGRAM - LEVEL TWO

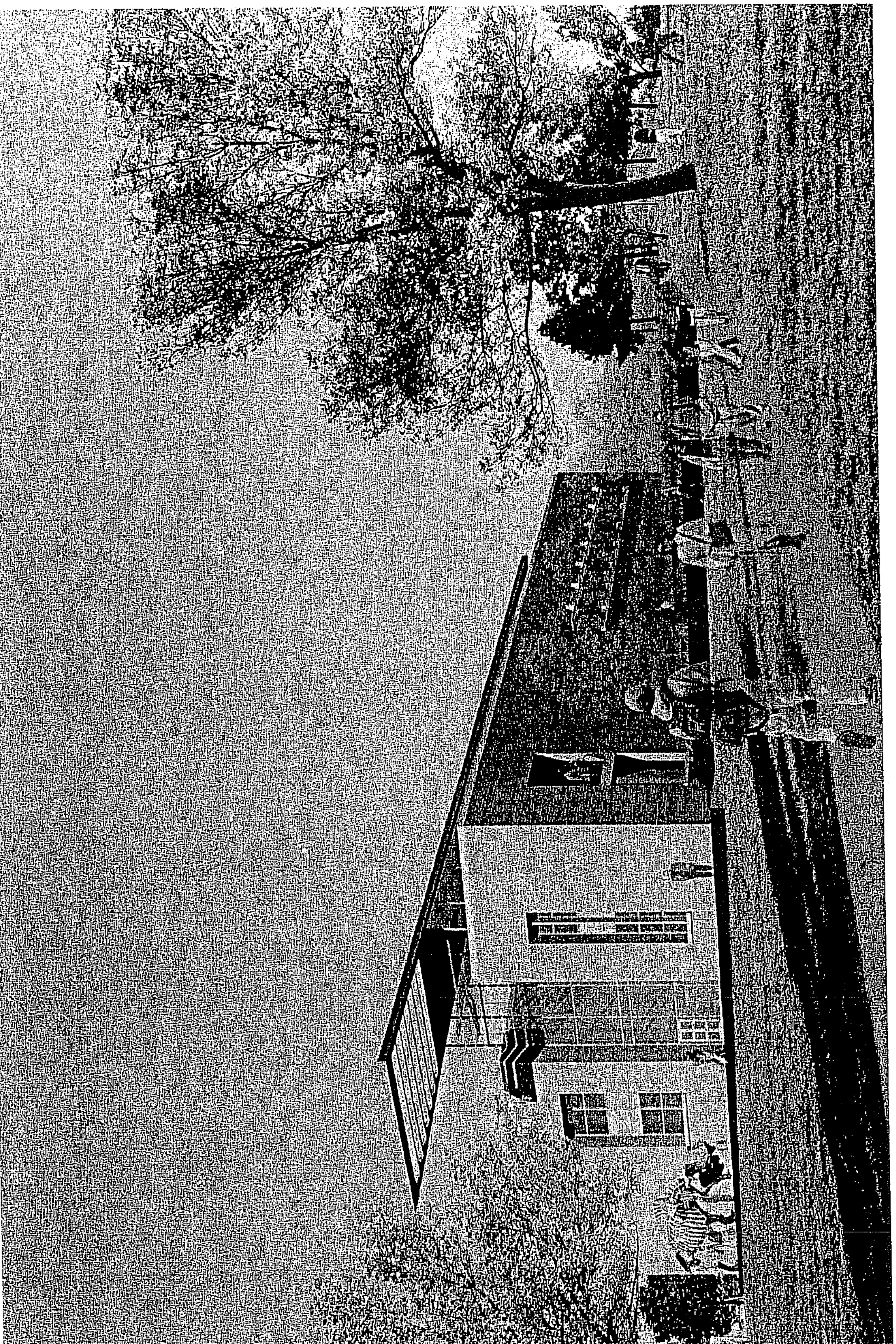
SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY
OCTOBER 25, 2007

0' 10' 25' 50' 100'

AndersonMasonDale Architects

EXHIBIT A-2

EXHIBIT B-1



Anderson Mason Dale Architects

PERSPECTIVE VIEW LOOKING SOUTH

SOUTH DAKOTA SCHOOL OF MINES
OCTOBER 26, 2007

SOUTH DAKOTA STATE UNIVERSITY
Board of Regents Science Facility Renovations
Ag Hall – Basement and Third Floor Renovations

a. Project Overview

This project will renovate a portion of Ag Hall (basement and third floors) including the utility infrastructure serving the floors affected. The majority of the floor space on each of these floors functions as laboratories or laboratory support space. Basement laboratories (soils research and extension) have not been upgraded since the building was constructed. A portion of the third floor laboratories (biology laboratories) have been renovated within the last 10 years out of necessity, but the building infrastructure has largely been untouched since the building construction. More than 50% of the undergraduate students will take biology and/or microbiology while pursuing their academic degree. The entire building needs renovation to bring the building to modern standards, including needed life safety upgrades for general life safety protection and specialized laboratory protection. The elevator should be upgraded so the entire building is accessible to all students and faculty.

b. Current Facility Description

Ag Hall was constructed in 1953. Ag Hall is a primary laboratory, class/lab, classroom, and office building on the campus of SDSU. The gross area of the building is 71,114 gsf. The building has a partial basement with 3 floors above the basement level.

This building remained largely unmodified from its construction in 1953 until the mid 1990's. The only upgrade the entire building received since construction was to augment the secondary electrical system in the building in the late 1980's. A number of electrical panels were added to the building in anticipation of the proliferation of personal computers and computerized laboratory equipment. This was also done because the existing electrical service was completely utilized. Since this project, most of the spare electrical power has been utilized, and further capacity is now needed.

The building is in good structural condition and structural capabilities are compatible with laboratory use. The building is a steel frame building with nonbearing masonry exterior and corridor walls. The building has received basic maintenance and repair throughout its life, but no major renovations have been undertaken to modernize the building. The building was reroofed with a modern single ply roofing system (including added insulation) in 2000. Approximately 10% of the ceiling tile in the hallways and selected offices of the building has fallen over the last 10 years, leaving an unsightly condition.

Since the building's construction a few renovation projects were undertaken to modernize individual undergraduate class/lab facilities. All projects were accomplished in a piecemeal fashion to address pressing needs for modern facilities that could no longer be ignored. The two first floor lecture halls were upgraded in 1992. Four biology labs on the third floor were upgraded in the mid 1990's to provide a more modern learning environment that utilized

computer aided instruction. An Anatomy Lab was created in the late 1990's to support the Life Science needs for the Nursing Department and undergraduates interested in the Life Sciences. Recently, we have completed renovations to the Insectarium to properly house the Biology Department's collection of insects. Selected offices and conference rooms have been upgraded on the first floor since the mid-1990's. 1/6 of the corridor ceiling was replaced in 2006.

The greatest deficiency in the building is the basic infrastructure. Heating piping, plumbing, and laboratory utilities are all original equipment. Much is galvanized piping that leaks or ruptures frequently and is 20 to 30 years past it normal expected life. The building does not have a central air conditioning system. However, over 100 window air conditioning units are scattered throughout the facility to provide cooling to portions of the building. Much of the building is used 12 months per year. To meet modern life safety requirements, a fire sprinkler system should be installed. The fire alarm system should be upgraded to an addressable system. Laboratory ventilation and safety systems should be provided in many of the research labs. The building envelope would also benefit by addressing deferred maintenance projects. The brick walls are showing mortar deterioration and a need for tuckpointing, especially the stair towers and parapets. The windows should be replaced with more energy efficient types. The existing elevator is a freight only elevator that is original building equipment. This should be replaced with a combination freight and passenger elevator. This would make the entire building (rathern than only the first floor) accessible to disabled students and faculty.

c. Proposed Renovations

SDSU proposes to use the funds allocated for this project to renovate the basement and third floors of the building. Both of these floors will be renovated in their entirety. This will include all laboratory built-in casework, room finishes, lighting, plumbing, laboratory service piping, fume hoods, heating and ventilation systems. The renovated space will be air conditioned. A fire sprinkler system will be installed. Other work will be required to support these renovations. A small 4 story addition will be required to provide adequate space for the air handling equipment needed to provide ventilation and air conditioning of the space. The mechanical equipment (steam service, basic plumbing utilities, primary plumbing and heating risers, and electrical service) will be upgraded to the building. The basic infrastructure improvements will serve the basement and third floors, and will be sized to serve eventual upgrades to the first and second floors. The water service line will be upgraded to a 6" or 8" service line for a fire sprinkler system. The electrical service to the building will be replaced. The main electrical distribution system will be augmented. The steam distribution system will be replaced.

The first and second floors will remain largely unmodified. SDSU does not anticipate that building envelope upgrades (tuckpointing and window replacement) will be possible, due to funding limitations. These items will be included in the project scope as alternates if funding is available. SDSU intends to make the main and north entrances accessible for disabled individuals and to upgrade the elevator to a combination freight and passenger elevator. It is not practical to make the basement accessible to the elevator without creating a 100' to 150' connection between the soils lab and the elevator location.

d. Location and Site Analysis

Ag Hall is located on the western part of campus on Medary Avenue. It is an 'L' shaped floor plan. A small parking lot and loading dock access point are located on the inside of the legs of the 'L'. The site around the building slopes downwards to the north, so the basement exits on grade on the north end of the building. The main and east entrances of the building access the building on the first floor. All basic utilities are available to the building. A water main is available north of the building that can provide fire and domestic water service. The steam tunnel intersects the north end of the building. The building is situated very close to a primary electrical switchgear and service transformer west of the building. Sanitary sewer service drains away from the building to the northeast.

e. Space Allocation and Uses of Current Facility

Ag Hall houses the College of Agriculture and Biological Sciences at SDSU, including the Biology/Microbiology Department. The statewide Cooperative Extension Service Offices and Ag Experiment Station offices are also contained in the building. The Oak Lake Field Station near Aurora, SD is administered from offices in this building. Significant portions of the basement, second, and third floors are devoted to class labs and research labs. Over half of the undergraduate student population will take classes delivered through the Biology/Microbiology Department, including, but not limited to those enrolled in Nursing, Agricultural Sciences, Dairy Sciences, Family and Consumer Sciences, some Engineering Disciplines, Biology/Microbiology, Biochemistry, Plant Science, Education and Counseling, Landscape Architecture, Human Development, Pharmacy, and Psychology.

Basement level - The gross floor area of the basement is 8,757 gsf. The primary occupant is the SDSU Soils Testing Lab, a research and extension laboratory dedicated to identification of soils types, soil chemical analysis, and the ability of soils to support agricultural uses. 62% of the gross area of the basement is research lab, lab offices, and lab support space. Most of the remainder houses mechanical support space that provides heating, water, and electrical services throughout the building.

First Floor level (This level will not be a part of the lab renovation project.) - The gross floor area of the first floor is 22,971 gsf. 17% is used for 3 general classroom spaces including two lecture halls. 17% is used for class/labs or research labs, particularly regarding plant and environmental ecology. 38% of the space is used for offices and office support space. Offices on this floor include the office suite for the Dean of Agriculture and Biological Sciences, the office suite for the SDSU Ag Experiment Station, the office suite for the South Dakota Cooperative Extension Service, the offices for 4-H and the 4-H Foundation, and researchers' offices.

Second Floor level (This level will not be a part of the lab renovation project..) - The gross area of the 2nd floor is 19,994 gsf. 74% of this floor is used for class labs, research labs, support space, or researcher's offices. These labs include the Seed Certification Labs for the State of South Dakota (teaching, research, and extension labs), Biology Labs, Anatomy Lab

(undergraduate teaching), Ecology and Environmental Sciences labs, and Crop Utilization Council offices. Most laboratories are research labs and extension lab services.

Third Floor level - The third floor has 19,392 gsf. 65% of this floor is used for class labs, research labs, support space, or faculty offices. The bulk of the space on this floor is used for undergraduate class/labs for the Biology/Microbiology Department. Lab support space housing the insectarium, herbarium (graduate & undergraduate), and mammalian collections are essential support spaces on this floor. The Biology/Microbiology department is on the third floor. Offices on this floor are faculty/researcher offices.

The following table shows the current use of space in Ag Hall, by the category of use. Highlighted information shows the space to be renovated.

SOUTH DAKOTA STATE UNIVERSITY
Board of Regents Science Facility Renovations
Ag Hall - Existing Space Allocations

Space Use	Count	Discipline	Level	Gross Square Feet
Basement				
Lab Storage	**7**	**Soils Laboratory**	**Graduate & Extension**	**1,074**
Research Lab	**5**	**Soils Laboratory**	**Graduate & Extension**	**2,082**
Lab Support	**9**	**Soils Laboratory**	**Graduate & Extension**	**1,001**
Office	**11**	**Soils Laboratory**	**Graduate & Extension**	**1,232**
Circulation	**2**		**NA**	**1,693**
Custodial	**1**		**NA**	**82**
Mechanical	**2**		**NA**	**1,479**
Restrooms	**2**		**NA**	**114**
Basement Subtotal				**8,757**

First Floor	Count	Discipline	Level	GSF
Research Lab	4	Biology/Microbiology	Doctoral, Graduate	1,933
Class Laboratory	2	Biology/Microbiology	Undergraduate, Graduate	1,957
Lab Support	1	Biology/Microbiology	Doctoral, Graduate	115
Classroom	3	General Use	Undergraduate	3,919
Office	42	Ag & Biosciences College, Ag Experiment Station, Cooperative Extension Service, 4-H Foundation	Administration, Doctoral	7,529
Conference Room	2	General Use	NA	1,193
Circulation	1		NA	5,448
Custodial	3		NA	240

Mechanical	2		NA	99
Restrooms	2		NA	537
First Floor Subtotal				22,971

Second Floor	Count	Discipline	Level	GSF
Research Lab	6	Biology/Microbiology	Graduate, Extension	4,296
Lab Support	8	Biology/Microbiology	Graduate, Extension	1,282
Classroom	2	Biology/Microbiology	Undergraduate	2,687
Office	39	Biology, Extension	Doctoral, Extension	6,562
Conference Room	1	General Use	NA	168
Circulation	1		NA	4,620
Custodial	1		NA	73
Mechanical	2		NA	122
Restrooms	1		NA	184
Second Floor Subtotal				19,994

Third Floor	Count	Discipline	Level	GSF
Research Lab	**5**	**Biology/Microbiology**	**Undergraduate, Graduate**	**1,513**
Lab Support	**7**	**Biology/Microbiology**	**Undergraduate, Graduate**	**2,723**
Classlab	**7**	**Biology/Microbiology**	**Undergraduate**	**7,272**
Classroom Support	**1**	**Biology/Microbiology**	**Undergraduate**	**326**
Office	**18**	**Biology/Microbiology**	**Bio-Micro, Plant Science, Doctoral**	**2,359**
Circulation	**1**		**NA**	**4,308**
Custodial	**4**		**NA**	**128**
Mechanical	**2**		**NA**	**219**
Restrooms	**2**		**NA**	**545**
Third Floor Subtotal				**19,392**

Building Area				71,114

f. Space Allocation and Uses of Renovated Facility

The proposed project will renovate the entire basement level (8,757 gsf) and third floor (19,392 gsf) of the building. The condition of the infrastructure support facilities is inadequate to allow room by room renovations of the existing building. We expect the space allocation on each floor to be very similar to current space allocations. We expect to explore the possibility of moving the herbarium, insectarium, and mammalian collections from the third floor to the basement and replacing this third floor space with the Soils Testing Lab and offices. Either way, the types of