PREDESIGN REPORT

LIFE SCIENCE BUILDING RENOVATION
University of Minnesota, Duluth

April 2004

College of Science & Engineering
College of Pharmacy
AHC Office of Facilities
Capital Planning & Project Management
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PREDESIGN SUMMARY STATEMENT

Renewal of the Life Science Building is the second phase of improvements to basic science facilities at the University of Minnesota, Duluth. The first phase, construction of the Swenson Laboratory Sciences Building currently under construction, will provide contemporary laboratory facilities needed to support the rapidly growing teaching and research programs for both chemistry and biology. Renewal of the Life Science Building, which will be partially vacated when the new building is occupied, will make it functional and safe, and will provide space for:

- Instructional labs, research labs, laboratory support facilities, and faculty and staff offices for portions of the Biology Department that will not be accommodated in the Swenson Building
- Classrooms, instructional labs, research labs, faculty and staff offices for the recently initiated Pharmacy Program in Duluth.

The 35-year-old Life Science Building suffers from poor air quality caused by inadequate ventilation in instructional labs, numerous life safety and accessibility code deficiencies, and a high level of asbestos in floor, ceiling, and fireproofing materials throughout the building. Renewal of the HVAC and electrical systems, installation of sprinkler and alarm systems, upgrades of elevators and restrooms, renewal of interior finishes and repair of the building envelope are necessary to extend the useful life of the facility. Reconfiguration of the interior is also required to meet the needs of the Pharmacy and Biology programs.

- Space to be renovated (including auditoriums & greenhouses) 72,588 GSF
- Estimated project cost $14 million
- Estimated annual operating cost $707,700
- Anticipated occupancy date December 2006
STATEMENTS OF NEED

Biology Program

- Renewal of the Life Science Building is needed to provide teaching facilities for biology, a program that has experienced an 86% increase in declared majors over the last ten years.

- The 35-year-old building needs to be renovated to provide a safe, functional environment for contemporary teaching and to extend its useful life for another 25 years.

The University of Minnesota, Duluth’s strategic focus on freshwater ecology and large lake biology make it unique in the country. As one of only thirty Sea Grant Colleges in the United States, UMD scientists provide instruction and conduct research on water related topics ranging from exotic aquatic species in the Lake Superior ecosystem to improving sewage treatment practices in Minnesota’s lake communities. Biology and chemistry are the basic sciences at the core of these water resource initiatives.

The College of Science and Engineering (CSE) is the third largest undergraduate college in the University of Minnesota system, and the largest college at UMD. The high demand for biology courses is the result of new programs in cell biology and biochemistry/molecular biology targeted at meeting the changing needs of employers and a general increase in the number of students interested in the sciences. This demand is demonstrated by an 86 percent increase in biology majors in the last 10 years. Effective teaching in biology requires safe, functional instructional facilities. An upgraded Life Science Building, coupled with the new Swenson Laboratory Sciences Building, will satisfy those needs.

The Swenson Building, currently under construction, will be shared by the Chemistry and Biology programs. It will provide sophisticated labs for CSE’s instruction and research in biochemistry, molecular biology, and cell biology. However, the new building was not intended to satisfy the teaching labs needed for general biology, aquatic biology, and ecology. The Swenson building was planned to accommodate only 53% of the space generated by the MFM analysis of the Biology program. The preceding functions and several faculty and graduate assistants will remain in the Life Science Building.

Renewal of the Life Science Building is necessary to provide a safe and functional environment for its occupants. The 35-year-old Life Science Building suffers from poor air quality caused by inadequate ventilation in instructional and research labs, numerous life safety and accessibility code deficiencies, and a high level of asbestos in floor, ceiling, and fireproofing materials throughout the building. Renewal of the HVAC and electrical systems, installation of sprinkler and alarm systems, upgrades of elevators and restrooms, renewal of interior finishes and repair of the building envelope are necessary to extend the useful life of the facility. Reconfiguration of the interior will also required to meet programmatic needs and increase the use efficiency of the building.

Pharmacy Program

- Minnesota faces a critical shortage of pharmacists, most acute in rural communities. To help meet this critical shortage, the College of Pharmacy has implemented an expansion of its professional program at the Duluth Campus, where an additional 50 students per year will graduate.

- Placement of pharmacists in rural Minnesota is a major goal of the pharmacy program expansion. The Duluth pharmacy program will strongly emphasize health care needs and pharmacy practice opportunities in Greater Minnesota.

- Temporary facilities for pharmacy at the University of Minnesota Duluth have been provided in Kirby Plaza, but the facilities are inadequate for the full needs of pharmacy students and faculty. State funding for this expansion carries an expectation of producing health professionals for Greater Minnesota.
Renovation of the Life Sciences Building at the Duluth Campus will provide a permanent home for the expanded pharmacy program, giving long-term stability to the increase in pharmacy graduates and to the strong rural program emphasis.

The College of Pharmacy is a nationally recognized leader in professional pharmacy education, with a strong history of program characteristics that capitalize on the resources of the Academic Health Center. Historically, the College has had a commitment to the health of Minnesotans. At the core of the professional curriculum is a commitment to preparing pharmacists for pharmaceutical care, the activities of pharmacists that optimize drug therapy, reduce the possibility of drug errors, and positively contribute to the overall health of the patient.

The College has consistently placed graduates throughout the state. It has not, however, been as successful as hoped in the placement of graduates in Greater Minnesota. Since Minnesota has consistently been in the top three states for a shortage of pharmacists, the College has sought ways to meet the shortage. Low numbers of pharmacists in rural areas is of special concern, since it will inhibit access of Minnesotans, especially senior citizens, to prescription drugs and professional care/services from pharmacists.

The decision to expand the College to the University of Minnesota Duluth was made to address two problems: First, it will permit an increase in the number of graduates, helping to alleviate the shortage of pharmacists. Second, it will enable a strategic focus on the placement of pharmacists in rural areas.

The College has examined for some time ways to help meet the pharmacist shortage. Applications for admission have increased significantly in recent years, facilitating an increase. However, expanding the number of graduates in the Twin Cities has not been possible, primarily due to the lack of physical space at the Academic Health Center. Instead, several alternative locations were considered. Because of the medical facilities in Duluth, the comprehensive nature of the University of Minnesota Duluth, and the access to nearby rural pharmacies and health care, Duluth and UMD were chosen as the expansion location.

Placement of the new program at UMD also facilitates a rural programmatic emphasis not possible in the Twin Cities. Rural student experiences and placement of graduates in rural settings can be more completely emphasized in Duluth than can be done at the Academic Health Center with its high level, tertiary care emphasis. Throughout the curriculum, students in Duluth will be exposed to rural care, rural practitioners, and attractive rural opportunities for practice and business entrepreneurship.

The expansion of pharmacy to the UMD campus requires facilities specific to the needs of students and faculty in an advanced professional pharmacy program. General aspects of facility needs are as follows:

- The curriculum will be the same on the two campuses, and the faculties will collaborate extensively in teaching. Several means of electronic communication will be heavily used, including instructional television (ITV), videoconferencing, computer and Internet delivery. Classrooms must be equipped for the ongoing interactions of students and faculty on both campuses, and must include conference room space for break-out class discussions.

- Students will need study space, patient encounter space, and limited computer space.

- Faculty will teach in laboratory and classroom settings, conduct research consistent with the research and scholarly expectations of the University, and will engage in professional and public service activities. Laboratories, especially, will require specific design, fixtures and equipment, and research will emphasize rural health issues when possible.

- As a new, complete program, space will be required for staff to support faculty, provide services to students, and handle visitors and guests interested in the program.
SPACE PROGRAM

Space Allocation

After thorough review of the current and requested faculty, staff and enrollment levels of the Biology and Pharmacy programs, the following planning assumptions and space allocations were agreed upon by the University of Minnesota, Duluth and the Academic Health Center in the program statement dated January 12, 2004.

1. The project will be limited to the renovation of space within the existing building.

2. Pharmacy will be assigned all of the 1st floor and the 2nd floor except for the greenhouse and greenhouse support space on that floor (approximately 16,500 assignable square feet). In addition, offices and research lab space for two Pharmacy faculty members will be provided in the Swenson Lab Science Building.

3. Biology will be assigned all of the ground floor, the greenhouse and greenhouse support space on 2nd floor, and all of the 3rd floor (approximately 18,980 assignable square feet, of which 3,570 square feet is greenhouse and approximately 3,500 square feet is storage).

4. Two 60-person classrooms will be provided within the space allocated to Pharmacy.

5. If it is determined during the design phase that existing mechanical space extending into the first floor (rooms 27A and 40) will not be needed for mechanical equipment after renovation, the space will be converted to two centrally scheduled 30-person classrooms. If the mechanical space cannot be converted, two 30-person classrooms from the existing classroom inventory will be identified and designated for priority scheduling for Pharmacy.

6. Pharmacy will vacate all space it currently occupies in Kirby Plaza immediately after occupying the renovated Life Science Building.

The amount of programmatic space desired after renovation, assuming that an increase in building efficiency (ratio of ASF to GSF) can be attained, is shown in the three left hand columns of the following tables (labeled "Target Program”).

The ability of program components to fit into the space allocation was tested through the development of conceptual floor plans. Adjustments to individual spaces were required to make the programs fit into existing space. The adjusted figures are shown in the three columns on the right (labeled “Achieved in Conceptual Plan”). These figures are provided for information only, and are subject to further refinement during the design phase of the project.
### Biology Space Program

<table>
<thead>
<tr>
<th></th>
<th>Target Program</th>
<th>Achieved in Conceptual Plan</th>
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<tbody>
<tr>
<td></td>
<td>Units ASF/Unit</td>
<td>ASF</td>
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<td>Greenhouse Coordinator</td>
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<td>Student Organizations Office</td>
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<td><strong>Instructional Labs</strong></td>
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<td>Class Labs</td>
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<td>Class Lab Prep Room</td>
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<td>Animal Collections Room</td>
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<td><strong>Research Labs</strong></td>
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<td><strong>Support Space</strong></td>
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<td>Greenhouse #1*</td>
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<td>Greenhouse #2*</td>
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<td>Greenhouse Prep Room</td>
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<td>Electron Microscope Room*</td>
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<td>Chemical Prep Room</td>
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<td>Cold Room</td>
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<td><strong>Total Program Space</strong></td>
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<td><strong>Storage Space</strong></td>
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<td>Chemical Storage Room</td>
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<td><strong>Total Space</strong></td>
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<td>18,985</td>
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* Existing rooms to remain in current use
### Pharmacy Space Program

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<th>Target Program</th>
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<td>Instructional Space</td>
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<td>Classrooms (60 capacity)*</td>
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<td>Classrooms (30 capacity)**</td>
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<td>Class Lab (Patient Care)</td>
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<td>Breakout Rooms</td>
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<td>200</td>
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<tr>
<td>Research Labs</td>
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<tr>
<td>Research Labs (Wet)</td>
<td>5</td>
<td>800</td>
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<tr>
<td>Research Labs (Computational)</td>
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<tr>
<td>Lab Assistant Workstations</td>
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<tr>
<td>Administrative Space</td>
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<tr>
<td>Offices</td>
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<td>Secretarial Workstations</td>
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<td>Office Service</td>
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<td>Information Technology</td>
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<tr>
<td>Student Support Space</td>
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<td>Small group study</td>
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<tr>
<td>Individual study (carrels)</td>
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<tr>
<td>Student lockers</td>
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<td>0</td>
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<tr>
<td>Total</td>
<td></td>
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</tbody>
</table>

* Within Pharmacy's space allocation. Both with ITV capability
**Within recaptured mechanical space (if feasible) or from existing classroom inventory.
    One with ITV capability
FACILITY PROGRAM

General Building Condition

Although no detailed building assessment has been conducted, UMD Facilities Management has summarized the following conditions in Life Science:

- The roof was replaced in 1990, and remains in good condition
- Windows on the south side are the original single pane with wood frames. Windows on the north side are newer, but also wood-framed. Replacement of all windows is recommended at this time.
- The brick exterior is in good condition, with no apparent need for tuckpointing.
- The existing ventilation system is inadequate for the laboratory and classroom uses, resulting in poor air quality throughout the building. There is no air conditioning.
- The heating system, with only two zones and no automatic controls, is obsolete.
- The steam supply to the building is adequate.
- The water supply to the building is not adequate to support a full sprinkler system.
- The electrical service is maximized, providing no flexibility for additional demand.

Code & Environmental Requirements

Building and Fire Code
Consultation with the Building Code Official during programming and concept plan development determined that the International Building Code will apply, and identified the following code improvements that must be addressed when the building is renovated:

- Provide two-hour firewall/fire doors between adjacent buildings at all levels and at tunnel access
- Install sprinkling system and standpipes throughout the building (including the auditoriums)
- Install sprinkling in greenhouses, or separate from building with two-hour firewall
- Install new fire alarm system, emergency lights, and exit signage
- Fire rate elevator shaft and separate elevator from corridors (double, opposite-swinging fire doors in corridor are acceptable)
- Enclose open stairs
- Increase ventilation for labs and assembly areas
- Damper of penetrations into the multi-story central mechanical chase
- Replace doors and hardware at laboratories
- Upgrade elevators and restrooms to ADA requirements
- Construct control zones for H-rated laboratories (if necessary) and chemical storage room
- Provide direct entrance from outside to the chemical suite. The three functions – chemical preparation, chemical storage, and hazardous materials storage – may share the same entrance.
- Emergency exiting from Heller Hall is through Life Science. An exiting path will have to be maintained during construction, or an alternative path created.
- Additional egress at north end of stockroom (ground level) will not be required if use remains as storage and human occupancy is minimal.
- Lockers are acceptable in corridors of 6’ width or more.
- Confirm adequate quantity of plumbing units in restrooms for the projected occupancy. Preliminary analysis indicated that the existing quantity will meet IBC requirements, but this must be confirmed during design.

The preceding items are based on preliminary program and conceptual floor plan information, and may not be complete. The design team will be required to consult with the Building Code Official throughout the design phase as more detailed plans are developed to determine final code requirements.

Hazard Classification
The type and quantity of chemicals currently in the storage area (ground level) do not reach the threshold for an “H” classification. Preliminary review of the proposed list of chemicals for the teaching and research labs by the Department of Environmental Health & Safety indicate that the quantities will be below the exempt level. A more thorough review of the inventory must be conducted during the design phase to confirm this conclusion.


Hazardous Materials
Asbestos-containing materials, including spray on fireproofing, pipe insulation, and floor tile, exist throughout the Life Science Building. Because this condition affects even maintenance activities, the abatement of the building has been a priority for the Department of Health & Safety (DEHS) and Facilities Management for several years. Exposed spray-on fireproofing material throughout the Ground Floor and in portions of the other floors has been encapsulated or removed. All remaining friable asbestos-containing materials, and those that may become friable during demolition and construction activities related to the renovation, must be removed.

A full building survey, conducted by the DEHS in March 2004, identified all asbestos-bearing materials and their location. The complete report, dated April 7, 2004, is on file at the UMD Facilities Management office and at the Capital Planning & Project Management office. The report summary is included in the appendix.

Infrastructure Requirements

Utilities
A new 6 inch diameter water main must be extended from the existing main in Oakland Avenue to provide adequate capacity for the sprinkler system.

Chilled water must be extended from the chiller plant in the adjacent Swenson Laboratory Science Building.

The current electrical transformers and switchgear serve both Life Science and Heller Hall. The increased electrical demand after renovation may require upgrades to the service. Providing a new transformer and switchgear for Heller Hall and leaving the entire existing service for Life Science needs should be considered in the design phase of the project.

Communications
Life Science is currently served by single Category 5 cable. The building will need to be upgraded to fiber. Vertical distribution and switching equipment is currently accommodated in the central mechanical corridor. Equipment rooms of approximately 100 square feet will be required on each floor.

Special Requirements & Conditions

Following are special requirements that must be addressed during the design phase of the project:

Service Access
The requirement for direct exterior access to the hazardous materials and chemical storage rooms in the ground level will necessitate reconfiguration of those spaces and the adjacent greenhouse head house area. Reconfiguration will affect the service access to the head house and to the adjacent mechanical room.

•Bins for loose greenhouse materials (soil, sand) should continue to be served with openings directly to the exterior.

•A double service door is needed for occasional delivery of large plants and other oversized parcels. Provision of a direct service door into the head house is preferred, but modification of the lower east building entrance and ramp to accommodate a wheelbarrow and a dolly for large parcels may be an acceptable alternative if direct service cannot be retained.

•Service to mechanical space needs to be retained for equipment delivery.

Service to the stockroom is provided from the tunnel connecting to the central receiving facility. The existing service door to the tunnel is too narrow to accommodate palettes, requiring transfer and double handling of lab materials delivered in this manner. The potential to widen the service door should be investigated during the design stage of the project.
Greenhouse Operation
The greenhouses must remain in operation throughout the construction period. Safe access, egress, and service to the greenhouse must be maintained.

Heller Hall Egress
The second emergency egress from Heller Hall is through Life Science. A temporary exit near the south end of Heller must be created, probably by removing an existing office and modifying a window opening (an approach used at UMD for other projects). If a temporary exit is found to be infeasible, a safe, protected egress route through Life Science must be maintained throughout the construction period.

Pedestrian Circulation
Student and staff traffic between Heller Hall and M.W. Alworth Hall will be routed through the Medical School while the Life Science Building is under construction.

Swing Space
Many of Life Science’s occupants will be relocated to the Swenson Building when it is completed. Occupants/uses of the Life Science Building that will not be relocated to the Swenson Building must be relocated to swing space in the Chemistry Building and M.W. Alworth Hall. Specific spaces will be identified by the College of Science and Engineering. Adaptation of the swing space to accommodate new uses, and the relocation of occupants to and from swing space are part of this project. Space for Geology labs will require minimal adjustment. Limited modification of chemistry labs may be required to temporarily accommodate biology teaching labs.

Relocation of Herbarium
Because of limited space, the Biology Department has determined that the Olga Lakela Herbarium, now located in rooms 214 and 218 of Life Science, will be relocated to other space identified by the College of Science & Engineering, probably in M.W. Alworth Hall. The relocation of existing collections, storage cabinets, and equipment associated with the herbarium is part of this project. The herbarium preparation room will require laboratory services – gas, vacuum, compressed air, deionized water, emergency shower and eyewash – at the benches. A compact storage system for the collections may be required if the existing storage cabinets do not fit the new space.

Classrooms
A preliminary assessment by Foster, Jacobs and Johnson indicates that the portions of mechanical rooms 27A and 40 that extend into the first floor will be required for mechanical equipment even if the mechanical penthouse is expanded. If during the design phase it is determined that some or all of the mechanical space is not needed, it should be converted to 30-person classrooms if feasible. As an alternative, UMD will work with Pharmacy to identify two 30-person classrooms that may be used by Pharmacy to satisfy their classroom needs.

Furniture & Equipment
Standard office furniture in the Kirby Plaza space currently occupied by Pharmacy will remain in Kirby. Furniture and equipment in the classrooms, Pharmacy teaching labs and student study rooms will be moved to Life Science after its renovation.

A preliminary assessment of furniture and equipment has been made (listed in Program Detail contained in the appendix), and allowances for each have been included in the budget. Because the project has a fixed budget, the allowances may not be adequate to purchase all furniture and equipment listed. If the construction costs are less than currently estimated, the FF&E allowance may be increased.

Fume hoods, emergency showers and eyewashes, and casework for laboratories are included in the general construction portion of the project budget.
Heller Hall Elevator
The elevator at the south end of Life Science is the only elevator that provides accessibility to all floors of Heller Hall. A new elevator must be installed in Heller Hall to provide proper access while Life Science is under construction. UMD Facilities Management has engaged an architectural/engineering consultant to design the new elevator so that its construction can occur during the design phase of the Life Science project and be ready for use before the Life Science Building is closed for renovation. Installation of the elevator is part of this project and is included in the project budget.

An empty elevator shaft exists in Heller Hall. Consultation with Minnesota Elevator Company revealed that an ADA compliant cab is available to fit the shaft dimensions (80”x61” platform; 68”x54” inside cab). Since there is insufficient room in the shaft to accommodate counterweights, a hydraulic or possibly an electric side pull elevator will be required. If it is determined that such a solution is not feasible, an external elevator shaft will have to be constructed at the southwest corner of Heller Hall.

Scope of Work
The following scope of renovation work is based on:
• Preliminary code review by the Building Code Official
• Asbestos survey prepared by the UMD Environmental Health & Safety
• Analysis of the mechanical and electrical systems by Foster, Jacobs & Johnson, Inc., professional engineers (August 2003)
• Analysis of structural system by Krech & Ojard, Inc., professional engineers (August 2003)
• Facilities condition information provided by UMD Facilities Management
• Programmatic information from Biology and Pharmacy

Basic Physical & Code Improvements for Entire Building (including greenhouses and auditoriums)
• Abate asbestos
• Install new elevator in existing shaft in Heller Hall
• Install sprinkling system, stand pipes, fire alarm, and emergency lighting throughout building, including auditorium classrooms
• Install sprinkling system in greenhouses, or construct firewall/fire doors at entrances to greenhouses
• Construct firewall/fire doors at first floor entrance to Heller Hall
• Separate stair and elevator from corridors with hold-open fire doors
• Reconfigure the hazardous materials room and chemical storage room to provide direct exterior access
• Upgrade existing elevator and restrooms to meet ADA requirements
• Upgrade technology infrastructure throughout building
  - Extend fiber optic cable to building
  - Construct data closets on each floor
  - Upgrade/replace telephone and data distribution lines
• Extend new 6” water service from Oakland Avenue
• Upgrade/replace HVAC system & controls
  - Replace existing air handlers
  - Add variable speed drives to allow for VAV supply system
  - Clean and insulate or replace supply ducts
  - Extend supply air throughout building
  - Replace pneumatic thermostats with electronic sensors
  - Provide high-efficiency filtration and clean steam humidifiers
  - Extend chilled water supply from existing mains
  - Upgrade/replace plumbing in labs
  - Upgrade/replace gas, DI water, and compressed air systems to labs
• Upgrade/replace electrical system
  - Install new switchgear and transformer for Heller Hall, leaving existing service to serve Life Science only
  - Upgrade service to HVAC system, elevators, fire alarms and emergency lighting, fume hoods, and laboratory equipment
  - Install new lighting
• Install emergency generator
• Expand mechanical penthouse. Modify structural system and repair roof as necessary.
• Provide new ceiling, floor and wall finishes
• Replace windows

Programmatic Improvements
• Adapt space in M.W. Alworth Hall to accommodate the herbarium
• Adapt laboratory space in the Chemistry Building and M.W. Alworth Hall for use as swing space
• Reconfigure floor plan to accommodate labs, classrooms, and offices as illustrated on conceptual floor plans
• Install fume hoods and laminar-flow hoods as indicated on room description sheets
• Install ventilated biological safety cabinets
• Install lab casework and benches
• Install ITV capability in 2 classrooms
• Furnish and equip rooms as indicated on room description sheets (contained in appendices)
COST ANALYSIS

Project Budget

The preliminary project budget is summarized as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>G/M/E Construction</td>
<td>$11,557,000</td>
</tr>
<tr>
<td>G/M/E construction</td>
<td>10,100,000</td>
</tr>
<tr>
<td>Hazardous material abatement</td>
<td>750,000</td>
</tr>
<tr>
<td>Construction contingency (7%)</td>
<td>707,000</td>
</tr>
<tr>
<td>Interiors</td>
<td>1,005,000</td>
</tr>
<tr>
<td>Furniture</td>
<td>350,000</td>
</tr>
<tr>
<td>Laboratory equipment</td>
<td>400,000</td>
</tr>
<tr>
<td>Telecommunication equipment</td>
<td>50,000</td>
</tr>
<tr>
<td>Moving &amp; swing space accommodations</td>
<td>105,000</td>
</tr>
<tr>
<td>Public art</td>
<td>100,000</td>
</tr>
<tr>
<td>Site Work</td>
<td>15,000</td>
</tr>
<tr>
<td>Consultant Fees</td>
<td>1,191,400</td>
</tr>
<tr>
<td>Permits &amp; Fees</td>
<td>186,600</td>
</tr>
<tr>
<td>Miscellaneous Non-construction Expenses</td>
<td>45,000</td>
</tr>
<tr>
<td><strong>Total Project Cost</strong></td>
<td><strong>$14,000,000</strong></td>
</tr>
</tbody>
</table>

Source of Funds

This project is part of the University’s 2004 capital request to the state. Two-thirds of the project cost ($9,333,000) will be financed with state bonds and one-third ($4,667,000) will be paid by the University. One half of the University’s obligation will be financed with University debt. The remainder will be shared by the College of Science & Engineering (42 percent, or $980,100) and the College of Pharmacy (58 percent, or $1,353,400).

Cost Management Strategies

The cost estimate for general-mechanical-electrical construction, prepared by Johnson Wilson Constructors, exceeds the predesign construction budget by approximately 5 percent. This is within the normal variance of a concept level estimate. During the design phase, the following cost management strategies will be employed to assure that the project remains within the established budget of $14 million:

- Value engineering will be conducted with the Construction Manager throughout the design phase.
- Scope reductions will be developed, if required, such as:
  - Adjusting the program requirements to reduce the amount of wall reconfiguration
  - Reducing the quality of interior finishes
  - Reducing the quantity of new equipment and furnishings
  - Refurbishing existing casework and lab furnishings instead of replacement
  - Reducing window replacement
  - Reducing or eliminating public art
Projected Operating Cost

The annual operating cost for Life Science was $7.00 per gross square foot (GSF) in 2003. This figure includes the cost of fuel (steam), electricity, water, general building maintenance, custodial, waste removal, and grounds maintenance services. UMD Facilities Management projects the operating cost after renovation to be $9.75 per GSF, or $707,700, in December 2006, the anticipated date of occupancy. This figure includes increased costs for air conditioning, more intense laboratory use, and inflation (5 percent per year). This represents an increase of approximately $199,600 over 2003 operating costs.

Energy Conservation & Sustainable Design

The Minnesota State Sustainable Building Guidelines do not apply to this project because it involves the renovation of an existing building. In the interest of improving the operating performance of Life Science, the University will conduct an energy audit and analysis to identify opportunities to exceed code requirements for energy conservation.

Depreciation Analysis

A building is comprised of basic components and systems, each representing a specific percentage of the value of the building and each having a predictable life expectancy. Life Science will have an estimated value of approximately $14 million after renovation. The annual depreciation for the building is $392,000, calculated as follows:

<table>
<thead>
<tr>
<th>Building Component</th>
<th>Percent of Bldg. Value</th>
<th>Value of Component</th>
<th>Life Expectancy</th>
<th>Annual Depreciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation/Structure</td>
<td>45%</td>
<td>$6,300,000</td>
<td>50+ yrs.</td>
<td>N/A</td>
</tr>
<tr>
<td>HVAC/Plumb/Elect</td>
<td>40%</td>
<td>$5,600,000</td>
<td>25 yrs.</td>
<td>$224,000</td>
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<tr>
<td>Exterior Envelop</td>
<td>5%</td>
<td>$700,000</td>
<td>25 yrs.</td>
<td>$28,000</td>
</tr>
<tr>
<td>Interiors</td>
<td>10%</td>
<td>$1,400,000</td>
<td>10 yrs.</td>
<td>$140,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
<td>$14,000,000</td>
<td></td>
<td>$392,000</td>
</tr>
</tbody>
</table>
Renovation cannot begin until current occupants can be relocated to the Swenson Building or to swing space in the Chemistry Building, scheduled for July 2005. Johnson Wilson Constructors, cost consultants for the predesign, have determined that a construction period of 16 to 18 months will be required. The following schedule will permit occupancy in December 2006. The use of the Construction Manager at Risk delivery method is assumed.
APPENDICES
Program Detail (room descriptions)
Conceptual plans
Estimate of probable cost
Budget worksheet
Building Code Deficiency Survey
Asbestos Survey (summary only)
PROGRAM DETAIL
Department of Biology, Duluth

Room and equipment descriptions for the Ground, 3rd, and part of 2nd floor to accommodate the Department of Biology, Duluth. Lab equipment to be purchased is noted by priority.

Prepared by: Randall Hicks
Head, Biology
College of Science & Engineering, Duluth
March 1, 2004

OFFICES – Faculty Office
This space will include a desk, filing cabinets, bookshelves and workspace for one faculty member

Occupants: 1 faculty member

Room Requirements:
- (1) Office desk and chair
- (1) Guest chair
- (2) Filing cabinets
- Credenza
- Bookshelves
- 120V outlets
- (1) Telephone connection
- (2) Ethernet connection
- Markerboard
- Coat hooks
- Bulletin board
- Wall clock

Notes:
- 3rd floor; 6 offices

OFFICES - Graduate Teaching Assistant Office
This space will include a desk, filing cabinets, bookshelves and workspace for two graduate teaching assistants.

Occupants: 2 graduate teaching assistants

Room Requirements:
- (2) Office desk and chair
- (1) Guest chair
- 120V outlets
- (1) Telephone connection
- (2) Ethernet connection
- Markerboard
- Coat hooks
- Bulletin board
- (1) File cabinet
- Wall clock

Notes:
- 3rd floor; 7 offices
OFFICES – Laboratory Coordinator #1 Office
This space will include a desk, filing cabinets, bookshelves and workspace for the Senior Laboratory Coordinator in the Department of Biology

Occupants: 2 persons

Room Requirements:
- (2) Office desks and chairs
- Project work area
- (1) Guest chair
- (3) Filing cabinets
- Bookshelves
- 120V outlets
- (2) Telephone connection
- (2) Ethernet connection
- Markerboard
- Coat hooks
- Bulletin board
- Wall cabinet (existing)
- Wall clock

Notes:
- Ground floor; old LSci Rm 35
- This office could use a window (but unlikely)

Room Adjacencies:
- Adjacent to stockroom

OFFICES – Greenhouse Coordinator Office
This space will include a desk, filing cabinets, bookshelves and workspace for the Department of Biology Greenhouse Coordinator

Occupants: 1 person

Room Requirements:
- (1) Office desk and chair
- Project work area
- (1) Guest chair
- (2) Filing cabinets
- Bookshelves
- 120V outlets
- (1) Telephone connection
- (1) Ethernet connection
- Markerboard (no wall space but could go on door)
- Coat hooks
- Bulletin board
- Wall clock

Notes:
- 2nd Floor; old LSci Rm 204
- Retain wall with sink and full cabinets and drawers
- Greenhouse control panels are on one wall of this room

Room Adjacencies:
- Adjacent to greenhouse
OFFICES – Student Organizations Office
This room serves as an office and meeting room for the student clubs (Biology, Pre-Dentistry, Pre-Optometry, Pre-Vet Med) affiliated with the Department of Biology. The room houses filing cabinets for career information and club records, as well as furniture for small group meetings or study.

**Occupants:** up to 12 persons

**Room Requirements:**
- (1) Conference table
- (6) Chairs
- ICW (industrial cold water) and IHW (industrial hot water)
- (1) 6’ long, 36” high base cabinet with (1) regular sink, drawers and cabinet storage under
- (1) 6’ long overhead cabinet
- (1) Computer desk
- (4) Filing cabinets
- Bookshelves
- 120V outlets
- (1) Telephone connection
- (3) Ethernet connections
- Markerboard
- Coat hooks
- Bulletin board
- Wall clock

**Notes:**
- 2nd floor; northerly 175 sq ft. of old LSci Rm 206
INSTRUCTIONAL LABS – Plant Biology Teaching Lab
This room will accommodate different laboratory sections of plant biology courses taught in the Department of Biology. Laboratory courses such as Biol 3601-Plant Diversity, Biol 3603-Plant Taxonomy, Biol 5831-Plant Population and Community Ecology, Biol 1010-Home Horticulture, and other courses to be named later by a future faculty hire will typically be instructed in this room.

Occupants: 16 students + 1 instructor

Room Requirements:
- (2) 6 foot fume hood w/ sink
- (4) regular sinks
- ICW (cold water), IHW (hot water), and DI (de-ionized water)
- G (natural gas), V (vacuum), and CA (compressed air) at lab benches and fume hoods
- 120 VAC outlets
- Emergency shower and eyewash stations
- (2) Ethernet connections
- Markerboard and projection screen
- Wall clock
- Lab benches with (16) student stations w/ chairs and 120V power for each station
- Separate lab bench for transient common materials
- Room for rolling shelf racks with artificial lighting for student plant growth/development projects
- Cubby holes along one wall for student coats and books
- Bulletin board
- Storage cabinets for compound and dissecting microscopes (16 of each)
- Storage cabinets for teaching materials
- Ceiling-mounted projector w/speakers Priority 1 purchase
- Biological safety cabinet (77 5/8” wide w/vacuum) Priority 1 purchase

Notes:
- 3rd floor; old LSci Rm 310

Room Adjacencies:
- Close to greenhouses
- Adjacent to Plant Biol./Aquatic Biol. Prep Room

INSTRUCTIONAL LABS – Animal Biology Teaching Lab (Zoology)
This room will accommodate different laboratory sections of animal biology courses taught in the Department of Biology. Laboratory courses such as Biol 4731 Entomology, Biol 4763 Ornithology, Biol 5401 Coevolution, and other animal biology courses (e.g., Mammology) will typically be instructed in this room. These classes focus heavily on animal dissection and thus require well-ventilated storage areas and over-the-bench ventilation for students.

Occupants: 24 students + 1 instructor

Room Requirements:
- (1) 6 foot fume hood w/ sink
- (3) large sinks
- ICW (cold water), IHW (hot water), and DI (de-ionized water)
- G (natural gas), V (vacuum), and CA (compressed air) at lab benches and fume hoods
- 120 VAC outlets
- Emergency shower and eyewash stations
- (2) Ethernet connections
- Markerboard and projection screen
- Wall clock
- Storage cabinets for 24 microscopes
- Lab benches with (24) student stations w/ chairs and 120V power for each station; (3) 5’ x 16’ lab benches - 30” high with 4 knee spaces, 8 student drawers
- (8) Power and Data outlets along the center of each bench
- A/V cabinet in front of room with Power and Data Port, Computer hook-up
- Bench space (36”) with base cabinets and drawers around periphery of room; cabinets above
- Cubby holes along one wall for student coats and books
- Bulletin board
- Ceiling-mounted projector w/ speakers *Priority 1 purchase*
- VCR/DVD player *Priority 3 purchase*

Notes:
- 3rd floor; old LSci Rm 330

Room Adjacencies:
- Adjacent to Animal Collections Room

INSTRUCTIONAL LABS – Ecology Teaching Lab
This room will accommodate different laboratory sections of ecology and field biology courses taught in the Department of Biology. During the fall semester it will be used exclusively for the Biol 2802-Ecology Lab course with 8-9 lab sections. During the spring semester, Biol 3761-Animal Diversity (3 sections) will be instructed in this room.

Occupants: 24 students + 1 instructor

Room Requirements:
- (1) 6 foot fume hood w/ sink
- (3) large sinks on sides of room
- ICW (cold water), IHW (hot water), and DI (de-ionized water)
- G (natural gas), V (vacuum), and CA (compressed air) at lab benches and fume hoods
- 120 VAC outlets
- Emergency shower and eyewash stations
- (2) Ethernet connections
- Markerboard and projection screen
- Wall clock
- (3) 5’ x 16’ lab benches - 30” high with 8 knee spaces, 8 student drawers
- (8) Power and Data outlets along the center of each bench
- A/V cabinet in front of room with Power and Data Port, Computer hook-up
- Bench space (36”) around periphery of room with drawers and cabinets below and cabinets above.
- (12) electrical outlets along periphery of room
- Cubby holes along one wall for student coats and books
- Bulletin board
- Ceiling-mounted projector w/ speakers *Priority 1 purchase*
- (1) Refrigerator/freezer VCR/DVD player *Priority 3 purchase*

Notes:
- 3rd floor (east side of building)

Room Adjacencies:
- Adjacent to Non-Majors and Anatomy Teaching Labs
INSTRUCTIONAL LABS – Aquatic Biology Teaching Lab
This room will accommodate different laboratory sections of aquatic biology courses taught in the Department of Biology. Laboratory courses such as Biol 5862-Advanced Lake Ecology, Biol 5833-Stream Ecology, Biol 5839-Coral Reef Studies, Biol 5803-Water Pollution Biology, Biol 5805-Fisheries Ecology, Lim 5004-Field Limnology and other aquatic biology courses will typically be instructed in this room.

Occupants: 16 students + 1 instructor

Room Requirements:
- (2) 6 foot fume hood w/ sink
- (2) large sinks on opposite sides of the room
- (2) extra large, deep sinks on opposite sides of the room
- ICW (cold water), IHW (hot water), and DI (de-ionized water)
- G (natural gas), V (vacuum), and CA (compressed air) at fume hood and along sides and back of room
- 120 VAC outlets
- Emergency shower and eyewash stations
- (2) Ethernet connections
- Markerboard and projection screen
- Wall clock
- (2) 5’ x 16’ lab benches - 30” high with 8 knee spaces, student drawers
- (8) Power and Data connections along the center of each bench
- A/V cabinet in front of room with Power and Data Port, Computer hook-up
- Bench space (36”) around periphery of 75% of room with drawers and cabinets below and cabinets above for microscopes, field gear and lab supplies.
- Open wall space with outlets around 25% of room to accommodate 1 refrigerator for live specimens.
- (12) electrical outlets along periphery of room
- Cubby holes along one wall for student coats and books
- Storage cabinets for 16 dissecting microscopes
- Bulletin board
- Ceiling-mounted projector w/ speakers Priority 1 purchase
- Refrigerator/freezer Priority 3 purchase
- VCR/DVD player Priority 3 purchase

Notes:
- 3rd floor; old LSci Rm 314

Room Adjacencies:
- Adjacent to Biol. Prep Room and Animal Biology Teaching Lab
- Close to Aquarium Room

INSTRUCTIONAL LABS – Non-Majors Biology Teaching Lab
This room will accommodate 8-9 laboratory sections of the non-majors Biol 1001-Biology & Society course taught in the Department of Biology each semester.

Occupants: 24 students + 1 instructor

Room Requirements:
- (1) 6 foot fume hood w/ sink
- (3) sinks
- ICW (cold water), IHW (hot water), and DI (de-ionized water)
- G (natural gas), V (vacuum), and CA (compressed air) at lab benches and fume hoods
- 120 VAC outlets
- Emergency shower and eyewash stations
- (2) Ethernet connections
- Markerboard and projection screen
- Wall clock
- Storage cabinets for 24 microscopes
- Lab benches with (24) student stations with chairs and 120 VAC power for each station; (3) 5 ft x 16 ft lab benches – 30” high with 4 knee spaces and 8 student drawers per side
- (8) Power and data outlets along the center of each bench
- A/V cabinet in front of room with power and data ports, Ethernet connection
- Bench space (36” high) around periphery of room with drawers and cabinets below and cabinets above
- Separate lab bench for transient common materials
- Storage cabinets for teaching materials
- Cubby holes along one wall for student coats and books
- Bulletin board
- Ceiling-mounted projector w/ speakers Priority 1 purchase
- (1) Refrigerator/freezer Priority 3 purchase
- VCR/DVD player Priority 3 purchase

Notes:
- 3rd floor; northeast lab on eastern side of building (see drawings)

Room Adjacencies:
- Adjacent to Ecology Teaching Lab

INSTRUCTIONAL LABS – Anatomy Teaching Lab
This room will accommodate laboratory sections of different introductory and upper division biology courses taught in the Department of Biology. Laboratory courses such as Biol 1761-Human Anatomy (Fall Semester; 3 sections), Biol 4761-Ichtyology (Spring Semester), and Biol 5863-Ecosystems Ecology will typically be instructed in this room. This lab will also be used by departmental Freshman Seminar classes that need access to an instructional laboratory during part of the semester. The anatomy classes focus heavily on animal dissection and thus require well-ventilated storage areas and over-the-bench ventilation for students.

Occupants: 24 students + 1 instructor

Room Requirements:
- (2) 6 foot fume hood w/ sink
- (3) large sinks
- ICW (cold water), IHW (hot water), and DI (de-ionized water)
- G (natural gas), V (vacuum), and CA (compressed air) at lab benches and fume hoods
- 120 VAC outlets
- Emergency shower and eyewash stations
- (2) Ethernet connections
- Markerboard and projection screen
- Wall clock
- (6) 5’ x 8’ lab bench@ 30” high with 4 knee spaces, 8 student drawers
- (24) Power and Ethernet outlets, 4 at each student bench
- (16) wall outlets, @ 4/wall
- Bench space (36”) around periphery of room with drawers and cabinets below and cabinets above.
- Separate lab bench for transient common materials
- Storage cabinets for teaching materials
- (1) Bench, 36” high with drawers to serve as “morgue” –(as in LSci 360); ventilated above
- Cubby holes along one wall for student coats and books
- Bulletin board
- Ventilated storage area (as in SSB GB2 lab) for preserved specimens **Priority 1 purchase**
- Ceiling-mounted projector w/ speakers **Priority 1 purchase**

**Notes:**
- 3rd floor; (eastern side of building)
- This lab will require ventilated storage units for student dissection specimens – cats, pigs, sharks, etc

**Room Adjacencies:**
- Adjacent to Plant Biology Research Lab and Ecology Teaching Lab

**INSTRUCTIONAL LABS – Plant Biology/Aquatic Biology Prep Room**
This room will serve as a service alcove for all teaching and research labs on the 3rd floor and be the preparation area for laboratory courses taught in the Plant Biology and Aquatic Biology Teaching Labs. It will provide a location for preparing chemical solutions, conducting chlorophyll analyses, and other light-sensitive activities.

**Occupants:** 1 instructor + 1 Lab Coordinator + 2 work study students

**Room Requirements:**
- (1) 6 foot fume hood w/ sink
- (1) large sink
- (1) 4’ desk with knee space and drawers
- Storage cabinets for teaching materials
- ICW (cold water), IHW (hot water), and DI (de-ionized water)
- Floor drain
- G (natural gas), V (vacuum), and CA (compressed air) at lab benches and fume hoods
- 120 VAC outlets
- Emergency shower and eyewash stations
- (1) Telephone connection
- (1) Ethernet connections
- (1) Bench, 36” with drawers on one side of room
- (1) 8’ lab/microscope bench with knee space and power along center of bench
- (1) Steam autoclave **Priority 1 purchase**
- (1) Ice machine **Priority 2 purchase**
- Milli-Q water mounted on wall and connected to DI **Priority 2 purchase**
- (1) Small chest freezer **Priority 3 purchase**
- (1) refrigerator/freezer **Priority 3 purchase**

**Notes:**
- 3rd floor; old LSci Rm 312 (expanded)
- Needs door directly to corridor in addition to doors to adjacent instructional labs

**Room Adjacencies:**
- Adjacent to Plant Biology and Aquatic Biology Teaching Labs

**INSTRUCTIONAL LABS – Animal Collections Room (“Range Room”)**
This room will be a centralized specimen storage room to accommodate preserved and mounted animal specimens that the Department of Biology holds. These collections include: birds, mammals, fish, amphibians, reptiles, as well as the Animal Diversity and Entomology collections.

**Occupants:** 1 student curator

**Room Requirements:**
- (1) 6 foot fume hood w/ sink
Life Science Building Renovation  
University of Minnesota, Duluth

- (1) 4’ desk with knee space and drawers
- G (natural gas), V (vacuum), and CA (compressed air) at lab benches and fume hoods
- 120 VAC outlets
- (1) Telephone connection
- (1) Ethernet connection
- Ventilated storage cabinets for preserved and stuffed animals **Priority 1 purchase**
- (1) refrigerator/freezer **Priority 3 purchase**

**Notes:**
- This room should have containment cabinets and extra ventilation to draw out potentially hazardous fumes (formalin, naphthalene and paradichlorobenzene, among others). This centralized storage room will simplify the process of locating material for lab setups. TAs would be able to look in a single room for specimens rather than go on a scavenger hunt through many rooms hoping to find things.

**Room Adjacencies:**
- Adjacent to Animal Biology Teaching Lab
- Close to Ecology and Aquatic Biology Teaching Labs

**SUPPORT SPACE – Aquarium Room**
This room is used to house live aquatic animals (fish and amphibians) in the Department of Biology for instructional activities and sometimes research.

**Occupants:** 1 instructor + 1 Lab Coordinator + 2 work-study students

**Room Requirements:**
- Epoxy-coated wall that are waterproof and easy to clean
- (1) double basin stainless steel sink
- ICW (cold water), IHW (hot water), and DI (de-ionized water)
- Floor drain
- V (vacuum), and CA (compressed air) with compressed air jets every two feet along walls
- 120 VAC outlets – GFCI electrical outlets needed with splash protection (outdoor boxes) located every three feet as sufficient height off the floor to minimize water intrusion
- Heavy duty aquarium racks down side walls and the center of the room
- Stainless steel bench with double stainless steel sink located at one end of the room (similar to the current setup). Plastic (non-rusting) cabinets overhead
- Room lighting on a timer
- Display windows into corridor to accommodate large aquaria
- Heavy duty aquarium racks down side walls and center of room **Priority 3 purchase**
- Floor to ceiling AHAB fish holding system on back wall (flexible for a wide range of fish or invertebrates) **Priority 2 purchase**
- (1) refrigerator/freezer **Priority 3 purchase**

**Notes:**
- 3rd floor; northerly 2/3rds of old LSci 325
- This room needs to be climate controlled to maintain a constant 70°F temperature and must be able to properly exhaust heat from pumps, chillers, etc.
- Prefer the room to be square instead of rectangular to maximize space for aquaria.

**Room Adjacencies:**
- Close to Aquatic Biology and Ecology Teaching Labs

**SUPPORT SPACE – Stockroom**
This space will be used to house all departmental materials and supplies for instructional activities and office functions. It houses many pieces of large research field gear that cannot be housed in faculty
research labs. It will also temporarily house large equipment and materials for classes when they are not taught.

**Occupants:** 2 Lab Coordinators + 6 work-study students

**Room Requirements:**
- (1) large double basin sink
- (1) 4’ desk with knee space and drawers for student workers
- ICW (cold water), IHW (hot water), and DI (de-ionized water)
- Floor drain
- 120 VAC outlets
- Emergency shower and eyewash stations
- (1) Telephone connection
- (1) Ethernet connection
- (2) chest freezers
- Bookshelves for catalogs
- Floor to ceiling shelves (60% of wall space + center island shelves); most can be ~18” depth; need at least 25’ of 36” to accommodate specimens & large items
- Need free wall space to park carts and for placement of equipment
chest freezers, incubators, shaker tables, etc.
- Need some lockable areas for items that need to be checked out (cages). (tools, waders, disposable lab supplies, TV’s, etc.)
- Need 5’ work bench to repair equipment (36” height, areas for tools)
- Compressed air at work bench and near sink.
- Need frequent power outlets
- Need increased ventilation
- Coat hooks
- Markerboard
- (2) refrigerator/freezers (existing)
- (2) chest freezers (existing)

**Notes:**
- Ground floor; old LSci Rms. 50, 53, 55, 57, 59, 65. and 67
- This room should contain a glass washing area and ideally it would also contain space for preparing solutions for different courses

**Room Adjacencies:**
- Adjacent to Chemical Preparation and Hazardous Materials Storage Room
RESEARCH LABS – Plant Biology Research Lab
This is a research laboratory for tenured faculty member (Dr. David Schimpf). It will be used for plant ecology/physiology research by this faculty member, graduate and undergraduate students, and research technicians.

Occupants: 8 persons

Room Requirements:
- (1) 6 foot fume hood w/ sink
- (2) regular sinks
- ICW (cold water), IHW (hot water), and DI (de-ionized water)
- G (natural gas), V (vacuum), and CA (compressed air) at lab benches and fume hoods
- 120 VAC outlets
- 220 VAC outlet
- Emergency shower and eyewash stations
- (2) 4’ laboratory desks with chairs
- (2) Ethernet connections
- (1) Telephone connection
- high benches with cabinets underneath
- wall cabinets for storage of chemicals and materials
- Coat hooks
- (1) Bulletin board
- (1) Markerboard
- Wall clock
- (1) refrigerator/freezer Priority 3 purchase
- Biological safety cabinet (77 5/8” wide w/vacuum) Priority 1 purchase
- Milli-Q water mounted on wall and connected to DI Priority 2 purchase

Notes:
- 3rd floor; southeast corner of eastern side of building (see drawings)

Room Adjacencies:
- Proximity to greenhouse desirable

RESEARCH LABS – Plankton Ecology Research Lab
This is a research laboratory for a tenured faculty member (A. Klemer). It will be used for plankton ecology research by the faculty member, graduate and undergraduate students, and research technicians.

Occupants: 8 persons

Room Requirements:
- (1) 6 foot fume hood w/ sink
- (2) large sinks
- ICW (cold water), IHW (hot water), and DI (de-ionized water)
- G (natural gas), V (vacuum), and CA (compressed air) at lab benches and fume hoods
- 120 VAC outlets
- 220 VAC outlet
- Emergency shower and eyewash stations
- High (wall) benches (3’) with cabinets below
- Low (wall or island) benches that are 30” high and open below
- (4) 4’ laboratory desks with chairs
- (2) Ethernet connections
- (1) Telephone connection
- Coat hooks
- Bulletin board
- Markerboard
- Wall clock
- Environmental chamber (walk-in) with variable lighting and temperature (existing)
- Milli-Q water mounted on wall and connected to DI (existing)
- (1) refrigerator/freezer (existing)

Notes:
- 3rd floor; old LSci Rm 302
- This room has a large walk-in environmental chamber that will have to be moved and reconnected if this room is gutted.

Room Adjacencies:

RESEARCH LABS – Electron Microscope Room
Current location of electron microscope and space for departmental refrigerators, growth chamber and a -80°C freezer

Occupants: 4 persons

Room Requirements:
- Climate controlled to maintain constant temperature
- Good ventilation to properly exhaust heat generated from refrigerators, freezers, and growth chambers
- V (vacuum), and CA (compressed air)
- 120 VAC outlets
- 220 VAC outlets
- (1) Ethernet connection
- (1) Ultacold (-80°C) freezer (existing)
- Freezers (existing)
- Growth chambers (existing)

Notes:
- Ground floor; between LSci 175 and 185 lecture halls
- In the future, we recommend that the electron microscope be removed from the Life Science building. After renovation, the room should be kept as a site for large, heat generating equipment such as refrigerators, -80 freezers and growth chambers. This room should also be the new location for the departmental muffle furnace.

Room Adjacencies:
- Current location is acceptable
SUPPORT SPACE – Cold Room
This is a constant temperature room that should hold temperature at 40°F (4°C). It will be used for research by faculty members, keep bulky research soil samples chilled, hold dormant greenhouse plants that require an annual cold period for normal development, and for fresh material for instructional use.

Occupants: none

Room Requirements:
- Temperature constantly regulated at 4°C (40°F) with an alarm to Greenhouse Coordinator Office if temperature rises above the set point
- Insulated walls and door
- (1) large sink
- ICW (cold water) and DI (de-ionized water)
- Floor drain
- V (vacuum) and CA (compressed air)
- 120 VAC outlets

Notes:
- 2nd floor; old LSci Rm 202

Room Adjacencies:
- Adjacent to one greenhouse
- Close to faculty research laboratories

SUPPORT SPACE – Greenhouse #1 (Lower Octagonal Greenhouse)
This is an existing greenhouse to grow plant materials for instructional and research purposes. This greenhouse is also used by the Art Department for drawing classes and by campus visitors on tours. It will remain largely unchanged.

Occupants: Greenhouse coordinator + several work-study students + visitors + students conducting course projects

Room Requirements:
- ICW (cold water), IHW (hot water)
- Floor drains and drainage under benches
- 120 VAC outlets
- 220 VAC outlets
- plant benches
- light for extending photoperiod (mercury arc lamps)
- floor tank present

Notes:
- Ground floor
- May need emergency egress added

Room Adjacencies:
- needs to be adjacent to Headhouse

SUPPORT SPACE – Greenhouse #2 (Greenhouse over LSci Lecture Halls, 2nd floor)
This is an existing greenhouse to grow plant materials for instructional and research purposes. This greenhouse is also used by the Art Department for drawing classes and by campus visitors on tours. It will remain largely unchanged.

Occupants: Greenhouse coordinator + several work-study students + visitors
Room Requirements:
- (1) large sink
- ICW (cold water), IHW (hot water), and DI (de-ionized water)
- Floor drains
- G (natural gas), V (vacuum), and CA (compressed air) at lab benches
- 120 VAC outlets
- 220 VAC outlets
- plant benches
- light for extending photoperiod and making up for light blocked by new Swenson Science Building (Mercury arc lamps need to be added)

Notes:
- 2nd floor
- Our Greenhouse Coordinator indicates that this greenhouse needs a new roof.

SUPPORT SPACE – Headhouse
This area is used to prepare plant materials for both greenhouses. It has plant potting facilities, an autoclave, and storage for potting soils, gravel and other materials.

Area used for potting plants, sterilizing soil, cleaning pots, and growing plants that need special attention. Also used for storage of all greenhouse equipment and supplies. Other uses include site for Biology Department course and research demonstrations and prep, Art course work, and Facilities Management work for plant care.

Occupants: Greenhouse Coordinator + several work-study students + students working on course projects + visitors

Room Requirements:
- (1) large double basin sink
- ICW (cold water), IHW (hot water), and DI (de-ionized water)
- Floor drain
- V (vacuum), and CA (compressed air)
- 120 VAC outlets
- 220 VAC outlets
- Emergency shower and eyewash stations
- (1) Telephone connection
- Soil bins with outside loading capability
- Improved shelving and storage capabilities
- Bench top soil bins
- 25 ft of bench and table space for potting plants
- Coat hooks
- (1) Bulletin board
- (1) Markerboard
- Wall clock
- Industrial style dishwasher Priority 2 purchase
- Growth chamber Priority 3 purchase
- (1) Steam autoclave or steamer (could get by with a steamer only) Priority 1 purchase

Notes:
- Ground floor
- This areas needs improved lighting and improved heating especially in the winter.

Room Adjacencies:
- Adjacent to Greenhouse #1 (octagonal greenhouse on ground floor)
- Must have outdoor access to soil bins (for trucks)
SUPPORT SPACE – Greenhouse Preparation Room
This room is the preparation area for Greenhouse #2. It is used to prepare solutions, store research supplies, and as an area for insect free propagation of plants. It will remain largely unchanged.

Occupants: Greenhouse Coordinator + several work-study students

Room Requirements:
- (1) 6 foot fume hood w/ sink
- (1) large double basin sink
- ICW (cold water), IHW (hot water), and DI (de-ionized water)
- V (vacuum), and CA (compressed air) at lab benches and fume hoods
- 120 VAC outlets (many)
- Cabinet space for storage
- Counter space for work areas
- Emergency shower and eyewash station
- (1) Telephone connection
- (1) Ethernet connection
- (1) floor drain

Notes:
- 2nd floor; southerly 90 sq ft of old LSci Rm 206

Room Adjacencies:
- Adjacent to Greenhouse #2 (existing greenhouse on 2nd floor of Life Sciences)

SUPPORT SPACE – Chemical Preparation and Hazardous Materials Storage Room
This room supports the instructional mission of the Department of Biology by housing chemicals, serving as a preparation area for making solutions, and as a hazardous waste process and storage facility for the entire department. It may be best to break this room into three smaller rooms to house these three separate functions.

Occupants: 2 Lab Coordinators + several work-study students

Room Requirements:
1. Chemical Storage Room
   - Shelving with lips appropriate for chemical storage
   - Properly ventilated storage areas for flammables, acids, etc
   - Room for lockable cabinets for highly hazardous items

2. Reagent Preparation Room
   - (1) 6 foot fume hood w/ sink
   - (1) large double sink
   - ICW (cold water), IHW (hot water), and DI (de-ionized water)
   - Floor drain
   - G (natural gas), V (vacuum), and CA (compressed air) at lab benches and fume hoods
   - 120 VAC outlets
   - Cabinets for glassware storage
   - Drawer space for pipettors, gloves, and other supplies
   - Free work space
   - 20 ft of counter space for balances, hot plates, pH meter, etc.
   - Emergency shower and eyewash stations
   - (1) 4’ desk with knee space and drawers
   - (1) Telephone connection
   - (1) Ethernet connection
- (1) Flammable materials refrigerator/freezer (29.5 CF) **Priority 1 purchase**

3. Hazardous Waste Preparation and Storage Room
- Shelving with lips appropriate for chemical storage
- Need approximately 10’ of counter space
- Drawer space for minor supplies: labels, packing tape, forms

**Notes:**
- Ground floor; including old LSci Rms 30, 32, 34 plus additional space (see drawings)

**Room Adjacencies:**
- Adjacent to Stockroom
- No access to greenhouses or headhouse because of dirt in these areas

**INSTRUCTIONAL LABS – Olga Lakela Herbarium**
This is an endowed herbarium run by the Department of Biology. The purpose of this room is mainly plant research and service with minor support of plant biology instructional activities.

**NOTE:** This Herbarium will be relocated into space in Marshall Alworth Hall.

**Occupants:** 4 persons

**Room Requirements:**
- 120 VAC outlets
- (1) Telephone connection
- (2) Ethernet connection
- (1) 6 ft x 7 ft computer workstation with chair (existing)
- (2) 3 ft x 6 ft examination tables with chairs (1 existing, 1 new)
- (2) 2.5 ft x 5 ft desks with chairs (1 existing, 1 new)
- 100 ft of wall-mounted bookshelves
- Filing and specimen cabinets (existing)
- Map cabinet (existing)
- (32) 29” x 19” x 7’ collection storage cabinets (existing)
- Compact storage system (30’ x 10.5’) **Priority 3 purchase**
- Coat hooks
- (1) Marker board
- (1) Bulletin board
- Wall clock

**Notes:**
- To be moved to Marshall Alworth Hall
- No water connections in this room. Water leaks are a hazard for the specimen collection
- Consider public display window

**Room Adjacencies:**
- Adjacent to Herbarium Prep Room
INSTRUCTIONAL LABS – Herbarium Prep Room

This room will be used to prepare plant materials for the Olga Lakela Herbarium.

NOTE: This room will be relocated into space in Marshall Alworth Hall.

Occupants: 4 persons

Room Requirements:
- (1) sink
- ICW (cold water), IHW (hot water), and DI (de-ionized water)
- G (natural gas), V (vacuum), and CA (compressed air) at benches
- 120 VAC outlets
- Emergency shower and eyewash stations
- (1) Telephone connection
- (1) Ethernet connection
- Wall clock
- (1) 3 ft x 6 ft specimen preparation table (existing)
- (1) 2 ft x 4 ft plant dryer (existing)
- (2) 2 ft x 4 ft, 2 ft x 6 ft supply cabinets (existing)
- (1) refrigerator/freezer

Notes:
- To be moved to Marshall Alworth Hall

Room Adjacencies:
- Adjacent to Olga Lakela Herbarium
PROGRAM DETAIL
College of Pharmacy, Duluth

Room and equipment descriptions for 1st and 2nd floors to accommodate the College of Pharmacy, Duluth. Office furniture must be purchased. Furniture for classrooms and other rooms will be moved from temporary Pharmacy space in Kirby Plaza. Research lab equipment requested to be purchased is shown in italics.

Prepared by: Stephen Hoag
Senior Associate Dean
College of Pharmacy, Duluth
March 24, 2004

Faculty Offices (16)
Occupants: 1
Requirements:  
- Office desk (1)
- Credenza (1, w/ 2 peds w/ drawers)
- Desk chair (1)
- Guest chair (2)
- Table (1, 36” round or tear drop)
- Marker board (1)
- Wall mounted office storage cabinet (2, 4 ft.)
- Corkboard (2, 48”x18”)
- Filing cabinet (1, 4-drawer)
- Bookcase (1, 6-shelf)
- 120V outlet (4)
- Ethernet connection (2)
- Telephone connection (2)

Faculty Offices (2)
Occupants: 2
Requirements:  
- Office desk (1, to accommodate 2 users)
- Credenza (1, w/ 2 peds w/ drawers)
- Desk chair (2)
- Guest chair (1)
- Table (1, 36” round or teardrop)
- Marker board (1)
- Wall mounted office storage cabinet (2, 4 ft.)
- Corkboard (2, 48”x18”)
- Filing cabinet (1, 4-drawer)
- Bookcase (1, 6 shelf)
- 120V outlet (4)
- Ethernet connection (2)
- Telephone connection (2)

Staff Offices (5)
Occupants: 1
Requirements:  
- Office desk (1)
- Credenza (1, w/ 1 ped w/ drawers)
- Desk chair (1)
- Guest chair (2)
- Table (1, 36” round or teardrop)
- Filing cabinet (2, 4-drawer)
- Bookcase (1, 4 shelf)
- Wall mounted office storage cabinet (2, 4 ft.)
- Corkboard (2, 48”x18”)

Prepared by: Stephen Hoag
Senior Associate Dean
College of Pharmacy, Duluth
March 24, 2004
### Dean’s Office:
**Occupants:** 1  
**Requirements:**
- Desk (1, w/ return for computer workstation)  
- Credenza (1, in addition to desk return for computer)  
- Ped (2 to 3, w/ drawers)  
- Desk Chair (1)  
- Guest chair (6, with arms)  
- Table (1, 48 in. round)  
- Wall-mounted office storage cabinets (2, 4 ft.)  
- Corkboard (2, 48”x18”)  
- Filing cabinet (1, 4 drawer)  
- Bookcase (2, 36”, 4 shelf)  
- 120V outlet (4)  
- Ethernet connection (2)  
- Telephone connection (2)

### Administration/Reception
**Occupants:** 2 + visitors  
**Requirements:**
- Desk (2, configured as double workstation with 8 ft. counter space between)  
- Additional counter (1, approx 8-10 ft. length)  
- Corner counter (3, 4’x4’)  
- Ped under counter workspace (6)  
- Reception counter (4, 4-ft.)  
- Task chair, clerical style (4)  
- Wall-mounted office storage cabinet (2, 6 ft.)  
- Corkboard (2, 48”x18”)  
- File cabinet (5, 5-drawer)  
- Arm-chair (2, upholstered)  
- End table (1)  
- Counter w/cabinets below, 24 linear ft.  
- Mailboxes, faculty/staff (25 box unit)  
- Sink, stainless (1, 30”x24”x10”)  
- Copy machine (1)  
- Fax Machine (1)  
- Color printer (1)  
- Refrigerator (1, 15-18 cu. ft.)  
- Microwave oven (1)  
- Coffee maker (1)  
- 120V outlet (10)  
- Ethernet connection (6)  
- Telephone connection (6)
Computation Lab
Purpose: Research involving statistical and other mathematical calculations. Non wet-lab.
Occupants: 8 to 10
Requirements: - Computer (4, standard with expanded memory)
- Computer (2, top-level capability)
- Counter, computer (16 ft.)
- Table, conference (4, 4’x8’)
- Chair, classroom (32)
- Desk (2, 48”x36”, w/ 1 ped w/ drawers)
- Desk chair (2)
- TV Monitor (1, 36 inch)
- Codec for videoconferencing (1)
- Mobile cart (1, for TV monitor)
- Projection screen (1)
- Marker board (1, 4’x8”)
- 120V outlet (14)
- Ethernet connection (8)
- Telephone connection (4)

Pharmaceutical Care Lab (class lab)
Purpose: Instruction and practice - pharmaceutical care procedures, techniques.
Occupants: Up to 30
Requirements: - Counter for computers (10, 30’x3’x2.5’)
- Computer (10, w/ monitor)
- Stool for computer counter (10)
- Table, general purpose (6, 34”x72”)
- Chair, classroom, armless (32)
- Table (1, 4’x8’)
- Marker board, mobile (2, 4’x6’)
- Cabinet, mobile (8, 60”x36”x30” w/ 12” shelf above)
- Cabinet, mobile (6, 36”x30”x24”)
- Cabinet, mobile (1, 36”x72”x30”)
- Shelf, wall mounted (3, 72”x12”)
- Sink, stainless (5, 30”x24”x12”)
- Sink, stainless (1, 30”x24”x5”)
- Cabinet s/doors (2, 8’x3”x2’)
- Hood, laminar flow (2, 8’x6”x3’)
- Cabinet, biological safety (1, 8’x4”x3’)
- File cabinet (5, 4-drawer)
- Shelving, metal, 72”x30”
- Screen, projection (1, 10’x10’, ceiling mount)
- 120V outlet (20)
- Ethernet connection (5)
- Telephone connection (2)

Patient Assessment Lab (class lab)
Purpose: Discussion and practice of techniques of physical examination.
Occupants: Up to 30
Requirements: - Movable partitions to create 6 semi-private patient exam rooms and instructor desk area
- Desk (7, office style)
- Desk Chair (1)
- File cabinet (1, 4 drawer)
- Bookshelf (2, 4 shelf)
- Cabinet (1, 4 shelf, 84”x48”x12”)

College of Science & Engineering
College of Pharmacy
- Table, patient examination (6)
- Desk, small, for patient exam rooms (6)
- Guest chair (8)
- Marker board (1, 8′x4″)
- Coat rack, small (7)
- 120V outlet (14)
- Ethernet connection (8)
- Telephone connection (8)

**Classroom (2)**

**Occupants:** Up to 60

**Requirements:**
- Console, teaching technology (1, 42″x84″x30″ w/ 42″x36″x30″ return)
- Monitor, TV (7, 40″)
- Marker board (1, 14′x4″)
- Screen, projection, ceiling mount (1, 10′x10″)
- Cart, mobile, TV monitor (1)
- Podium w/shelving below (1, 42″x36″x36″)
- Speaker (2, wall mount)
- Panel, soundproofing, wall mount (24, 24″x60″)
- Panel, soundproofing, wall mount (24, 12″x36″)
- Table, classroom (12, 24″x72″)
- Chair, classroom, armless (60)
- Stool, suitable for console height (1)
- 120V outlet (10)
- Ethernet connection (5)
- Telephone connection (2)
- Conduit and cabling for Instructional TV and other teaching electronics

**Breakout Rooms (4)**

**Purpose:** Small group discussions within the timeframe of larger classes.

**Occupants:** 6 to 8

**Requirements:**
- Table (2, 4′x6′)
- Chair, classroom (6, with arms)
- Marker board (1, 6′x4″)
- 120V outlet (6)
- Ethernet connection (2)
- Telephone connection (2)

**Breakout Rooms (2)**

**Purpose:** Small group discussion and videotaping of practice sessions in-patient interviewing and counseling.

**Occupants:** 6 to 8

**Requirements:**
- Table (2, 4′x6′)
- Chair, classroom (6, 4′x6′)
- Marker board (1, 6′x4″)
- Video camera (1)
- Video monitor (1)
- Video recorder (1)
- 120V outlet (6)
- Ethernet connection (2)
- Telephone connection (2)
Information Technology Work Room/Office
Purpose: Office space for IT professional; workspace for equipment set-up, maintenance and repair.
Occupants: 1 to 2
Requirements:
- Desk (1)
- Workbench/Counter (1, 6’ to 8’, 30” depth)
- Bookcase (1, 6 shelf, 36”)
- File cabinet (1, 4 drawer)
- Marker board (1, 6’x4’)
- Table, for meetings (1, 36”x40”)
- Shelving, 6’x8’x2’
- 120V outlet (8)
- Ethernet connection (8)
- Telephone connection (4)

Independent Study/Carrels
Purpose: Student study, reading, casual discussion, mail pick-up.
Occupants: 20 to 30
Requirements:
- Bookcase (16, 4 shelf, 36x36)
- Bookcase (3, 8 shelf, 96”x36”)
- Table (3, coffee table height, 24 in. round)
- Table (2, study table height, 36 in. round)
- Chair, individual reading (12, upholstered)
- Chair, classroom (8, with arms)
- Marker board (1, 4’x6’)
- Mailboxes, student (160)
- Carrels, study (6, 29”x40”x30” attached shelf above)
- 120V outlet (16)
- Ethernet connection (8)
- Telephone connection (2)

Small Group Study Rooms (6)
Purpose: Student study/discussion in small groups outside of class time.
Occupants: 2 to 4
Requirements:
- Table (1, 30”x60”)
- Chairs, classroom (4, armless)
- Marker Board (1, 6’x4’)
- 120V outlet (4)
- Ethernet connection (1)
- Telephone connection (1)

Student Organization Office
Purpose: Meetings and administrative work of 6 to 8 pharmacy student Organizations.
Occupants: 6 to 10
Requirements:
- Table (2, 4’x6’)
- Chair, classroom (10, with arms)
- File cabinet (8, 4 drawer, lockable)
- Bookcase (4, 6 shelf, 42 in. wide)
- Marker board (1, 4’x8’)
- 120V outlet (8)
- Ethernet connection (4)
- Telephone connection (2)
Research Lab
Purpose: General wet lab research by faculty, graduate students, lab technicians.
Occupants: 10 to 30
Requirements:
- Sinks (4-6)
- Drying racks suspended over sinks
- Hot and cold water
- House deionized water
- White boards attached to the end of every other bench
- Desks (1 per bench, 4’ wide, movable) with built-in file cabinet and drawers
- Adjustable chair per desk (1)
- Adjustable chair per bench (1)
- Bench (9’, adjustable stone-topped table)
- Cabinet to fit under each bench (1, movable)
- Shelving suspended over each bench
- Vacuum
- Gas outlet per bench (1)
- 120 V outlets (many; mix of dedicated and multiple circuit outlets)
- Stone-topped tables (2-4)
- Large entry doors for moving equipment
- Stand alone glassware cabinets (5-10, 4’ wide x 7’ tall)
- Emergency power (on wall shared with Linear Rooms)
- Computer connections for each desk
- Phone jack every other bay (1)
- Additional bench lighting from under the suspended shelving
- Eyewashes and showers over every sink

Shared equipment:
- 4°C refrigerators (5)
- −20°C freezers (5)
- −80°C freezers (5)
- Analytical balances (1 set) and stone table
- Microfuges (5)
- Electrophoresis power supplies (5)
- Low speed centrifuges (2)
- Lyophilizer (1)
- Vacuum pumps (2)

Research Lab Linear Rooms 1 and 2 (to be constructed within designated lab space)
Purpose: These rooms will house noise and heat generating equipment such as freezers, centrifuges etc. In addition these rooms will house tissue culture hoods, fume hoods and certain pieces of tabletop equipment. One room will also house the ice machine and water deionizer. A portion of one room will be used for work with radioactivity.
Occupants: None
Requirements:
- Fume hoods (6 foot wide, 2 per room)
- Flammable/corrosive cabinetry associated with fume hoods
- Sink (1 per room)
- Wall brackets for CO2 gas cylinders (next to TC hood incubators)
- Shelving on walls for supply storage
- 220V outlets (3-4 per room)
- 120V outlets (many; mix of dedicated and multiple circuit outlets)
- Emergency power outlets
- Computer connections
- Natural gas to TC hoods
- Vacuum
- Hot and cold water for sinks
- Stone-topped small equipment and procedure tables (2-3 per room)
- Chairs for working (4 per room)
- Large entry doors for moving equipment
- Eye washes and showers over each sink
- Ice making machine (1)
- Water deionizer (1) located above ice machine
- Tissue culture hoods (6', 2)

Shared Equipment:
- Ultracentrifuges (2)
- Ultracentrifuge rotors (1 set)
- High speed centrifuges (2)
- Large shaking incubator, variable temperature (1)
- Real time PCR machine (1)
- HPLCs (2)
- LC-GC (1)
- UV spectrophotometer (1)
- Scintillation counter (1)
- Cell culture inverted microscope (1)
- Fluorescence microscope (1)
- Phosphorimager (1)
- Speed vacuum (1)
- Plate Reader (1)

Notes: Need good ventilation to account for heat generating equipment.

Research Lab Dark Room (to be constructed within designated lab space)
Purpose: This room will be used for photographic development and for light sensitive experiments. The room may also house a fluorescent microscope.

Occupants: None
Requirements:
- Sink w/attached counter and cabinetry underneath the counter (1)
- Small table (1)
- Lab chairs (2)
- 120V outlets
- Shelving
- Revolving light-proof door (1)
- Red-light for working with film (1)

Notes: Room must be well ventilated to protect from developing fumes.

Research Lab Cold Room (to be constructed within designated lab space)
Purpose: This room will be used to store reagents at 4°C and to conduct experiments that require continuous cold temperatures. Protein purification equipment may be permanently kept in this room.

Occupants: None
Requirements:
- Sink (1)
- 120V outlets
- Racks lining one full wall
- Stone-topped tables adjacent to sink along wall
- Shelving above tables
- Rack for attaching columns on endwall

Shared equipment: BioCad protein purification system
**Research Lab Bullpen** (to be constructed within designated lab space)

**Purpose:** This room will be used as office space for graduate assistants; post-docs, technicians etc. The room will be used for informal discussions and provides an environment conducive for writing manuscripts and reading.

**Occupants:** 8

**Requirements:**
- Telephone connection
- Computer network connections (8)
- Desks (4’, 8)
- Office chairs (8)
- Bookshelves
- 120V outlets
- Whiteboard (5’ wide x 4’ high, 1)
- Small table with 2 chairs (1)
- Small refrigerator
- Small microwave

**Research Lab Storage Room** (to be constructed within designated lab space)

**Purpose:** This space will be used for equipment and supply storage and could be converted to a procedure room at a later date if necessary.

**Occupants:** None

**Requirements:**
- Shelving on walls for supply storage
- 220V outlet (1)
- 120V outlets (mix of dedicated and multiple circuit outlets)

**Notes:** Ventilation should be able to handle heat produced by refrigeration condensers

**Research Lab Conference Room** (to be constructed within designated lab space)

**Purpose:** Small group conferences, presentations and/or discussions dealing with research issues. Will also contain research-related reference materials and will also be used as a lunchroom, as food cannot be taken into labs research areas.

**Occupants:** 6 to 12

**Requirements:**
- Table, conference (1, 4’x12’)
- Chairs, classroom (12, armless)
- Marker board (1, 8’x5’)
- Screen, projection (1, 8’x8’)
- Projector, LCD (1)
- Projector, overhead (1)
- Dimmer lighting
- Bookcase (3, 6 shelf, 72”x36”x12”)
- Magazine Rack (1, 48”x60”)
- 120V outlet (6)
- Ethernet connection (4)
- Telephone connection (2)