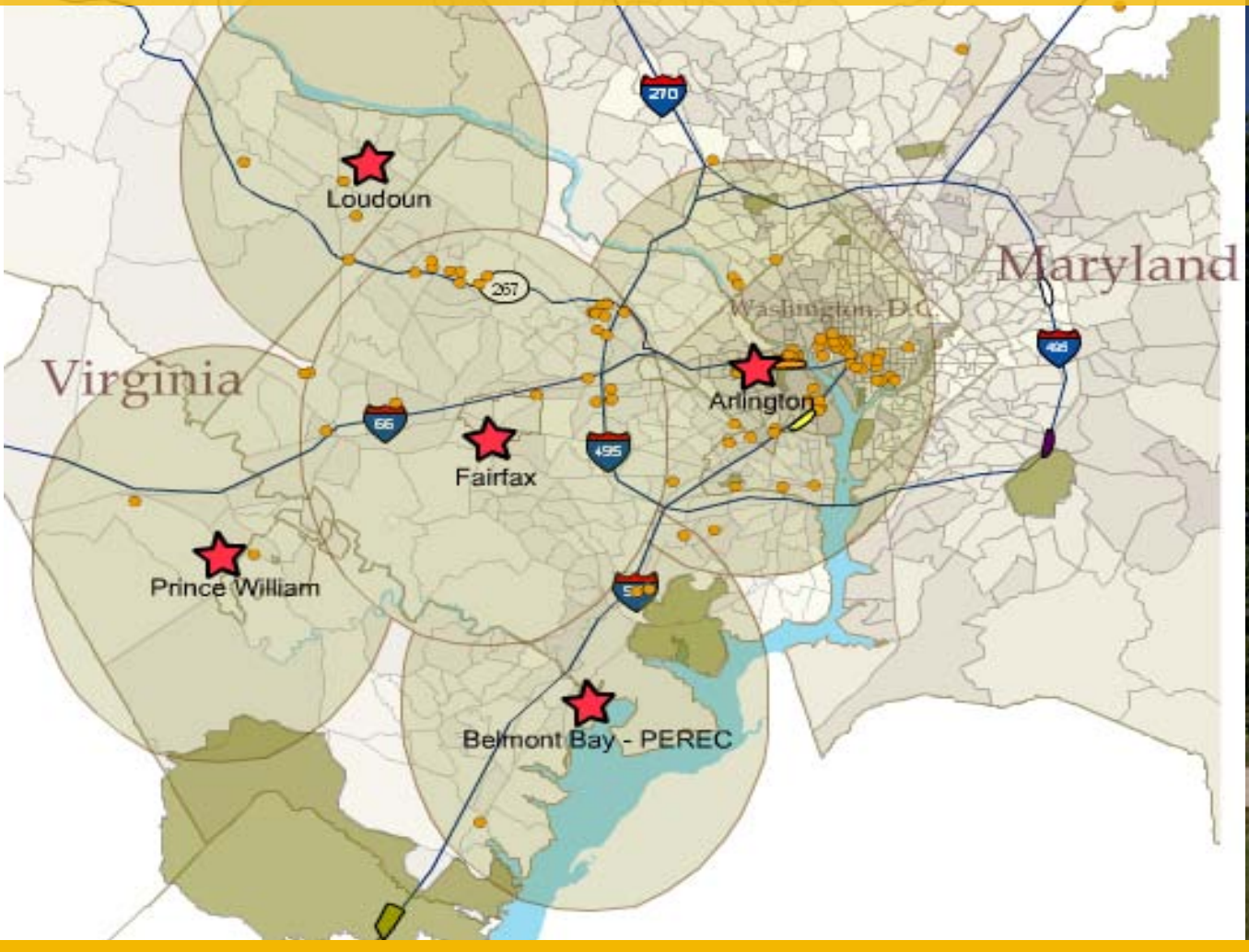
George Mason University

PERKINS + WILL

College of Science Master Plan Report – Final Report – June 24, 2009



GEORGE MASON UNIVERSITY

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Executive Summary

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Section 1 – Executive Summary

A. Vision and Mission
B. Master Plan Purpose
C. Program Participants
D. Objectives
E. Relationship to College and University Plans
F. Budget and Schedule Strategies

A. Vision and Mission

Vision Statement

The College of Science is a vibrant and dynamic community of learning and discovery which offers unique opportunities for academic and research collaborations across the university, region, and world.

Educational Mission

The institutional vision of entrepreneurial responsiveness is embodied in innovative pedagogies, preparing all students to be independent and creative members of the scientific community and society. Undergraduate research opportunities will draw the best and brightest students to the COS.

Collaboration Mission

The COS will aggressively deploy human resources and technologies to strengthen collaboration between people and campuses and be better prepared to connect with compatible institutions -both public and private.

B. Master Plan Purpose

The goal of the COS Facilities Master Plan is to document facility priorities for the next 6-10 year funding cycle that will assist the college in meeting its anticipated growth and pedagogical goals. The COS Facilities Master Plan process proposes teaching and research models that support the Strategic Plans for the college and the University. This report proposes building projects across campuses and sites (including but not limited to Science and Technology 1 & 2 and the addition at Fairfax, Belmont Bay, Prince William and others). Recommended space prototypes for teaching and research, strategies for strengthening the COS community and supporting future growth are also addressed in this report.

The COS faculty, Mason facilities, and representatives from the Provost's office have actively participated in focus groups and workshops that have lead to the development of this master plan. During the summer of 2008 focus groups were lead by Perkins +Will and discussed topics such as pedagogy and curriculum, research, and community. The fall of 2008, Project Kaleidoscope (PKAL), conducted a series of workshops particularly designed for the COS at Mason. These workshops were well attended and exposed attendees to STEM (science, technology, engineering and mathematics) building projects, current technologies, educational tools, as well as ideas for how to create a community of science. The PKAL workshops helped establish institutional priorities, formulate aspirational goals for the COS, and presented examples of learning spaces that serve various pedagogies. The PKAL workshops became a catalyst for the COS to begin closer examination of their future plans for teaching methodologies and space renovation and expansion.

This master plan is a tool to help the COS meet future goals for education and research. The master plan includes a summary of existing and growth program requirements by site. Prototypes for classroom, office, and laboratory space is included in the document. In addition, strategies for assembling space elements and forming communities is touched on. The document includes narrative descriptions for architectural, mechanical, electrical, and plumbing systems that would be appropriate for future science project planning. It is the intention that the master plan document be referenced at the start of any future COS projects to confirm direction and standards.

C. Program Participants

Executive Committee
Vikas Chandhoke, Dean College of Science
Maria Dworzecka, Sr. Associate Dean for Academic Affairs & Special Projects/ Observer
Renate Gilford, Associate Provost, Enrollment Planning and Administration
Thomas Calhoun, Vice President, Facilities Administration
Cathy Wolfe, Director, Campus Planning
Jim Miller, University Architect
Erik Backus, Project Manager, Facilities Administration

Steering Committee
Maria Dworzecka, Sr. Associate Dean for Academic Affairs & Special
Rick Diecchio, Associate Dean for Undergraduate Programs
Paul Schopf, Associate Dean for Research and Computing
Cyndy Beck, Associate Chair for Biology and Undergraduate Coordinator
John Schreifels, Associate Professor, Chemistry and BioChemistry
Justin Brown, Associate Director COS IT
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Kim Eby, Associate Provost, Faculty Development/ Center for Teaching Excellence Director
Cathy Wolfe, Director, Campus Planning
Jim Miller, University Architect
Erik Backus, Project Manager, Facilities Administration

Resources
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Chris Freas, Registrar's office
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Barry Klinger, Climate Dynamics
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Bob Ehrlich, Chair, Physics & Astronomy Department
Jim Willet, Chair, Molecular and Mcrobiology
Cyndy Beck, Associate Chair for Biology and Undergraduate Coordinator
Greg Foster, Chair, Chemistry and BioChemistry
Bob Jonas, Acting Chair, Environmental Sciences
Dimitri Papaconstantopoulus, Chair, Compuattaional & Data Sciences
Lance Liotta, Professor, Center for Applied Proteomics & Molecular Medicine
Chip Petricoin, Professor, Center for Applied Proteomics & Molecular Medicine
Charlie Bailey, Distinguished Professor, Executive Director, National Center for Biodefense and Infectious Diseases
M. Saleet Jafri, Chair, Bioinformatics & Computational Biology
Chris Jones, Chair, Environmental Science and Policy
Allan Falconer, former Chair, Geography
Jennifer Maloney, Department Manager, Geography
Anthony Stefanidis, Associate Professor, Earth Systems and Geoinformation Sciences
Harold Geller, Term Assistant Professor/ Director Observatory, Physics & Astronomy
Bob Weigel, Assistant Professor, Computational & Data Sciences
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Richard Kraus, Assistant Professor, Environmental Science and Policy
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Joel Schnur, Professor, Bio/ Molecular Science
Patty Snellings, Director, Communications COS
Hank Wolf, Director, COS Showcase
Nigel Waters, Professor, Geographic Information Science Center for Excellence-Director, Geography and GeoInformation Sciences Department
Hillary Cressey, Term Associate Professor/ Director, COS Undergrad Academic Programs, Environmental Science and Policy
Roslyn Cress, Financial/ Grant Analysis, Environmental Science and Policy
Justin Brown, Associate Director, IT COS
Sheryl Beach, Associate Professor/ Assoc. Chair/ Academic Programs Director Geography and GeoInformation Sciences Department
Bob Sachs, Professor, Mathematical Sciences/ Project Shepherd S+T 2 project
James Trefil, Robinson Professor, Physics/ Project Shepherd S+T 2 project
Larry Rockwood, Associate Professor, Environmental Science and Policy/ Project Shepherd S+T 2 project
Scott Joy, COS Showcase

D. Objectives

The COS Facilities Master Plan focuses on physical improvements that can support broader COS and University Strategic Plans and objectives. Perkins+Will examined the COS goals, as stated in June 2008, and the University's Strategic Goals for 2014, as issued on April 10, 2008. A series of workshops were held during the fall semester of 2008 with the guidance of Project Kaleidoscope (PKAL) around key topics including: 21st Century STEM (Science Technology, Engineering and Mathematics) Learning and Research Spaces; Technology Enhanced STEM learning and Research within and across campuses; Building Community.

The following primary goals were identified during the study:

Community

- Create a unified community of science that has a recognizable center.
- Provide structured and unstructured spaces for both quiet reflection and effective collaboration at any scale , indoors and outdoors.
- Express the vitality of the COS through physical and digital evidence of exciting teaching
- and research activities
- Provide an environment that enables highly effective collaboration for research and teaching.

Education

- Promote teaching methods that benefit all science learners (including majors and non majors)
- Provide flexible learning environments that serve a variety of teaching methods across disciplines
- Encourage interaction between faculty and students that strengthens learning.

Research

- Promote interdisciplinary research.
- Provide opportunities for undergraduate research.
- Provide flexible lab designs.
- Address the impact of "core labs" and/or core scientific activities on COS growth

Sustainability

- Provide learning and research buildings and sites that express the COS' commitment to the environment and that reflect the progressive activity of departments, including climate dynamics and environmental science and policy.
- Teach sustainability through the buildings and sites.
- Model sustainable principles that connect to and support science research and teaching

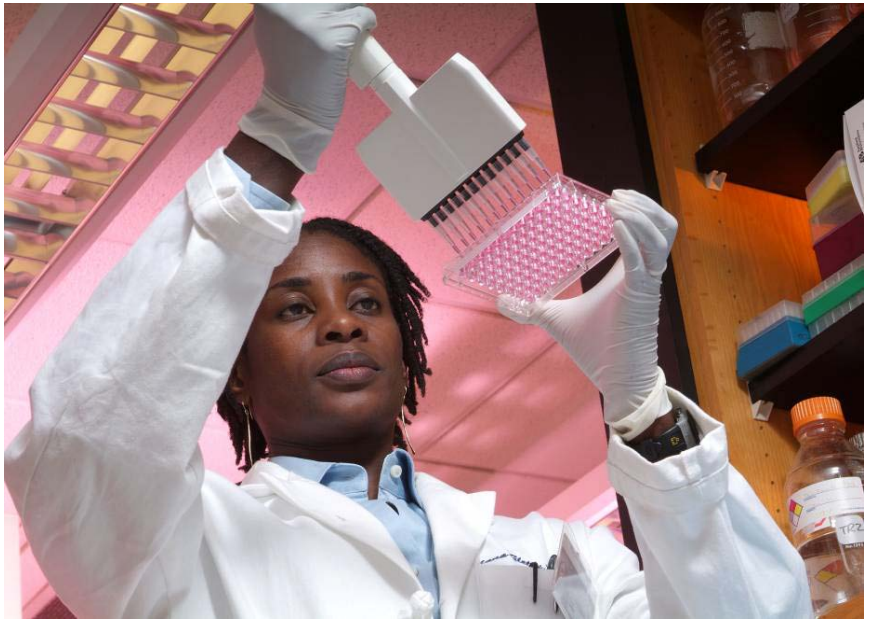
Technology

- Use technology to effectively bridge the distances between campuses and sites
- Use technology to more effectively engage the undergraduate student in learning.
- Use technology to increase collaboration.
- Leverage technology for collaboration and to maximize strengths at multiple sites.
- Create a science showcase to engage students, faculty and visitors.

E. Relationship to College and University Plans

George Mason University and the College of Science aspire to achieve greater distinction in the sciences and to improve its standing and attractiveness to potential students and faculty. Through an ongoing, comprehensive planning process, consultant studies, and strategic master planning several key issues have been documented which will contribute to this goal for the sciences:

- The COS aspires to increase the proportion of tenured faculty who are teaching. To support that goal additional office, teaching laboratory, and research laboratory space is needed.
- Proposed state of the art teaching laboratories and classrooms and opportunities for undergraduate research will help the COS be more competitive in attracting top students.
- Currently COS departments are scattered across the Fairfax campus in various buildings. The consolidation of the Fairfax COS departments into fewer buildings (Science & Technology 1, Science & Technology 2, David King Hall, and Research Building 1) will help form a more cohesive community of science.
- The most effective technology tools will be leveraged to create virtual communities and facilitate interaction across campuses.
- Sustainability is a strategic goal for the University and a focus of study for departments within the COS. New projects for the COS will strive to express sustainability and serve as examples for the region. Energy use reduction and water resource management are of particular interest to the University.



F. Budget and Schedule Strategies

As with all projects executed at George Mason University, projects planned in the COS Precinct Master Plan must be processed through the Commonwealth of Virginia Capital Planning cycle. This process enables the authorization of the expenditure of funds for projects outside of routine maintenance and minor renovation/construction. The projects envisioned in this Master Plan will fall into the capital program requirements.

Specific to funding of the Universities Capital Plan, 3 main sources of revenues exist and can be authorized for these expenditures: General Fund (GF) Authorizations from the Legislature, and Non-General Fund (NGF) Authorizations that take the form of Revenue Bond Secured Financing or Local Cash Reserve Allocations. General Fund Authorizations are legislatively authorized and approved issuances of revenue to execute the main missions of the University, namely Education and General use programs. The Commonwealth, for that reason can be reasonably expected to provide up to 100% GF support to academic buildings executed under this plan. In the Commonwealth, research buildings are funded at a maximum of 50% GF level. The College of Science will be required to provide adequate research grant and funded research dollars to enable the University to apply for NGF Bonded Financing or outright Cash Allocations to enable those projects to go forward.

Those projects that lean-forward outside of either of these models may be required to provide additional funding resources. As has been evidenced throughout the Commonwealth, these resources may be gained through Public Private Education Act agreements with various private organizations or federal government partners. The COS should leverage its continuing and developing relationships with industry and government to foster such opportunities to fully facilitate the capital program that this Master Plan articulates.

Based on current needs and the growth forecast, recommendations for potential projects have been developed. Below is a schedule for completion and order of magnitude budgets for planned and potential projects in the upcoming 10 year cycle.

Fairfax

2013- The Renovation and Expansion of Science and Technology 2 will improve the teaching facilities for the core sciences, provide a cohesive home for the COS, and help support the goal of making research more accessible to the undergraduate community. The expansion of 50,000 gsf will include mostly laboratory space. *(Bond funded- construction cost $43.33 million)*

2013- In order to facilitate evolving research needs and to promote a community of science it is recommended that the two floors (2nd and 3rd floors) of Research 1 occupied by COS be reconfigured with incubator space and shared communal areas. *(currently unfunded- est. cost- $2.7 million)*

2014 - The renovation of Science and Technology 1 is needed to replace outdated classrooms and laboratories for both research and teaching. The construction work will be a floor by floor phased renovation.
(currently unfunded- est. cost- $35.4 million)

2015- A portion of David King Hall will need to be renovated for COS lab and office space. David King hall currently houses approximately 17,400 net square feet of space that could be maintained for COS needs. *(currently unfunded- est. cost $10 million)*

2017 - If the included assessment of space needs is judged to be accurate by Mason representatives, planning should begin immediately to provide an additional 35,000 net square feet of space for science.
(Currently unfunded- est. cost $19.25 million)

Prince William

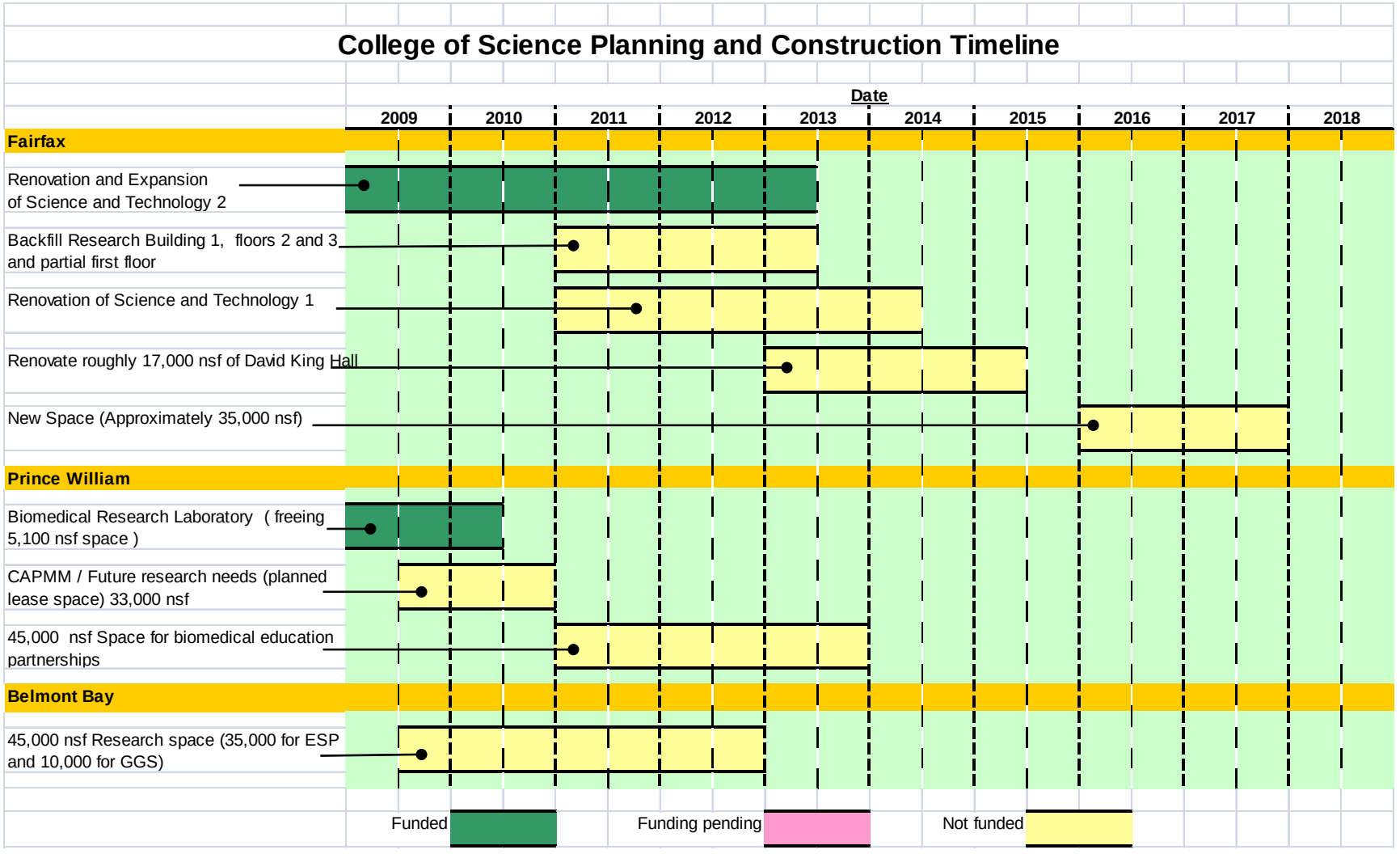
2010- The Biomedical Research Laboratory (BRL) space, BSL-3 lab, is nearing completion in roughly one year. The 53,000 gsf of space is mostly new program space and will not result in a large amount of vacancy in the existing buildings out at Prince William. *(funded through NIH/ NIAID- cost $33.22 million)*

2010- A new building or 33,000 nsf of lease space is recommended to accommodate existing CAPMM needs and to allow for research to be sustained at current growth levels. *(currently unfunded- est. new cost $24 million)*

2013- A new building or 45,000 nsf of lease space is recommended within 5 years to allow for biomedical education partnerships.
(currently unfunded- est. cost- $36 million)

Belmont Bay

2012- A permanent building is planned for Belmont Bay to facilitate research along the Potomac River and to serve as an educational outreach program for K-12 education. In addition, the GIS group has a need for training facilities at the same location. If this project is viable a majority, although not all, of the ESP department will be located at Belmont Bay. *(currently unfunded- est. cost $18 million)*


College of Science Planning and Construction Timeline
Date
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Fairfax
Renovation and Expansion of Science and Technology 2
Backfill Research Building 1, floors 2 and 3 and partial first floor
Renovation of Science and Technology 1
Renovate roughly 17,000 nsf of David King Hall
New Space (Approximately 35,000 nsf)
Prince William
Biomedical Research Laboratory (freeing 5,100 nsf space)
CAPMM / Future research needs (planned lease space) 33,000 nsf
45,000 nsf Space for biomedical education partnerships
Belmont Bay
45,000 nsf Research space (35,000 for ESP and 10,000 for GGS)
Funded
Funding pending
Not funded

Goals and Objectives

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Section 2 – Goals and Objectives

A. COS Organization
B. Goals and Objectives
C. Benchmarks

A. COS Organization

COS Background

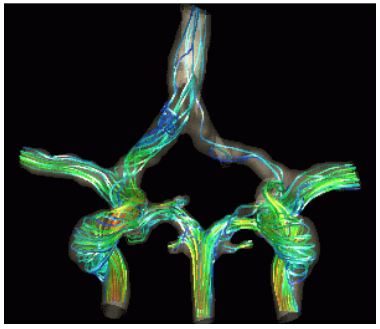
The recently formed College of Science, founded July 1, 2006, provides undergraduate and graduate education and research in physical, biological, mathematical, and computational sciences. The College of Science (COS) was formed from select departments from the former College of Arts and Sciences and incorporated the complete School of Computational Sciences. The COS is approaching 3 years of age, yet the departments that comprise the College are robust and vibrant entities. The college offers 42 degree and certificate programs and is the leader in external research funding for George Mason University. The college offers courses and/or has active research interests at the Fairfax Campus, Prince William Campus, the Loudoun site, and soon at the Belmont Bay site.

The college is comprised of nine departments. The nine departments and their locations (FX- Fairfax, BB- Belmont Bay, and PW- Prince William) are:

1. Atmospheric, Oceanic, and Earth Sciences (AOES) – FX (formerly Climate Dynamics and Geology). Some faculty in this department are located in MD and need to move to the FX campus.
2. Geography and GeoInformation Sciences (GGS) – FX/BB/PW (formerly ESGS and Geography)
3. Chemistry and Biochemistry- FX/PW/BB
4. Computational and Data Sciences- FX
5. Bioinformatics and Computational Biology- PW
6. Biology, also referred to as Molecular and Micro Biology at PW (MMB)- FX/PW
7. Physics and Astronomy- FX
8. Mathematical Sciences – FX
9. Environmental Science and Policy (ESP) – FX/BB/PW

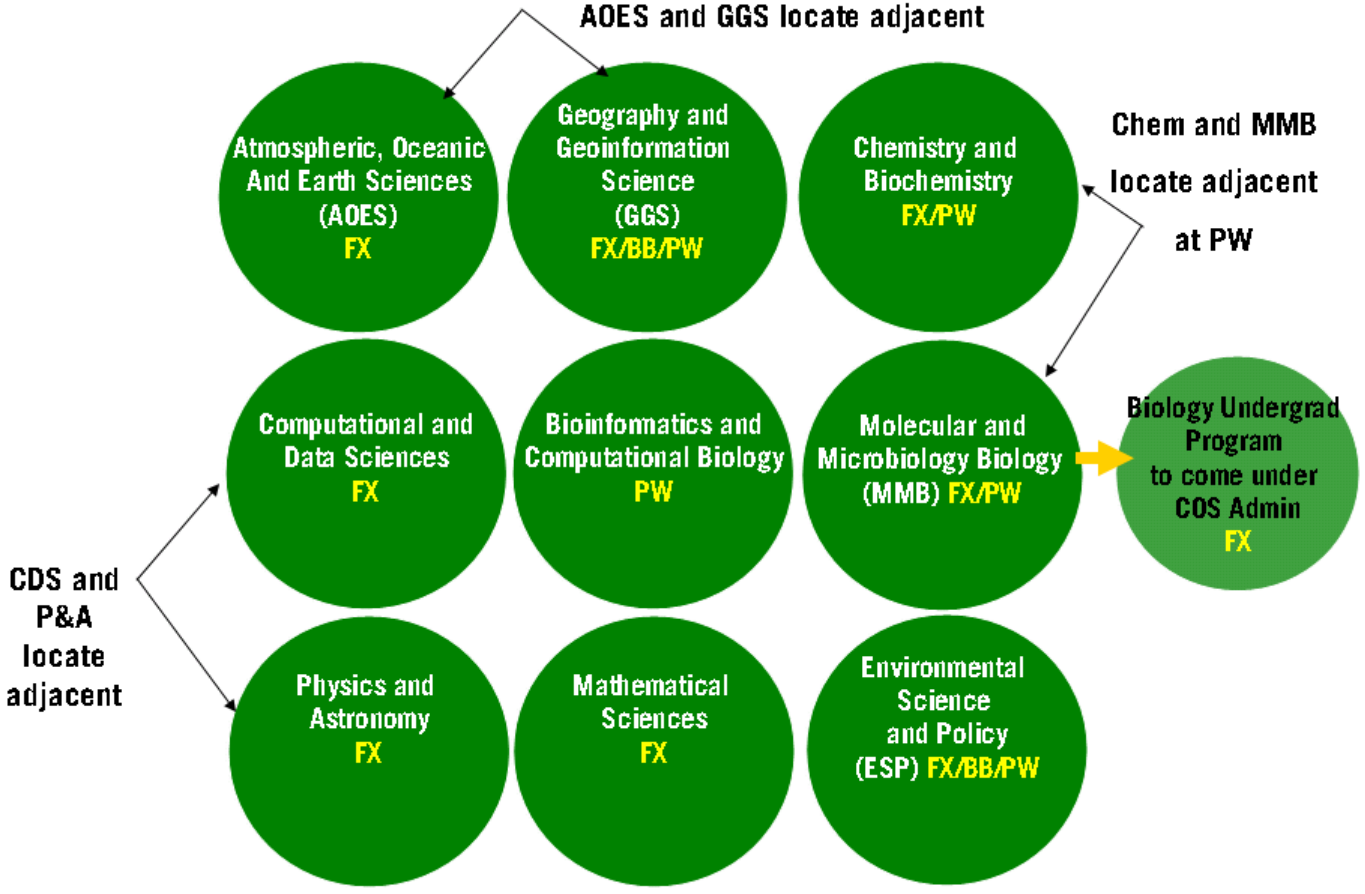
Many undergraduate departments and some research units are fragmented across multiple sites. On the Fairfax campus, many departments are fragmented across multiple buildings. New construction and renovation projects will draw academic departments and research units together to build synergies, eliminating fragmentation. On the Fairfax campus, the COS departments and research units will eventually be concentrated in David King Hall, Research 1, Science and Technology 1 and 2. At the Prince William campus, which the COS currently occupies portions of three buildings, a new building is recommended to allow for biomedical education partnerships. The projects proposed in this report are aimed at creating a collaborative scientific community.

Many of the departments have associated research centers and labs. Centers are grant driven and allow more administrative control. The larger research units are associated with the life sciences, MMB in particular, and are mostly located at the PW campus. Located on the PW campus the Biomedical Research Laboratory, with BSL-3 lab space, is nearing completion and will be a dynamic part of the COS research community. The ESP department and the PEREC research center are pursuing opportunities for research along the Potomac River at Belmont Bay. There are multiple research centers and labs associated with the GGS department and they can be found at Fairfax, PW, and likely in the future at Belmont Bay. Given the history of Mason's entrepreneurial spirit and the many opportunities for research exploration that arise in this region, there is a strong need and desire for incubator type research space that can serve various and changing needs. At Fairfax, it is the COS' intent to concentrate research centers and computational labs, in the Research I building. While some of the space in Research I will be designed for specific established research centers much of the fit out will be flexible in character to allow for that incubator type model of space.

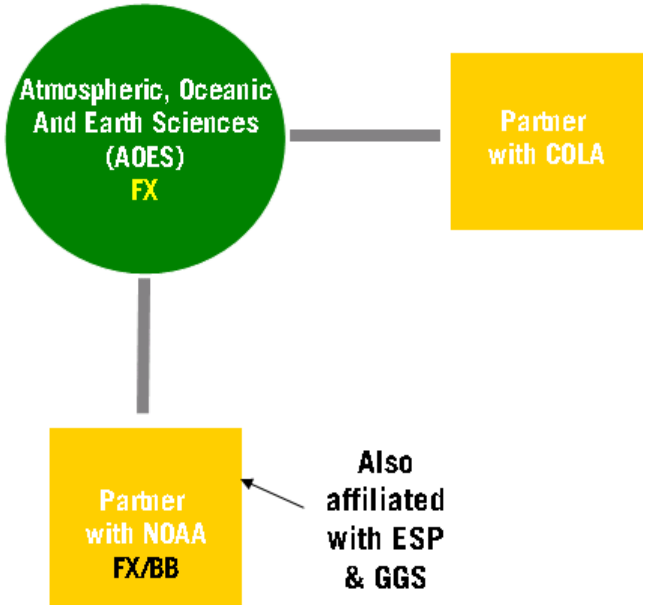


Departments in the College of Science

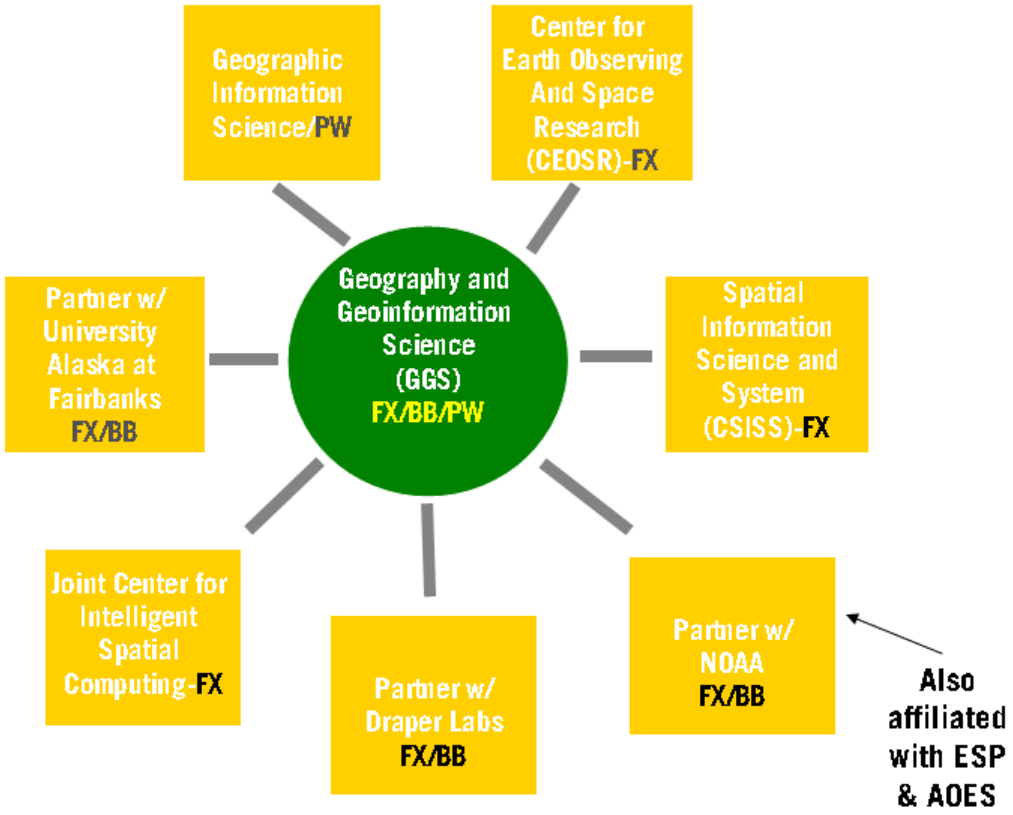
The following graphic diagrams of the COS organization illustrate the relationship of the research units to each department and their primary location. This first diagram represents the nine COS academic departments.



Research Centers and Labs affiliated with AOES



Research Centers and Labs affiliated with GGS



COS Organization

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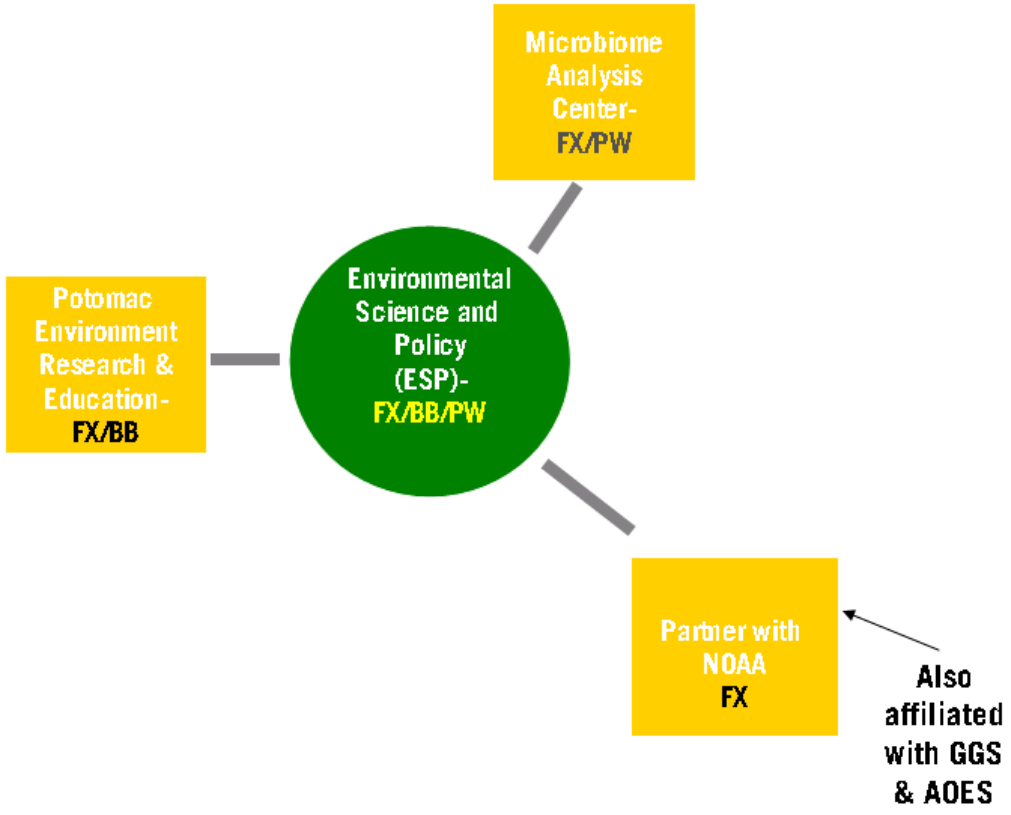
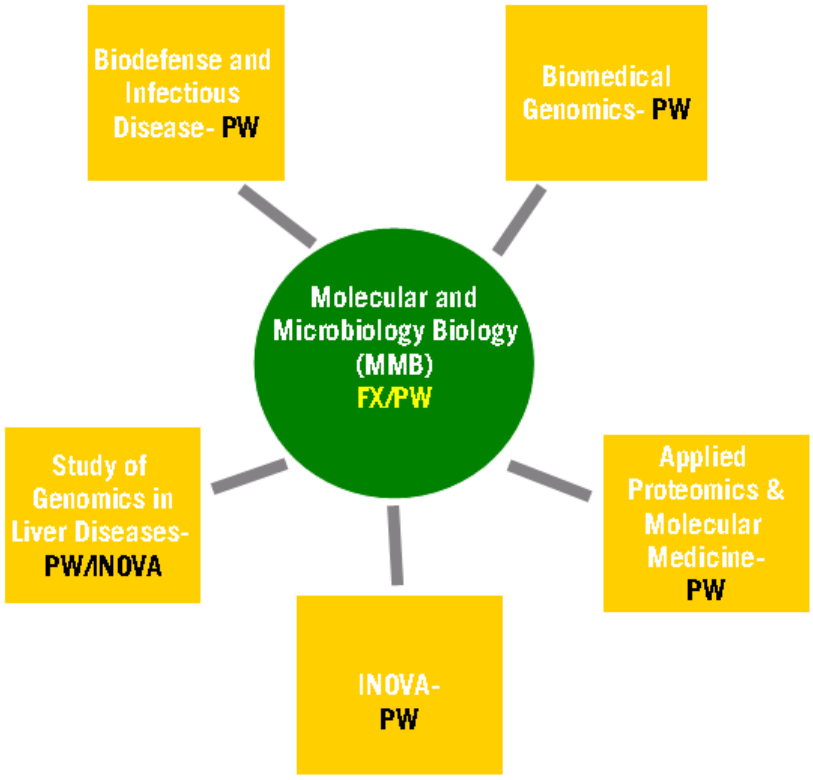
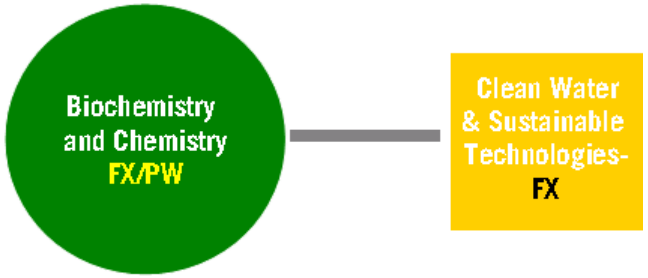
Research Centers and Labs affiliated with ESP



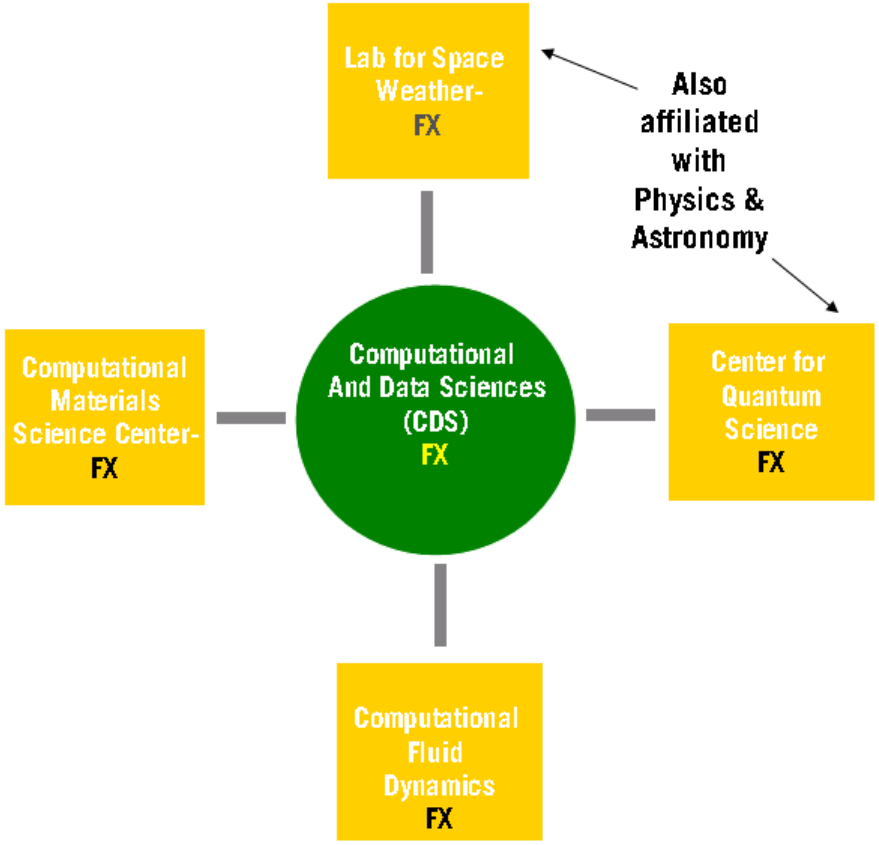
Research Centers and Labs affiliated with MMB



Research Centers and Labs affiliated with Biochemistry and Chemistry



Research Centers and Labs affiliated with CDS



COS Organization

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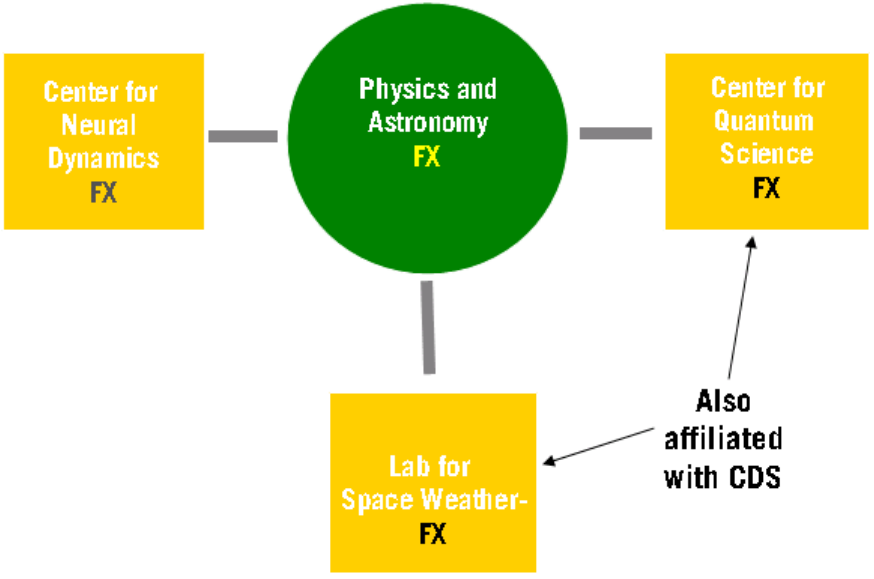
Research Centers and Labs affiliated with Physics and Astronomy



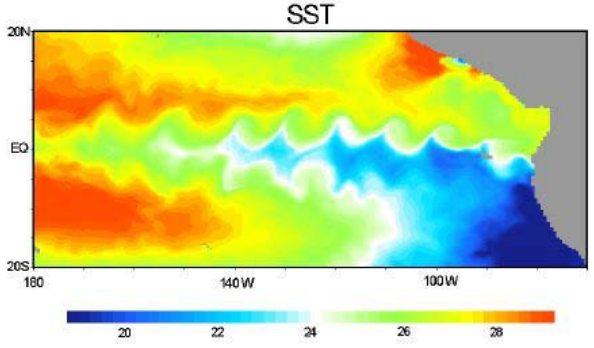
Research Centers not affiliated with a department

B. Goals and Objectives

During the course of the master plan study the following project objectives, some are cultural and some have more direct facility implications, were identified:

Community

- Effectively connect research units using seamless conferencing technologies.
- Provide space and infrastructure to support food, refreshments and events that bring people together for collaboration, learning and discovery.
- Anticipate opportunities for unexpected partnerships, leveraging multiple campuses and buildings to elevate programs through smart alliances. Provide high quality "touchdown" spaces for visits by partners and faculty that work at more than one site. Provide space for visiting faculty to react to rapidly developing research programs.
- Carefully plan the pathways (indoor and outdoor) through physical elements of the community of science to enable peer to peer learning, mentoring and collaboration between research teams. Use a wide variety of physical and digital displays to celebrate Mason's undergraduate science programs and to celebrate research units.
- Provide appropriate space for graduate students. Graduate teaching assistants will have shared space to work and to meet with students. Graduate research assistants will have dedicated workstations in a shared room with teaming/conference tables.
- Provide spaces that help undergraduates feel that they "belong" in the COS. Provide a mix of open flexible work/ teaming areas and quiet study space.



Research

- Support interdisciplinary research with seed grants. In addition to the research centers, other developing interdisciplinary models include initiatives in climate research & environmental science and policy.
- Plan for a growth rate of 10% per year for research funding.
- Research will become more accessible to undergraduate students to strengthen recruitment and create a more well-rounded opportunity for science majors to be involved in active research with leading scientists.
- The COS leadership desires to increase the percentage of tenured and tenure track faculty in many disciplines. The percentage of faculty doing academic research will increase in proportion as the number of tenure faculty increases.
- The COS welcomes opportunities to explore new areas of interest and development. At the same time, the COS will continue to develop and enhance current areas of research strength including but not limited to:
  - Biomedical (life sciences) Research (Prince William Campus)
  - Conservation/Sustainability (Belmont Bay, Prince William and Fairfax)
  - Climate Change (Fairfax)
  - Geoinformation/ Geointelligence (Fairfax and Belmont Bay)
  - Quantum Science (Fairfax)
- Spaces should be a balance of open and secure labs with shared collaboration labs and shared equipment spaces. Transparency will enable connections between research teams.
- Research labs must be agile, to adapt to unexpected opportunities, planned and unplanned growth and changes in types of research.
- Continuously evaluate the need for supporting traditional and non-traditional "core labs" at all major sites. Traditional core labs include imaging, animal research, bio-containment facilities, supercomputing , etc.. Non- traditional core labs include unique research collaborations with outside agencies , conference or seminar facilities, or highly effective research teams that create dramatic growth. In order to meet the future needs of the science units on each campus, a strategy for procurement, space and phasing should consider shared "core resources" for each campus that will promote desired growth and increase effectiveness.

Learning

- Provide layers of space with access to science learning so that individual students and student teams feel that they belong in the College of Science and are supported as they pursue their passion for science. Provide secure access to labs outside of typical course hours for individual study, and for continuing work on team projects.
- Create a curriculum for non-major required courses that recognizes the different learning goals between students with careers in the sciences and those who will be successful in other fields.
- Build a base of students who seek careers in the sciences, build the academic reputation of the COS to recruit sophisticated students, creating a committed population of graduate research assistants and graduate teaching assistants.
- Promote unique earning and undergraduate research opportunities by providing grants, space and technologies that connect the best teachers, researchers and students in ways that accelerate growth and learning.
- Build a community that seeks to share space across disciplines in ways that benefit all parties.
- Provide flexible learning spaces that can accommodate a variety of teaching methods and impromptu learning events. Flexible labs, classrooms, technologies and brainstorming spaces must enable the widest possible range of pedagogies and beneficial learning relationships.
- Encourage greater interaction between faculty and students by providing safe and attractive places for students to connect with faculty for learning.
- Provide opportunities for food, refreshments, and spaces for special events to enrich the community at multiple levels and strengthen student engagement.
- Provide flexible lab designs. Many undergraduate labs will serve more than one discipline or sub discipline, not just for ease of scheduling, but to cross pollinate the minds of the students. The “toys” of multiple disciplines in one room will create a bridge to dissolve disciplinary silos.
- Promote the concept of the “Sandbox Lab” which offers greater flexibility in systems and furniture to encourage a wide range of educational and undergraduate research events to showcase science education. Student/ faculty teams could compete with the best ideas earning the use of the Sandbox Lab for a semester.

Goals and Objectives

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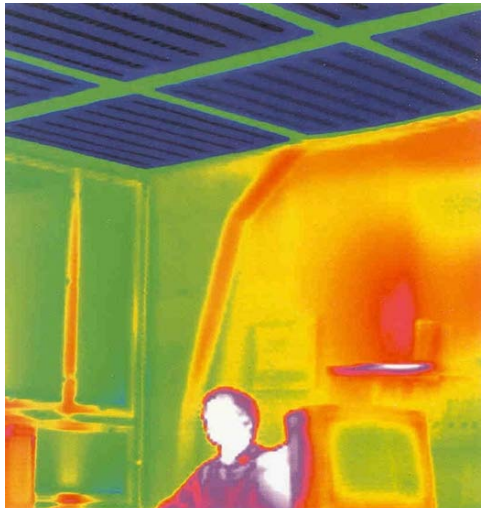
Sustainability

- The COS will become a campus leader in promoting the understanding and implementation of appropriate sustainable building and site strategies.
- All teaching units of the COS will strive to build a curriculum which incorporates sustainable science strategies.
- The COS will publicize environmental/ sustainable research initiatives - expressing Mason's leadership in promoting the health of future generations.
- Science buildings and sites will exhibit their impact on the planet and enable learning about sustainable systems for majors and non-majors.
- Building form, orientation, materials, systems will teach sustainability, through intelligent energy and water resources use strategies.

Technology

- Use technology to bridge the physical distances presented by the multi-campus organization. The challenges created by traffic, time and distance for many Mason students and faculty must be overcome by a mix of collaboration technologies, creative scheduling and new models of teaching.
- Use technology to better engage the undergraduate student in learning. Recognize that most members of the student population are "digital natives," faculty, space and technologies must engage the students where they are- digitally- and connect in ways that are seamless and intuitive.
- Seamless video conferencing, collaboration via PDA's and tablet PC's (and future forms of digital communication) must be integrated into learning and discovery.
- Consider the Science Showcase as a continuing public science event to engage students and faculty in planning. Use this space to explore a variety of furniture and technologies for use by the COS. Provide regularly scheduled gatherings and events to showcase all facets of the COS community.
- Modest point –of- use server pace may be required for individual research teams, but the current model is to utilize central University supercomputing resources.



C. Institutional Benchmarking

Research Space and Cost Benchmarks

Research universities typically establish square foot benchmarks for research for planning consistency and to measure the possible number of Principal Investigators in a variety of planning models.

For wet labs or equipment heavy research labs a range of 1200 to 1800 net square feet per PI team is normal. For dry research (computational) 620 to 930 net square feet per PI team is normal. This figure can be adjusted based on institutional goals and special funding opportunities. Often high performing research teams command more space that the norm because of the positive impact that they have on the health of an institution.

For general planning purposes in the Washington, DC region in 2008/09 the cost of space in a major new wet research building might range from $475-$675 per square foot in a new building for base construction cost (building and site elements excluding movable furniture and equipment) . Add 30% for soft costs (some equipment and furniture, design, and planning) to calculate at the total project costs. Animal research, imaging cores, and labs requiring higher bio- containment levels may cost more. Simple biomedical labs would be on the lower end of the scale with Chemistry labs on the upper end of the scale. Tenant fit-up costs necessary to provide research space in an empty speculative building shell, would vary based on the type of research and the condition of the existing building.

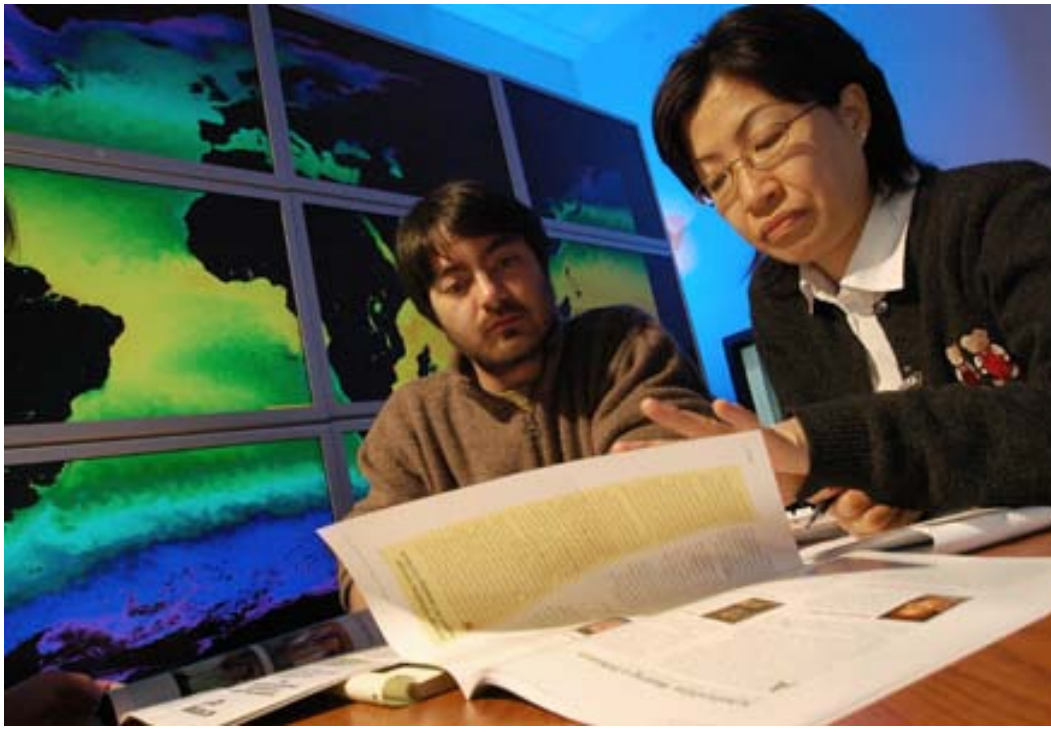
To balance the space needed for academic faculty research and promote undergraduate research on the Fairfax Campus the COS planning team has developed a unique space model. For each wet bench discipline -one 930 square foot space will be provided for grant funded research that will include student research. For tenured or tenure track faculty research space will be provided in shared research labs of 620 to 930 square feet, with the standard allocation of 310 square feet for each faculty member. This model will be refined over time and will not be fully realized until future buildings are funded and built.

Academic Space and Cost Benchmarks

To comply with the State Council of Higher Education for Virginia (SCHEV) utilization standards , teaching labs must be used for scheduled course time 24 hours per week and classrooms must be used for scheduled for course time 40 hours per week.

National studies of the amount of space allocated for space in undergraduate science buildings show an average range of 2200 to 2600 square feet of space per full time faculty (tenure track) per discipline . This average measure is for fully developed diverse programs with a large number of science majors and students preparing for further studies in science and or health professions. Mason requires a one year equivalent science track for students in all majors, which creates the potential for different/ unique lab teaching models and space types for majors and non- majors. As Mason's COS undergraduate programs include an increased percentage of majors in science courses and the percentage of tenure track faculty increases, the space needs will more closely match the national average. State guidelines for amount of space allowed per student and utilization rates force institutions such as Mason to create highly innovative models to deliver education at a high level while meeting state requirements.

Construction costs for undergraduate science lab building space in the Washington DC area in 2008- 2009 would range from $400 to $600 per square foot in a significant new building. Add 30% for soft costs to reach the total project costs. Renovation costs would vary based on site conditions and lab type.



Section 3 – Background and Forecast Data

A. Background
B. Forecast

A. Background

Assets- The growth of the college reflects the many assets; such as location, prominent research, the entrepreneurial nature, diversity of students, and the collaborative nature of faculty.

Mason's location in the suburbs of Washington, D.C. in one of the most affluent and well educated counties in the country allows the college to attract well qualified students and faculty. The location also places the school in proximity to government agencies such as NIH, NSF, DOD, and the FBI and a strong private sector to partner with for research. These same government agencies and private sector firms offer recruitment potential for Mason alumni.

The diverse student population gives the University and the college a global perspective and the potential to seek opportunities across borders.

The college has on going research in many exciting fields. The size and nimble organization of the college allows it to explore a wide range of research opportunities that arise. Unlike many colleges in large university systems, Mason is not encumbered by a burdensome hierarchy of boards and committees to seek approvals from before pursuing research endeavors.

Challenges- Impediments for the college include:

- Departments are split on campuses and across sites. There is a need to create an identifiable community of science.
- The existing space at the Fairfax site is deficient in meeting existing and predicted growth in both quantity and quality needs. Faculty offices are in some cases deficient in size and quantity for existing needs. Graduate student work space is needed. Refer to the Fairfax academic and research center programs, located in Section 5, for further details.
- There is a lack of sufficient levels of laboratory space for both teaching and research especially on the Fairfax and Prince William sites. For more detailed information reference the utilization charts in Section 5.
- The high cost of living in the Northern Virginia region makes it difficult to competitively attract graduate students. There is a need to address graduate housing on both Fairfax and Prince William campuses.
- Due to the constraints in state funding it is difficult to fund renovations and new construction rapidly to accommodate new growth or changing needs.

Opportunities - Communication and problem based learning and research were identified as leadership opportunities for the college to focus on in the coming years.

Technology will help with cross campus communication –facile, movable, 24/7, accessible and their impact on space and design needs. With a reorganized facilities plan the opportunity exists for increased interaction between faculty and students. The opportunity for increased Interdisciplinary research is also present.

Under Dean Vikas Chandhoke's direction the college will explore the possibilities of problem based learning and research without distinct boundaries. In today's climate, funding agencies are looking for interdisciplinary teams for research. There is a need to facilitate interdisciplinary interaction regardless of departments. This interaction can occur through enhanced communication capabilities and through flexible space configurations that allow for the changing learning and research structures. Facilities and resources should enhance interdisciplinary research and learning.

B. Forecast

George Mason University has projected the following levels of growth based on historical data and predicted opportunities:

Enrollment Growth Projection = **3% per year**

Faculty/ Staff Projection = **3% per year**

Sponsored Research Growth Projection = **10% per year**

Section 4 – Current Physical Assets and Projected Growth

A. Overview of Distributed Campus Strategy
B. Fairfax
C. Prince William
D. Loudoun
E. Arlington
F. Belmont Bay
G. Front Royal
H. Ras Al Khaimah

A. Overview of Distributed Campus Strategy

While Fairfax is the largest campus for Mason, there are multiple campuses and sites spread across the Northern Virginia region. The distributed campuses and sites are designed to bring innovation and technology opportunities across the Northern Virginia region. Of all the colleges at Mason, the COS is the most engaged in the distributed campus concept. The distributed campuses and sites of the Mason system have provided great opportunities to focus research, to form partnerships with the private sector and government agencies, and to serve a broader population and diversity of student. However the strategy creates challenges both in terms of facility and human impacts. Collaborative technologies and community creation will will help knit the COS together. In the future, Mason will continue with the distributed campus model to serve the Northern Virginia citizens and support the community.

A separate university study is focusing on the impact and opportunities of the regional sites. Conclusions of that study have not been finalized.

The image to the right, developed by the Department of Geography and Geoinformation Sciences, illustrates how the Fairfax, Loudoun, Prince William, Arlington, and Belmont Bay campuses and sites provide coverage and access to the working population and research partners in the Northern Virginia region.

B. Fairfax

Fairfax is the largest campus for Mason and for the COS. Undergraduate courses are the primary focus of the COS at the Fairfax campus. Currently the college and, even, departments are split among various buildings on campus. Many departments have no identifiable main office or department "front door". The college occupies space in various buildings throughout the campus; including Science and Technology I, Research I, Innovation, West, Krug, King, Robinson A and B, with classes held in many more buildings. Refer to the Fairfax site graphic on the next page. Space constraints for offices, labs, and classrooms are a major issue due to the growth the Fairfax campus has experienced and is predicted to have in the future.

Space constraints should ease some what with the upcoming Science and Technology II renovation and 50,000 sf addition. The future plans for the COS on the Fairfax campus are to occupy Science and Technology I and II with the addition, David King Hall and the Research I Building. Locating the college in these closely located buildings will help establish a stronger sense of community and aid in interdisciplinary interactions.

Some of the highlights of the proposed space strategy for the Fairfax campus include:

- Science and Technology I and II plus the new addition will become the heart of the COS community with a focus on undergraduate teaching.
- The Dean's office will be relocated to Science and Technology II.
- Wet labs will be at the addition to Science and Technology II and some in David King Hall.
- No college office or labs will be located in Krug or Robinson.
- COS occupants of Research I will be primarily research-focused (non-wet lab).

Physical Assets

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6. West Building:
Level B-
Physics & Astronomy Department.

7. Thompson Hall:
COS Classes occur in the Building.
See color plans for more detail.

8. East Building:
COS Classes occur in the Building.
See color plans for more detail.

9. Lecture Hall:
COS Classes occur in the Building.
See color plans for more detail.

10. George W. Johnson Center:
Level 3-
Mathematical Sciences Department.
(Offices and 1 Lecture Lab)

11. David King Hall:
Level 1-
Environmental Sci & Policy Department.
Molecular & Microbiology Department.
Level 2:
Environmental Sci & Policy Department.
Level 3:
Environmental Sci & Policy Department.
Molecular & Microbiology Department.

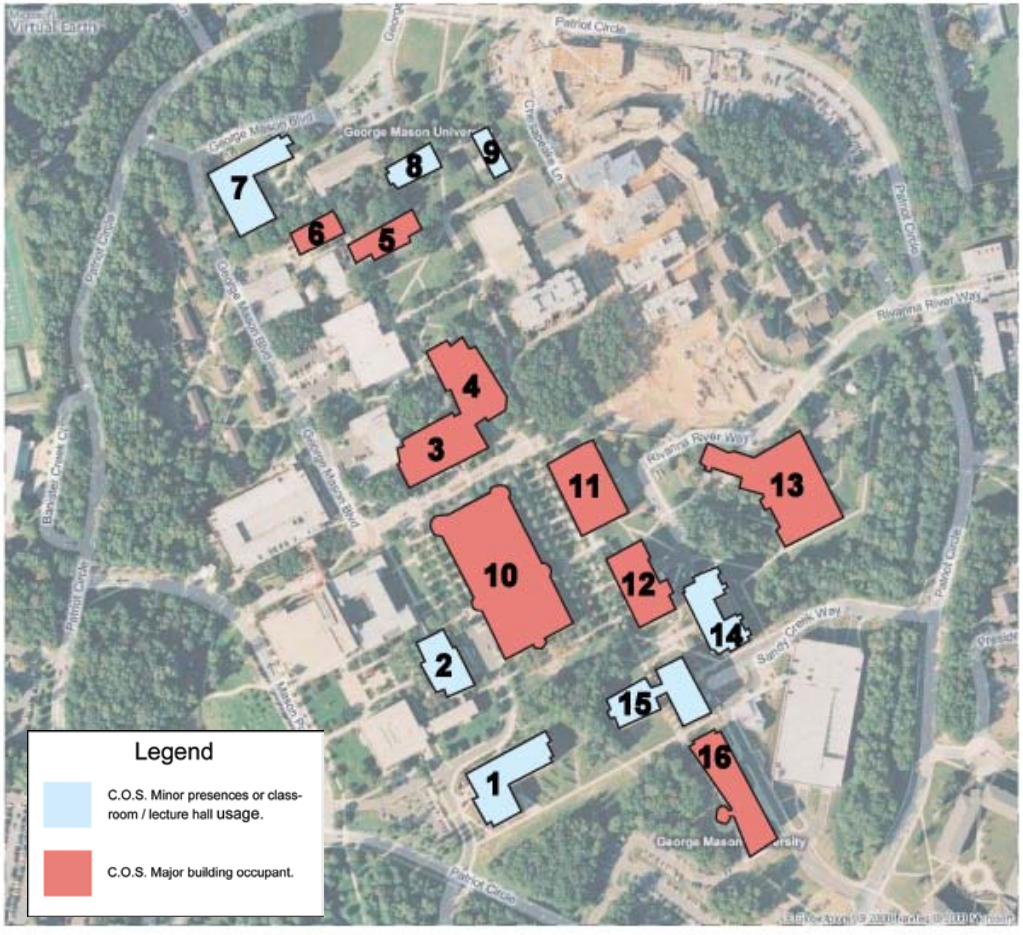
5. Krug Hall:
Level B-
Environmental Sci & Policy Department.

4. Robinson Hall A:
Level 1-
Environmental Sci & Policy Department.
Geography Department.
Level 4-
Environmental Sci & Policy Department.
Molecular & Microbiology Department.

3. Robinson Hall B:
Level 3-
Environmental Sci & Policy Department.
Molecular & Microbiology Department.
Level 4-
Environmental Sci & Policy Department.
Geography Department.

2. Fine Arts Building:
COS Classes occur in the Building.
See color plans for more detail.

1. Innovation Hall:
Level 3-
Physics & Astronomy Department.



12. Science & Technology I
Level B-
Chemistry Department
Environmental Sci & Policy Department.
Level 1-
Computational & Data Sciences.
COS Academic Administration.
Level 2-
Environmental Sci & Policy Department.
Molecular & Microbiology Department.
Mathematical Sciences Department.
Physics & Astronomy Department.
Level 3-
Chemistry Department.
Physics & Astronomy Department.
Level 4:
Chemistry Department.

13. Student Union II
Level 2-
Chemistry Department.

14. Science & Technology II
Level B-
Environmental Sci & Policy Department.

15. Enterprise Hall
COS Classes occur in the Building.
See color plans for more detail.

16. Research I
Level 1-
COS Dean's Academic Activity.
Level 2-
Ctr for Earth Observation (CEOSR).
Center for Quantum Studies.
Computational & Data Sciences.
COS Academic Administration.
COS Dean's Academic Activity.
Earth Systems (ESGS).
Level 3-
Ctr for Earth Observation (CEOSR).
Climate Dynamics.
Computational & Data Sciences.
COS Academic Administration.
Earth Systems (ESGS).
Level 6-
Physics & Astronomy Department.

George Mason University - Fairfax Campus - Site Map w/ Departments Per Level.

C. Prince William

The Prince William Campus (PWC) is focused on life science research. The PWC was developed with a tri-party agreement between Mason, the city of Manassas, and Prince William County. The PWC has two main components research and serving the local residents with the recreation center and performance center that is under construction. A town center with housing and retail is planned for adjacent land in possibly 7-8 years. This may be a resolution to the housing concerns for graduate research assistants. Commuting between the PWC and Fairfax continues to be a struggle due to traffic congestion on Route 66. The proposed employment of easily accessible and facile technology tools to enable communication is part of a strategy to bridge the distance gap between the campuses.

The COS occupies three buildings on the PWC site; Bull Run Hall, Occoquan Building, and Discovery Hall. Research space is limited on the site.

The rapidly growing Center for Applied Proteomics & Molecular Medicine (CAPMM) had been exploring the possibility of leasing space adjacent to the campus. The leased space would also have accommodated other growth needs for additional COS research groups. Due to the current economic climate the original developer, from which the space was to be leased, has decided not to pursue the project at this time. Therefore there is a need to accommodate research and in particular CAPMM's growth in new space.

A 53,000 square foot construction project is currently underway for a Regional Bio-Containment Laboratory (RBL) - BSL 3. The project has been funded by a $28.5 million grant from NIH. It is the largest of many of the facilities being built across the country through the NIH grant system.

Even with the Regional Bio-Containment Laboratory moving out of the existing buildings there will be a minimal amount of space available for CAPMM and the projected 10% research growth per year. The possibilities for space that should be explored are leased space in another location, constructing a Mason owned building on the PWC, and the least appealing alternative providing temporary modular space.

Physical Assets

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3. Discovery Hall:

Level 1-
Life Sciences Department.
Geography Department.
Molecular & Microbiology Department.

Level 2-
Life Sciences Department.
Molecular & Microbiology Department.

Level 3-
Life Sciences Department.
Molecular & Microbiology Department.

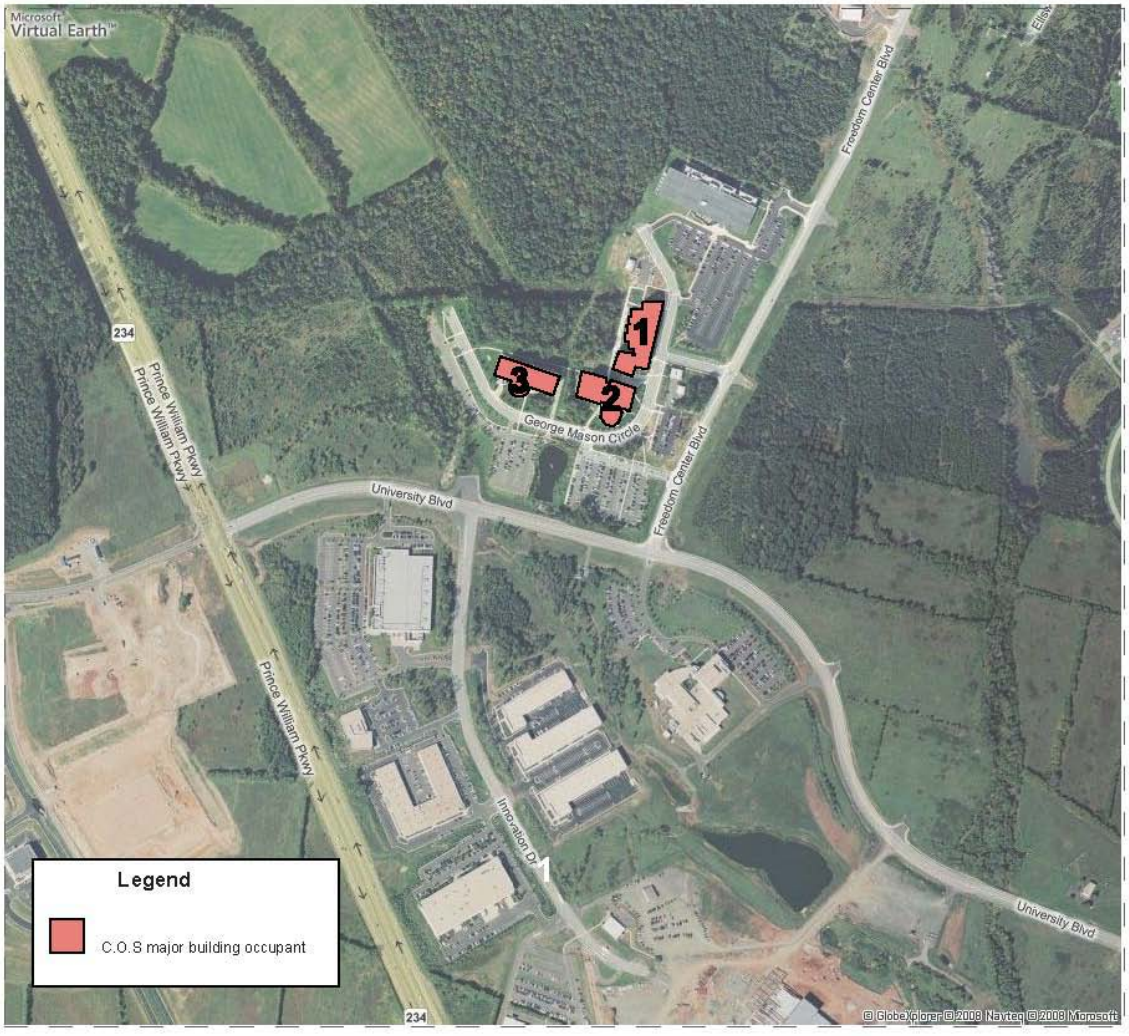
2. Occoquan Hall:

Level 3-
Bioinformatics Department.

Level 4-
Bioinformatics Department.
Environmental Sci & Policy Department.
Life Sciences Department.
Molecular & Microbiology Department.

1. Bull Run Hall:

Level 3-
Chemistry & Life Sciences Departments.



George Mason University - Prince William Campus - Site Map w/ Departments Per Level.

D. Loudoun

Mason has one building in Loudoun County located off Route 7 in Sterling. The Loudoun campus was established to serve the growing population of Loudoun County. Among other university offerings, the COS has some GIS courses and some teacher education programs offered at the Loudoun campus.

E. Arlington

The Arlington campus at Virginia Square is the home of Mason's law school. Some graduate and continuing education programs, although currently not within the COS, are offered at the Arlington campus. The Arlington campus' location, near a metro station and closer to downtown DC, makes it ideal for the working adult student who can not commute easily from a job in the urban core out to the suburban campuses for an evening class. Currently, the COS does not offer any courses at the Arlington campus.

George Mason University - Loudoun Campus - Site Map.

F. Belmont Bay

The Belmont Bay project began as collaboration with the Science Museum of Virginia and was to be sited on 4.5 acres of donated land in the Belmont Bay development along the Potomac River. The project was to be a science center for visitors to learn about science and was to have a component of actual ongoing research. The original proposed project included an IMAX theatre and museum exhibits. Mason was primarily involved in the research component of the project. In the Fall of 2008, the Science Museum of Virginia (SMV) decided to end their involvement with the project. The Virginia General Assembly is considering allocating some funds for Mason's research component to proceed. The funding issue has not been completely resolved at the issuance of this report.

The proposed Belmont Bay project is comprised of roughly 45,000 nsf. This includes roughly 35,000 nsf of space for the Potomac Environment and Research Education Center (PEREC), a research center affiliated with the Environmental Science and Policy department and includes growth space. In addition, approximately 10,000 nsf is proposed for the Geography and GeoInformation Sciences department.

The PEREC space would have laboratory space and easy access for field experiments and study of the Potomac River and watershed area. The Geography and Geoinformation Science space will for the most part serve as a training facility for certificate programs serving the defense community. The Belmont Bay site is near the Quantico and Fort Belvoir military bases. The Geography and Geoinformation Science group will require specialized computational lab space.

There is a possibility that a temporary modular facility will be located on the site in the near term if funds become available. Funding will need to be resolved before a firm schedule can be established for the permanent building. If the funding can not be resolved, the Environmental Science and Policy department will need additional space to keep programs on the Fairfax campus which will likely be in David King Hall.

G. Front Royal

A complex of buildings is planned at Front Royal in conjunction with the Smithsonian. ESP conservation will be at the CRC/ Front Royal location. Mason has an agreement to build dorms and provide food service at CRC/ Front Royal. The Smithsonian will build the research labs.

George Mason University - Belmont Bay - Site Map .

Program

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Section 5 – Program

A. Summary of Program Requirements by Campus
B. Fairfax Academic Program
C. Fairfax Utilization Analysis
D. Fairfax Research Centers Program
E. Prince William Campus Program
F. Belmont Bay Campus Program

A. Summary of Program Requirements by Campus

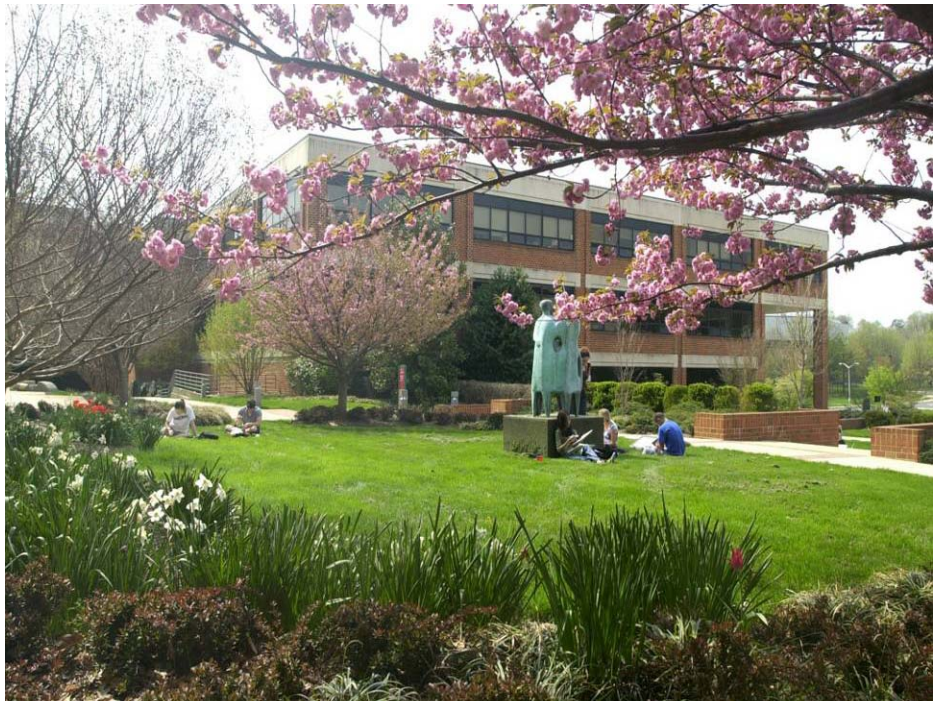
Tabular master plan programs are provided for the Fairfax academic departments, Fairfax research centers, Prince William, and Belmont Bay sites. These three Mason locations currently have or are proposed to have a significant presence of some parts of the COS. The COS has limited to no physical assets at the Loudoun, Arlington, and Front Royal sites and therefore a discussion of the program requirements for these sites is not germane to this study. The master plan programs included in this report are not project specific but rather capture the overall space needs of the particular COS site and or category. The distribution schedules for the Fairfax campus are a proposed model that are based on current conditions and recommendations. This section also includes an analysis of the peak utilization of COS laboratories and classrooms on the Fairfax campus.

Critical issues for the planning of new facilities for the COS are:

- Provide "Learning Communities" as a central theme for all academic enterprises. This can be loosely translated as providing physical places for faculty and students to exchange ideas. "Learning Communities" can also be established through technology linkages and communication tools.
- Problem-based learning models should be incorporated into the planning. Section 6, Space and Systems Prototypes, provides graphic examples of how standard sized spaces can be configured for a variety of learning models.
- Distinct lab models should be developed for majors and non-majors. Decisions will be made, by COS representatives, about the amount of virtual labs and wet labs for non majors. Specialized labs for majors will be provided including high end molecular labs and biotech labs.
- Key spaces must be physically and culturally transparent with easy access for the entire university community. Physical transparency, in key locations, will help form visual connections.
- A multi-disciplinary virtual learning lab would be an attraction for students and a gem for the COS.

One long term goal is to increase the number of tenured and tenure track faculty teaching undergraduate students. This will result in an increase in the necessary space for research. A COS standard allocation model for research academic laboratory space was established as:

- One active grant funded PI @ 930 nsf (i.e. wet/ equipment labs) or 620 nsf (i.e. dry computational labs) depending on the discipline.
- 3 faculty per 930 nsf minimum for normal tenured / tenure-track faculty research lab space.



B. Fairfax Academic Program

The following are proposed projects for the COS at the Fairfax campus:

- The renovation and 50,000 gsf addition to Science and Technology II (S+T 2).
- The renovation of Science and Technology I (S+T 1).
- The reconfiguration of two floors (2nd and 3rd floors) and a small portion of the first floor of Research 1.
- The renovation of a portion of David King Hall.

The creation of the addition and the occupation of S+T 2 will combined with S+T 1, some space in David King Hall, and a portion of Research I begin to form a cohesive precinct of occupation for the COS on the Fairfax campus.

The renovation and expansion of S+T 2 is a funded project that is currently, at the time of this report's issuance, in design. It is expected that the majority of space in the 50,000 gsf expansion building will be undergraduate teaching laboratory space. Connections to both of the existing buildings (S&T 1 and 2) are critical to the creation of a "learning community" and a the formation of a nucleus for the COS.

The addition will expand the undergraduate sciences and provide a showcase space for the sciences. The new building and renovation of S+T 2 will include tour routes for k-12 students, potential academic and government/ private sector funding partners. Transparency and views of science should be integrated at appropriate locations to engage building users and visitors. Some of the departments have interesting collections that can be placed on display. In addition, art expressing the sciences should be integrated into the building in order to enliven the user and visitor's experience through the building.

The planning concept for S+T 2 would allow many of the new laboratories to be flexibly designed to teach multiple disciplines. While the addition will house many biology teaching laboratories, it will also accommodate other COS department lab space such as ESP, Geology, and perhaps at times Chemistry. A COS faculty run committee, "Learning Spaces", has been established to examine the mix of laboratories to be provided in the addition.

During S and T 1's renovation, which will likely be phased by floor, space in the new addition will be used as swing space to be occupied during renovation work. S and T 1 will mainly house the Chemistry and Physics and Astronomy departments.

Due to campus space needs, the existing testing computer lab needs to be moved out of SUB 2 and incorporated into the COS shared space. The Fairfax academic space schedule includes the relocation of the Physics and Astronomy classrooms that are currently in Innovation Hall 323 and 328.

The University will continue to maintain and provide classroom space within S+T 2 and S+T 1.

Research 1 should be reconfigured to allow for primarily research based work. Standardized research incubator suites should be provided to allow for new centers and partnerships to be developed. In addition, the building's current configuration with windowless corridors does not actively encourage a science community. A renovation of Research 1 can be redesigned to provide more visual connections between users and research units and the outside.

Portions of David King Hall will continue to be occupied by the COS. This space is in need of general renovation due to age of the facility.

Based on the projected growth rate, the COS will need roughly 35,000 nsf of additional space for the sciences by the end of this 6-10 year planning cycle.

Fairfax Academic Program Summary

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Program Summary - Fairfax		Academic Year 2016-17 Target							
	Existing	New							New
	Total NSF	Total NSF	Teaching Labs	Research Labs	Offices	Conference Room	Support	Storage	Total NSF
Academic Programs									
College of Science Administration	8263	4,156	0	0	3,516	400	0	240	4,156
Undergraduate Admissions	0	1,786	0	0	1,296	250	0	240	1,786
Molecular and Microbiology	14263	30,076	21,390	3,720	4,606	0	0	360	30,076
Mathematical Sciences	7431	9,526	0	930	8,236	0	0	360	9,526
Geography & Geoinformation Science	6666	12,856	4,650	930	6,916	0	0	360	12,856
AOES (formerly Climate Dynamics & Geology)	960	13,036	5,580	3,100	4,116	0	0	240	13,036
Chemistry & Bio-Chemistry	19304	22,530	10,230	5,580	5,120	0	1,360	240	22,530
Environmental Science & Policy (ESP)	20681	19,062	5,270	7,750	5,612	0	0	430	19,062
Physics and Astronomy	12778	22,338	8,680	3,720	8,098	0	0	1,840	22,338
Computational and Data Sciences	7692	6,854	930	930	4,384	310	0	300	6,854
Total	98,038	142,220	56,730	26,660	51,900	960	1,360	4,610	142,220
Shared / MEP and Core									
College Shared	1651	34,418							34,418
University Shared			16,570	University Classrooms Per Requirement					16,570
Net Subtotal	99,689	176,638							193,208
Contingency 10%	9,969	17,664							
Total Net Square Feet	**109,658**	**194,302**							
Net to Gross Efficiency (Estimated)	0.55%	0.55%							
Total Gross Square Feet	**199,378**	**353,276**							

Fairfax Academic Distribution Summary

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Program Summary - Fairfax			Available COS Buildings (Available NSF inc. University Space)								
	Existing	New	15589	54676	28500	53806	29457	701			
	Total NSF	Total NSF	3rd of DKH	S&T 1	Exp. to S&T 2	S&T 2	Res 1	JC	Future Project	Balance	Notes on What is Defferred/Future Project
Academic Programs											
College of Science Administration	8263	4,156				4,156				0	
Undergraduate Admissions	0	1,786				1,786				0	
Molecular and Microbiology	14263	30,076	4,008		20,460	4,678			930	0	1x Research Labs
Mathematical Sciences	7431	9,526				8,596		930		0	1x Research Labs
Geography & Geoinformation Science	6666	12,856				11,926	930			0	
AOES (formerly Climate Dynamics & Geology)	960	13,036			1,240	1,960	6,286		3,550	0	1x Prep Rooms, 3x Research Labs, 15x GRA Spaces
Chemistry & Bio-Chemistry	19304	22,530		21,600					930	0	1x Research Labs
Environmental Science & Policy (ESP)	20681	19,062	10,202		3,100				5,760	0	3x Prep Rooms, 5x Research Labs, 6x GRA Spaces
Physics and Astronomy	12778	22,338		19,318			1,940		1,080	0	1x Prep Rooms, 1x Research Labs, 5x GRA Spaces
Computational and Data Sciences	7692	6,854				5,924			930	0	1x Research Labs
Total	98,038	142,220	-9	-31	30	-63	87				
Shared / MEP and Core											
College Shared	1651	34,418	1,388	5,736	3,670	6,326	0		17,298	0	1x Display/Projection/Event Center, 6x 12 Seat PBL Class, 1x Computer Room, 2x Sandbox Flex Labs, 1x Blackbox Class, 1x Faculty Break/collaboration, 2x Large Seminar/Conference, 1x Small Seminar/Conference, 6x Computer Class/Tutorial, 4x Open Collaboratio
			1x Fac. Break/Collab., 1x Small Conf., 1x Open Collab.	2x Fac. Break/Collab., 1x Small Conf., 1x Open Collab., 1x Machine Shop, 1x Large Conf., 1x Math Classroom, 1x Spare/Class Prep Room	1x Remaining Collections, 1x Tutorial/Testing, 1x Spare/Class Prep Room, Atrium: 5000 GSF Admin. Add (with no finance inc.)	2x Fac. Break/Collab., 2x Small Conf., 1x Large Conf., 1x Tutorial/Testing, 1x High Bay/CAVE, 1x Herbarium	Physics: 1x Prep room, 2x Research Lab (note these are 620 not 930), 13x GRA spaces	Mathematics Open Lab in Johnson Center			
University Shared				8,053		8,517				0	
											Offsets: Showcase = Display/Projection/Event Center
Net Subtotal	99,689	176,638	15,598	54,707	28,470	53,869	9,156	930	30,478	0	
Contingency 10%	9,969	17,664									
Total Net Square Feet	**109,658**	**194,302**									
Net to Gross Efficiency (Estimated)	0.55%	0.55%									
Total Gross Square Feet	**199,378**	**353,276**									

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science

5.04.09	College of Science Admin. Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Proposed Hours Per Week
								New	Floor		
Course Number	Room Name	Number of People	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Research Labs										
	Research Lab		1	628	628			0		Was COS Dean's Academic Admin.	
	Research Non Class Lab		1	1,058	1,058			0			
	Molecular and Microbiology			**Total**	**1,686**		**Total**	**0**			
	Support Facilities										
	Media Production		1		1,252					Was COS Dean's Academic Admin.	
	Central Computer on Telec		1		141						
				Total	**1,393**						
	Offices										
	Dean				0	1	256	256			
	Waiting/Reception		3		1,067	1	240	240			
	Staff/Admin Workstation		17		2,309	19	64	1,216			
	PT Research Faculty				0	1	100	100			
	Senior admin faculty				0	6	144	864		3x Assoc. Dean @ 180 sf and Joel @ 144 sf; Space provided enables this configuration	
	Admin Faculty				0	7	120	840			
	Office - Faculty		4		888	0	0	0			
	Office - Research Non-Faculty		1		125	0	0	0			
	Circulation				72	0	0	0			
				Total	**4,461**		**Total**	**3,516**			
	Conference Room										
	Seminar / Conference Room		2		608	1	400	400			
				Total	**608**		**Total**	**400**			
	Storage										
	Filing/Copy/Storage/Mail		1		115	2	120	240			
				Total	**115**		**Total**	**240**			

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science											
5.04.09	College of Science Admin. Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Proposed Hours Per Week
								New	Floor		
Course Number	Room Name	Number of People	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Total NSF				8,263			4,156			
	Net/ Gross Factor				0.55%			0.55%			
	Total Gross Square Feet				15,024			7,556			

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science

5.04.09	Undergraduate Admissions - Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Propsed Hours Per Week
								New	Floor		
Course Number	Room Name	Number Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Offices										
	Department Chair Office		0	0	0	0	180	0			
	Waiting/Reception		0	0	0	1	240	240			
	Molecular and Microbiology		0	0	0	3	64	192			
	Staff/Office		0	0	0	3	144	432		1x Assoc. Dean @ 180 sf, 1 x Asst. Dean @ 120 sf, and 2x Other Staff @ 120 sf; Space provided allows this configuration	
	FT Instructional Faculty		0	0	0	3	144	432			
				Total	**0**		**Total**	**1,296**			
	Conference Rooms										
	Seminar / Conference Room		0	0	0	1	250	250			
				Total	**0**		**Total**	**250**			
	Storage										
	Central Computer or telec		0	0	0	1	120	120			
	file/fax/copy/ work area		0	0	0	1	120	120			
				Total	**0**		**Total**	**240**			
	Total NSF				**0**			**1,786**			
	Net/ Gross Factor				0.55%			0.55%			
	Total Gross Square Feet				**0**			**3,247**			

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science												
5.04.09	Biology Dept. (Molecular and Microbiology) Fairfax		Existing Spaces			Academic Year 2016-17 Target					Comments	Proposed Hrs Per Week
								New		Floor		
Course Number	Room Name	Number occupants	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF				
	Teaching Labs											
Biol 103	Introductory Biology 1	24	0	0	0	1	1,240	1,240				28.4
Biol 103	Introductory Biology 1	24	0	0	0	1	1,240	1,240				28.4
Biol 103	Molecular and Microbiology	24	0	0	0	1	1,240	1,240				28.4
Biol 124	Human Anatomy /Physiology	18	0	0	0	1	1,240	1,240				22
Biol 124	Human Anatomy /Physiology	18	0	0	0	1	1,240	1,240				22
Biol 213	Cell Structure & Function	24	0	0	0	1	1,240	1,240				27
Biol 213	Cell Structure & Function	24	0	0	0	1	1,240	1,240				27
Biol 303 Biol 320 Biol 473	Animal Biology, Comp Chordate Anatomy, and Animal Behavior Lab	18	0	0	0	1	930	930				26.94
Biol 304	Ecology / Plant Biology	18	0	0	0	1	930	930				38.5
Biol 306	Biol: Microorganisms Lab	18	0	0	0	1	930	930				20
Biol 311 Biol 405 Biol 453	General Genetics, Microbial Genetics, and Immunology Lab	18	0	0	0	1	1,240	1,240				33.5
	Molecular/ Developmental	18-24	0	0	0	1	1,240	1,240				
	Biotechnology, etc	18	0	0	0	2	930	1,860				
	Student/ faculty capstone labs		0	0	0	2	1,240	2,480				
	Teaching Labs		7	0	6,418	0	0	0			include media prep	
	Prep Room		8	0	1,807	5	310	1,550			include media prep	
	Autoclave Room		0	0	0	1	310	310			include gglasswash	
	Equipment Room		0	0	0	1	310	310				
	Cold Room		0	0	0	1	155	155				
	Biology Stockroom		0	0	0	1	620	620				
	Stockrm Manager Office		0	0	0	1	155	155				
				Total	**8,225**		**Total**	**21,390**				
	Research Labs											
	Grant funded research	1	0	0	0	1	930	930				
	Faculty research	3	0	0	0	3	930	2,790				
	Research Lab		4	0	2,317	0	0	0				
	Research Non ClassLab		5	0	883							
				Total	**3,200**		**Total**	**3,720**				
	Offices											

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science

5.04.09	Biology Dept. (Molecular and Microbiology) Fairfax		Existing Spaces			Academic Year 2016-17 Target				Floor	Comments	Proposed Hrs Per Week
								New				
Course Number	Room Name	Number occupants	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF				
	Department Chair Office		0	0	0	1	180	180				
	Waiting/Reception		1	0	259	1	240	240				
	Staff/Admin Workstation		2	0	188	6	64	384				
	FT Instructional Faculty		0	0	0	14	144	2,016				
	PT Instructional Faculty		0	0	0	8	100	800				
	Visiting Faculty		0	0	0	3	144	432				
	Senior Research		0	0	0	0	64	0				
	GRA		1	0	128	11	30	330				
	GTA		1	0	97	4	56	224				
	Office - Faculty		13	0	1,509	0	0	0				
	Circulation		0	0	171	0	0	0				
				Total	2,352		Total	4,606				
	Shared amenities											
	Student Group Study		0	0	0	0	300	0			in college shared	
	Seminar / Conference Room		1	0	291	0	310	0			in college shared	
	Faculty break/ collaboration		0	0	0	0	620	0			in college shared	
				Total	291			0				
	Storage											
	Filing/Copy/Storage/Mail		2	0	195	2	120	240				
	Department Storage		0	0	0	1	120	120				
				Total	195		Total	360				
	Total NSF				14,263			30,076				
	Net/ Gross Factor				0.55%			0.55%				
	Total Gross Square Feet				25,933			54,684				

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science

5.04.09	Mathematical Sciences Dept. Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Proposed Hours Per Week
								New	Floor		
Course Number	Room Name	Number Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Teaching Labs										
	Open Laboratory		2	0	1,539	0	0	0			
				Total	**1,539**		**Total**	**0**			
	Molecular and Microbiology										
	Research Labs										
	Mathematical Department Computer Workshop (Lab)		0	0	0	1	930	930			
				Total	**0**		**Total**	**930**			
	Offices										
	Department Chair Office		0	0	0	1	180	180			
	Waiting/Reception		2	0	448	1	240	240			
	Staff/Admin Workstation		0	0	0	2	64	128			
	FT Instructional Faculty		33	0	3,653	40	144	5,760			
	PT Instructional Faculty		0	0	0	7	100	700			
	Admin Faculty		0	0	0	1	120	120			
	Visiting Faculty		0	0	0	2	144	288			
	Flex Faculty		0	0	0	1	120	120		shared phD or student fulbright space	
	GRA		0	0	0	14	30	420			
	GTA		2	0	442	5	56	280			
				Total	**4,543**		**Total**	**8,236**			
	Conference Rooms										
	Student Group study		2	0	461	0	300	0		in college shared	
	Seminar / Conference Room		0	0	0	0	620	0		in college shared	
	Faculty Break Room		3	0	715	0	310	0		in college shared	
				Total	**1,176**		**Total**	**0**			

Fairfax Academic Program

PERKINS +WILL

George Mason University - College of Science											
5.04.09	Mathematical Sciences Dept. Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Proposed Hours Per Week
								New	Floor		
Course Number	Room Name	Number Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Storage										
	Filing/Copy/Storage/Mail		2	0	173	1	120	120			
	Dept. Storage		0	0	0	1	120	120			
	Equipment Storage		0	0	0	1	120	120			
				Total	**173**		**Total**	**360**			
	Total NSF				7,431			9,526			
	Net/ Gross Factor				0.55%			0.55%			
	Total Gross Square Feet				**13,511**			**17,320**			

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science

5.04.09	Geography & Geoinformation Science. Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Proposed Hours Per Week
								New	Floor		
Course Number	Room Name	Number Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Teaching Labs										
	Teaching Lab	24	0	0	0	2	1,240	2,480		Exist. Robinson B-106 and B-108	
	Open Lab		1		431	1	930	930		Exist. Robinson A-113	
	Molecular and Microbiology		0	0	0	1	930	930		See Note 1./ Exist Innov. 320	
	Service - Equip Room		1	0	153	1	310	310		Exist. Robinson A-113A	
				Total	**584**		**Total**	**4,650**			
	Research Labs									See centers for further Research Labs.	
	Research Non Class Lab		2	0	555	1	930	930		Added from former ESGS	
	Research Office		0	0	0	0	0	0		Added from former ESGS	
				Total	**555**		**Total**	**930**			
	Offices										
	Department Chair Office		0	0	0	1	180	180		Combined with former ESGS	
	Waiting/Reception		0	0	0	1	240	240		Combined with former ESGS	
	Staff/Admin Workstation		2	0	210	4	64	256		Combined with former ESGS	
	FT Instructional Faculty		20	0	2,661	28	144	4,032		Combined with former ESGS	
	PT Instructional Faculty		0	0	0	4	100	400			
	FT Research Faculty		0	0	0	5	144	720			
	Adjunct Faculty		2	0	286	0	100	0			
	Visiting Faculty		0	0	0	1	144	144			
	GRA		2	0	1,329	24	30	720		Combined with former ESGS	
	GTA		1	0	99	4	56	224		Combined with former ESGS	
	Circulation		0	0	747	0	0	0			
				Total	**5,332**		**Total**	**6,916**			
	Conference Rooms										
	Seminar / Conference Room		0	0	0	0	310	0		in college shared	
				Total	**0**		**Total**	**0**			

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science											
5.04.09	Geography & Geoinformation Science. Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Proposed Hours Per Week
								New	Floor		
Course Number	Room Name	Number Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Storage										
	Work Room		1		195	0	0	0			
	Filing/Copy/Storage/Mail		0		0	1	120	120		Combined with former ESGS	
	Dept. Storage		0	0	0	1	120	120			
	Equipment Storage		0	0	0	1	120	120			
				Total	**195**		**Total**	**360**			
	Total NSF				6,666			12,856			
	Net/ Gross Factor				0.55%			0.55%			
	Total Gross Square Feet				**12,120**			**23,375**			

Fairfax Academic Program

PERKINS +WILL

George Mason University - College of Science

5.04.09	Atmospheric Oceanic and Earth Sciences (AOES) Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Propsed Hours Per Week
								New	Floor		
Course Number	Room Name	Number Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Teaching Labs										
Evpp 505 Geol 302 Evpp 643	Rivers & Drainage Basins, Mineralogy, Microbial Ecology, & Wetland Ecology & Management	18	0	0	0	1	1,240	1,240		DK 2074, DK 3021, and DK 1010	25.84
Geol 101	Introductory Geology I	24	0	0	0	1	1,240	1,240		DK 2084	28.75
Geol 101	Molecular and Microbiology	24	0	0	0	1	1,240	1,240			28.75
	Majors lab	24	0	0	0	1	1,240	1,240		Weather Climate Teaching Lab: To be provided through one of these labs	
	Prep Room		0	0	0	2	310	620		DK 2083	
				Total	**0**		**Total**	**5,580**			
	Research Labs										
	Office Research Non Fac		0	0	0	1	930	930			
	Research Labs		0	0	0	2	930	1,860		R A121, A121A-D, DK 3059 (Wet), and ST2 6	
	Prep/ Workroom		0	0	0	1	310	310			
				Total	**0**		**Total**	**3,100**			
	Offices										
	Department Chair Office		0	0	0	1	180	180			
	Waiting/Reception		6	0	827	1	240	240			
	Staff/Admin Workstation		1	0	133	2	64	128			
	FT Instructional Faculty		0	0	0	14	144	2,016			
	PT Instructional Faculty		0	0	0	3	100	300			
	Visiting Faculty		0	0	0	1	144	144			
	GRA		0	0	0	22	30	660			
	GTA		0	0	0	8	56	448			
				Total	**960**		**Total**	**4,116**			
	Shared Space										

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science											
5.04.09	Atmospheric Oceanic and Earth Sciences (AOES) Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Propsed Hours Per Week
								New	Floor		
Course Number	Room Name	Number Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Faculty Break Room		0	0	0	0	0	0		college shared	
				Total	0		Total	0			
	Storage										
	mail/fax/copy/storage		0	0	0	1	120	120			
	Equipment storage		0	0	0	1	120	120			
				Total	0		Total	240			
	Total NSF				960			13,036			
	Net/ Gross Factor				0.55%			0.55%			
	Total Gross Square Feet				1,745			23,702			

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science

5.04.09	Chemistry Dept. Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Proposed Hours Per Week
								New	Floor		
Course Number	Room Name	Number Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Teaching Labs										
Chem 103 Chem 212 Chem 251	Chem Sci in Mod Soc I Lab, General Chemistry II Lab, and General Chem for Engineers Lab	24	0	0	0	1	0	1,240		S & T I 409	30.8
Chem 211	General Chemistry I Lab	24	0	0	0	1	0	1,240		S & T I 401 (Room 409 sf. accounted for)	24.4
Chem 211	Molecular and Microbiology	24	0	0	0	1	0	1,240			24
Chem 315	Organic Chemistry I Lab	18	0	0	0	1	0	1,240		S & T I 403, 407, 409. (Room 409 sf. Accounted for)	23
Chem 315	Organic Chemistry I Lab	18	0	0	0	1	0	1,240			23
Chem 321 Chem 336 Chem 465	Elem Quantatative Analysis. Lab. Physical Chemistry Lab. - Biochemistry Lab.	18-24	0	0	0	1	0	1,240		Existing are S&T I 408.	20.5
	Biochemistry lab	18-24	0	0	0	1		1,240		new	
	Instrument Lab		0	0	0	1	620	620			
	Prep Room		3	0	1,192	3	310	930			
	Teaching Labs		8	0	8,620	0	0	0			
				Total	**9,812**		**Total**	**10,230**			
	Support										
	StockRoom Non Chemical		0	0	0	1	620	620			
	Chemical Storage Storeroom		0	0	0	1	310	310			
	Central Prep		0	0	0	1	310	310			
	Stockroom mgr		0	0	0	1	120	120			
				Total	**0**		**Total**	**1,360**			
	Research Labs										
	Research Lab/ Nonclass		9	0	4,844	0	0	0		Existing S and T 1 402	
	Research Lab/ Nonclass		0	0	0	2	930	1,860		for 2 senior principals	
	shared faculty labs		0	0	0	2	930	1,860		for 6-9 shared faculty	
	CVD lab		0	0	0	1	620	620			labs in PW
	NMR		0	0	0	1	620	620			
	Service-Prep Room		2	0	197	2	310	620			
				Total	**5,041**		**Total**	**5,580**			
	Offices										
	Department Chair Office		0	0	0	1	180	180			

GEORGE MASON UNIVERSITY

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science

5.04.09	Chemistry Dept. Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Proposed Hours Per Week
								New	Floor		
Course Number	Room Name	Number Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Waiting/Reception		1	0	216	1	240	240			
	Staff/Admin Workstation		0	0	0	2	64	128			
	FT Instructional Faculty		17	0	1,897	17	144	2,448			
	PT Instructional Faculty		0	0	0	3	100	300			
	FT Research Faculty		0	0	0	6	144	864			
	Visiting Faculty		0	0	0	2	144	288		flex	
	Adjunct Faculty		0	0	0	0	100	0			
	GRA		2	0	224	0	30	0		(1 was requested see notes)	
	GTA		0	0	0	12	56	672		(9 was requested see notes)	
	Circulation		0	0	1,845	0	0	0		(9 was requested see notes)	
				Total	**4,182**		**Total**	**5,120**			
	Conference Rooms										
	Seminar / Conference Room 1		1	269	269	0	620	0		in college shared	
	Student Group Study		0	0	0	0	620	0		in college shared	
	Faculty break/ collaboration		0	0	0	0	620	0		in college shared	
				Total	**269**		**Total**	**0**			
	Storage										
	Filing/Copy/Mail		0	0	0	1	120	120			
	Dept. Storage		0	0	0	1	120	120			
				Total	**0**		**Total**	**240**			
	Total NSF				**19,304**			**22,530**			
	Net/ Gross Factor				0.55%			0.55%			
	Total Gross Square Feet				**35,098**			**40,964**			

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science

5.04.09	Environmental Science & Policy (ESP) Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Proposed Hours Per Week
								New	Floor		
Course Number	Room Name	Number Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Teaching Labs										
Evpp 110	Ecosphere: Environ Sci I	24	0	0	0	2	1,240	2,480			28.5
	Upper level teaching	18	0	0	0	1	930	930		added see AOES	
	Molecular and Microbiology	1	2	0	992	1	1,240	1,240			
	Headhouse/Potting (Greenhouse Sevices)	1	3	0	1,013	1	310	310			
	Prep Room		2	0	529	1	310	310		ExistingRH A412B	
	Teaching Labs		4	0	3,743	0	0	0			
				Total	**6,277**		**Total**	**5,270**			
	Research Labs										
	Research Lab		19	0	8,702	4	930	3,720		4 principals	
	Research Lab		0	0	0	3	930	2,790		9 shared	
	Service - Prep Room		9	0	1,309	4	310	1,240			
					0			0			
				Total	**10,011**		**Total**	**7,750**			
	Offices										
	Office - Faculty		24	0	2,793	0	0	0			
	Department Chair Office		0	0	0	1	180	180			
	Waiting/Reception		1	0	240	1	240	240			
	Staff/Admin Workstation		0	0	0	4	64	256			
	FT Instructional Faculty		0	0	0	17	144	2,448		assumes 15,000 sf at belmont bay	
	PT Instructional Faculty		0	0	0	1	100	100			
	Adjunct Faculty		2	0	216	0	100	0			
	Private Room RR		1	0	22	0	0	0			
	Classified		0	0	0	6	30	180			
	Flex faculty		0	0	0	1	120	120			
	GRA		2	0	283	8	30	240			

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science											
5.04.09	Environmental Science & Policy (ESP) Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Proposed Hours Per Week
								New	Floor		
Course Number	Room Name	Number Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	GTA		0	0	0	33	56	1,848			
	Circulation		0	0	514	0	0	0			
				Total	4,068		Total	5,612			
	Conference Rooms										
	Seminar / Conference Room		0	0	0	0	310	0		college shared	
	Faculty break/ collaboration		0	0	0	0	310			college shared	
	Student Group Study		0	0	0	0	620	0		college shared	
					-		Total	-			
	Storage										
	Filing/Copy/Storage/Mail		5		325	1	310	310			
	Dept. Storage		0	0	0	1	120	120			
				Total	325		Total	430			
	Total NSF				20,681			19,062			
	Net/ Gross Factor				0.55%			0.55%			
	Total Gross Square Feet				37,602			34,658			

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science

5.04.09	Physics & Astronomy Dept. Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Proposed Hours Per Week
								New	Floor		
Course Number	Room Name	Number of Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Teaching Labs										
Astr. 112	Astronomy Class Labs	24	0	0	0	2	930	1,860		Class lab- no benches	80 for both
Phys 244	College Physics Lab I	24	0	0	0	1	1,240	1,240		S+T I - 324	18.5
Phys 103	Molecular and Microbiology	24	0	0	0	1	1,240	1,240		S+T I - 324 Existing sf. Accounted for.	18
Phys 261 Phys 263	Univ Physics II Lab	24	0	0	0	1	1,240	1,240		S+T I - 320	32.5
Phys 303	Classical Mechanics	9	0	0	0	0	0	0		S+T I - 310	
Phys 402	Intr Quan Mech/Atom Phys	3	0	0	0	0	0	0		S+T I - 310 Existing sf. Accounted for.	
Phys 407	Sr Lab in Modern Physics	4	0	0	0	0	0	0		S+T I - 310 Existing sf. Accounted for. (S&T 1 236, 236A, 240, 240A as well)	
Phys 533	Modern Instrumentation	8	0	0	0	0	0	0		S+T I - 310 Existing sf. Accounted for.	
	Computer Workshop (Lab)		0	0	0	1	310	310		dedicated to physics	
Phys 161	Teaching Lab		5	0	4,029	1	1,240	1,240		S+T 1 - 228.	
	Prep Room		4	0	785	3	310	930			
	Service - Prep Room		0	0	0	0	0	0			
	Equipment Storage		0	0	0	1	0	620			
				Total	**4,814**		**Total**	**8,680**			
	Research Labs										
	Research Lab		8	0	2,850	0	0	0			
	Grant research focus		0	0	0	4	620	2,480		1 PI / lab	
	research teaching		0	0	0	1	620	620		4 researcher / lab	
	Service - Prep Room		1	0	78	2	310	620			
	Office Research		0	0	0	0	0	0			
				Total	**2,928**		**Total**	**3,720**			
	Classroom										
	General Classroom		1	-	725	0	0	0			
				Total	**725**		**Total**	**0**			
	Offices										
	Department Chair Office		0	0	0	1	180	180			
	Waiting/Reception		2	0	448	1	240	240			
	Staff/Admin Workstation		0	0	0	5	64	320			
	FT Instructional Faculty		0	0	0	28	144	4,032			

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science

5.04.09	Physics & Astronomy Dept. Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Proposed Hours Per Week
								New	Floor		
Course Number	Room Name	Number of Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	PT Instructional Faculty		0	0	0	2	100	200			
	FT Research Faculty		0	0	0	6	144	864			
	PT Research Faculty		0	0	0	2	100	200			
	Visiting Faculty		0	0	0	1	144	144			
	GRA		3	0	388	18	30	540			
	GTA		2	0	514	8	56	448			
	Technical Support Suite		0	0	0	1	930	930			
	Office - Faculty		20	0	2,325	0	0	0			
	Office - Research Non Lab		3	0	406	0	0	0			
				Total	**4,081**		**Total**	**8,098**			
	Conference Rooms										
	Seminar / Conference Room 1		1	131	131	0	310	0		(1) at College Shared	
				Total	**131**		**Total**	**0**			
	Storage										
	Filing/Copy/Storage/Mail		1	99	99	1	120	120			
	Dept. Storage		0	0		1	120	120			
	Equipment Storage		0	0		1	1,600	1,600		As requested per note 7.	
	Machine Shop		0	0	0	0	930	0		In college shared	
				Total	**99**		**Total**	**1,840**			
	Total NSF				**12,778**			**22,338**			
	Net/ Gross Factor				0.55%			0.55%			
	Total Gross Square Feet				**23,233**			**40,615**			

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science

5.04.09	Computational and Data Sciences (CDS) - Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Propsed Hours Per Week
								New	Floor		
Course Number	Room Name	Number Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Teaching Labs										
	Seminar / Conference Room		0	0	0	1	930	930		software teaching RB 249(considrer shared)	
				Total	**0**		**Total**	**930**			
	Molecular and Microbiology										
	Research Labs										
	Computational Research Lab		2	0	683	1	930	930			
	Office Research Non Fac		0	0	0	0	0	0			
				Total	**683**		**Total**	**930**			
	Offices										
	Department Chair Office		0	0	0	1	180	180			
	Waiting/Reception		0	0	0	1	240	240			
	Staff/Admin Workstation		0	0	0	1	64	64			
	Office - Faculty		24	0	3,172	0	144	0			
	Office - Research Non Faculty		2	0	190	0	0	0			
	FT Instructional Faculty		0	0	0	14	144	2,016		5x Faculty moved to CFD (4) and CMS (1); 3x Faculty added back to account for those that work in CDS Area but are split (not accounted elsewhere)	
	FT Research Faculty		0	0	0	6	144	864		4x Res. Faculty moved to CFD (2) and CMS (2)	
	PT Research Faculty		0	0	0	3	100	300			
	GRA		3	0	2,335	24	30	720			
	GTA		0	0	0	0	56	0			
	Circulation		0	0	338	0	0	0			
				Total	**6,035**		**Total**	**4,384**			
	Conference Rooms										
	Seminar / Conference Room		2	0	946	1	310	310			
				Total	**946**		**Total**	**310**			

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science											
5.04.09	Computational and Data Sciences (CDS) - Fairfax		Existing Spaces			Academic Year 2016-17 Target				Comments	Propsed Hours Per Week
								New	Floor		
Course Number	Room Name	Number Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Storage										
	Filing/Copy/Storage/Mail		2	14	28	2	150	300			
				Total	**28**		**Total**	**300**			
	Total NSF				7,692			6,854			
	Net/ Gross Factor				0.55%			0.55%			
	Total Gross Square Feet				**13,985**			**12,462**			

Fairfax Academic Program

PERKINS + WILL

George Mason University - College of Science

5.04.09	College Shared		Existing Spaces			Academic Year 2016-17 Target						Comments	Proposed Hours Per Week
										New	Floor		
Course Number	Room Name	Number of People	Quantity	NSF	Total NSF	S.F. Per Person	Number of Seats	Quantity	NSF	Total NSF			
	Gathering spaces												
	Display, projection, event center		0	0	0	0	0	1	2,000	2,000			
				Total	**0**				**Total**	**2,000**			
	Molecular and Microbiology												
	Classrooms												
	200 Seat Lecture Hall		0	0	0	20	200	0	4,000	0		1 to meet COS needs; University Shared 110	
	75 Seat Classroom - movable chairs		0	0	0	25	75	0	1,875	0		2 to meet COS needs; University Shared 110	
	Current Mathematics Lecture		1	1,651	1,651	20	80	1	1,600	1,600		Current S&T 1, Room 129	
	40- 50 Seat flex Class all movable furn		0	0	0	25	50	0	1,250	0		2 to meet COS needs; University Shared 110	
	20-30 Seat Classroom		0	0	0	25	30	0	750	0		4 to meet COS needs; University Shared 110	
	12 Seat PBL Classrooms/ Group study		0	0	0	35	12	6	420	2,520		Arrange in pairs	
	Tutorial & Testing		0	0	0	0	0	2	900	1,800		Student Union 2002 and 2002A COS	
	Computer Room		0	0	0	0	0	1	900	900			
	Prep Rooms		0	0	0	0	0	2	310	620			
	Showcase Room		0	0	0	0	0	0	0	0		Existing R1-101	
	Greenhouse		0	0	0	0	0	0	0	0		In ESP Program	
	Observatory		0	0	0	0	0	0	0	0		Existing R1-504	
	Sandbox Flex Labs		0	0	0	0	0	2	1,240	2,480		and one in a discipline	
	BlackBox Classrooms		0	0	0	0	0	1	930	930		and one 50 seat above	
	High Bay Learning theater/ cave		0	0	0	0	0	1	930	930		function will change over time	
			Total		**1,651**				**Total**	**11,780**			
	Conference Rooms												
	Conference Rooms		0	0	0	0	0	0	0	0		See Collaboration Space below, not in Departments, Shared	
			Total		**0**				**Total**	**0**			
	Shared collaboration spaces												
	Faculty Break / collaboration		0	0	0	14	22	6	308	1,848		Collaboration model	
	Seminar / Conference Room		0	0	0	30	40	4	1,200	4,800		collaboration model	
	Seminar / Conference Room		0	0	0	30	24	4	720	2,880		collaboration model	
	Computer classrooms/tutorials		0	0	0	30	24	6	720	4,320		collaboration model	
			0	0	0	0	0	0	0	0			
	Student Group Study		0	0	0	35	12	6				Shared with PBL rooms above	
	Open Collaboration Areas		0	0	0	30	12	6	360	2,160		seating, writing surfaces, etc.	
			Total		**0**				**Total**	**16,008**			
	Collections												

Fairfax Academic Program

PERKINS +WILL

George Mason University - College of Science

5.04.09	College Shared		Existing Spaces			Academic Year 2016-17 Target						Comments	Proposed Hours Per Week
										New	Floor		
Course Number	Room Name	Number of People	Quantity	NSF	Total NSF	S.F. Per Person	Number of Seats	Quantity	NSF	Total NSF			
Biol 369 Biol 332 Biol 333 Biol 538 Biol 622	Mammal/Birds/Fish/Insect Collections	1	0	0	0			1	930	930		Used by ESP and MMB - Existing RH B369 and Two Cabinets in Dr. Rockwoods Research Lab (King 3038) & Biol 537 (Recommended combines K 3038 12sf plus Krug 16 384sf plus RH B-369 400 sf)	
Biol 344 Biol 345	Animal Collection Prep Room	1	0	0	0			1	310	310		Used by ESP and MMB - Existing at Krug 16	
	Herbarium	1	0	0	0			1	1,240	1,240		Used by ESP and MMB - Existing at Krug 15	
	Herbarium Teaching Prep Room		0	0	0			1	310	310			
	Fish and Invertebrates		0	0	0			1	310	310		ESP and MMB - Exsisting at Krug 11A	
	Geology Collection		0	0	0			1	600	600			
			0	0	0								
			Total		**0**				**Total**	**3,700**			
	Storage												
	Building Management		0	0	0				0	0		TBD	
	Machine Shop		0	0	0			1	930	930			
			Total		**0**				**Total**	**930**			
	Total NSF				**1,651**					**34,418**			
	Net/ Gross Factor				0.55%					0.60%			
	Total Gross Square Feet				**3,002**					**62,578**			

University shared clasrooms areshown but not included in the tally of COS shared space.

C. Fairfax Utilization Analysis

Utilization of labs and classrooms, as they pertain to the Fairfax campus, have been analyzed and the projected rates of usage are quite high. The utilization rates are based on peak enrollment years typically 2005 or as indicated on the bar charts that follow. The State Council of Higher Education for Virginia (SCHEV) utilization targets for teaching laboratories are 24 hours per week and classroom utilization targets are 40 hours per week of scheduled course time. An analysis of the utilization for labs and classrooms, based on peak enrollment, are located on the pages that follow. Where utilization is shown to exceed targets, proposed models are presented to achieve a more balanced utilization.

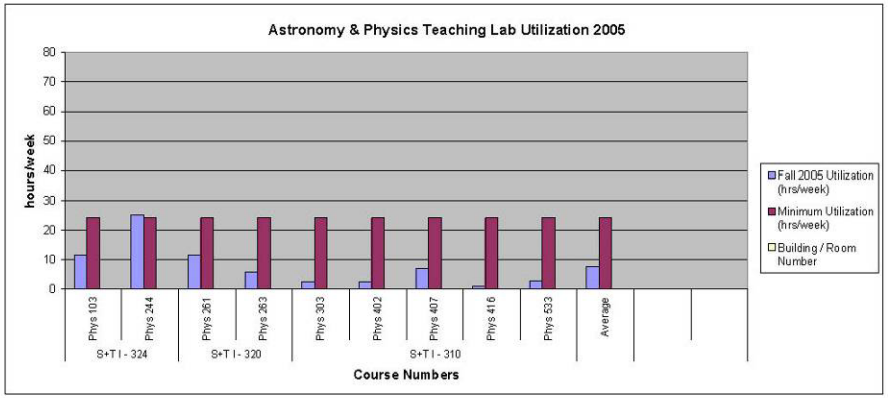
Fairfax Utilization Analysis

PERKINS +WILL

Utilization Analysis of Astronomy & Physics Teaching labs - 2005
George Mason University

Current Utilization

Building / Room Number	Courses	Number of Students	Enrollment Count	Course Names	Fall 2005 Utilization (hrs/week)	Minimum Utilization (hrs/week)	Existing Square Footage (s.f.)	Proposed Square Footage (s.f.)	Comments
IN 323	Astr 112	24	376	Astronomy Laboratory I	NA	24	725		Classroom assigned to A&P. NON LAB
IN 328	Astr 112	24	112	Astronomy Laboratory I	NA	24	724		Biol 559 is in room - IN 328. Assigned to Regisrar. NON LAB
S+T I - 324	Phys 103	24	149	Princ/Devel Modern Phys	11.32	24	1040		
	Phys 244	24	190	College Physics I Lab	25.18	24			
S+T I - 320	Phys 261	24	75	Univ Physics II Lab	11.34	24	1022		
	Phys 263	24	42	Univ Physics II Lab	5.66	24			
S+T I - 310	Phys 303	18	9	Classical Mechanics	2.5	24	524		Classes in this room range from 2-9 people.
	Phys 402	18	3	Intr Quan Mech/Atom Phys	2.5	24			Lecture?
	Phys 407	12 ?	4	Sr Lab in Modern Physics	7	24			
	Phys 416	20 ?	2	Contact Department for Topic	0.83	24			Lecture?
	Phys 533	10 ?	8	Modern Instrumentation	2.67	24			Lecture?
	Average				**8**	**24**			
Effective (of 24 hours)					**8**	**24**			
Total net square footage teaching labs							4035		
			970						

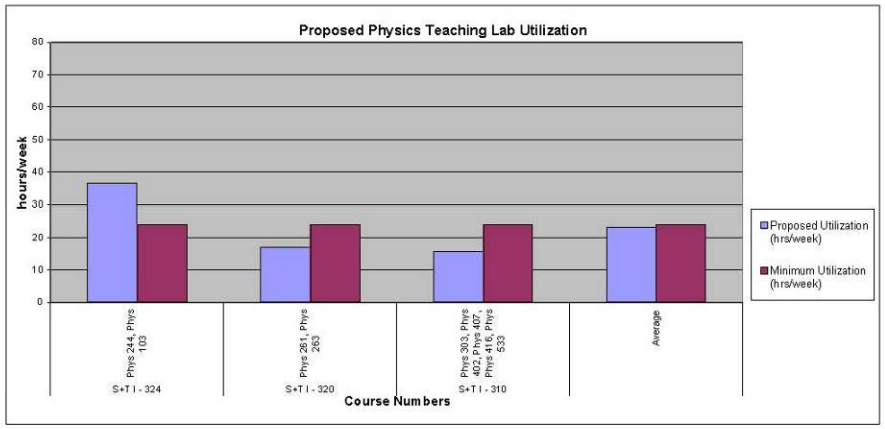


S & T 1 - Science and Technology Building 1

Utilization Analysis of Astronomy & Physics Teaching labs - 2005
George Mason University

Proposed Utilization

Building/Room Number	Courses	Number of Students	Enrollment Count	Course Names	Proposed Utilization (hrs/week)	Minimum Utilization (hrs/week)	Existing Square Footage (s.f.)	Proposed Square Footage (s.f.)	Comments
IN 323, IN 328	Astr 112	24	497	Astronomy Laboratory I	NA	NA			NON LAB. From IN 323. Biol 559 from - IN 328
	Astr 112	24		Astronomy Laboratory I	NA	NA			NON LAB From IN 328
S+T I - 324	Phys 244, Phys 103	24	339	College Physics I Lab, Princ/Devel Modern Phys	36.5	24	1040	**1240**	
S+T I - 320	Phys 261, Phys 263	24	117	Univ Physics II Lab	17	24	1022	**1240**	
S+T I - 310	Phys 303, Phys 402, Phys 407, Phys 416, Phys 533	18-20	29	Classical Mechanics, Intr Quan Mech/Atom Phys, Sr Lab in Modern Physics, Contact Department for Topic, and Modern Instrumentation.	15.5	24	524	**930**	Are Intr Quan Mech/Atom Phys, Contact Department for Topic, and Modern Instrumentation Lectures? Classes in room 403 range from 2-9 people.
	Average				**23**	**24**			
Effective (of 24 hours)					**23**	**24**			
total net square footage							2586	**3410**	
			982						



S & T 1 - Science and Technology Building 1

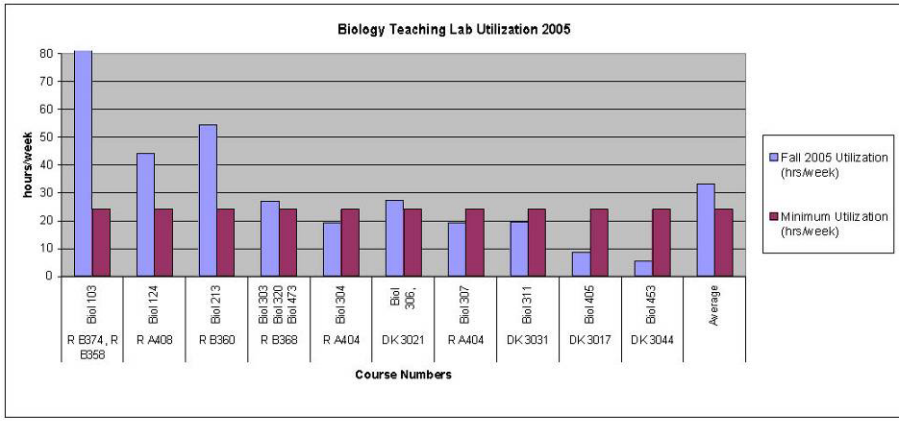
Fairfax Utilization Analysis

PERKINS +WILL

Utilization Analysis of Molecular and Microbiology Teaching Labs - 2005
George Mason University

Current Utilization

Building/Room Number	Courses	Number of Students	Enrollment Count	Course Name	Fall 2005 Utilization (hrs/week)	Minimum Utilization (hrs/week)	Existing Square Footage (s.f.)	Proposed Square Footage (s.f.)	Comments
IN 131	Biol 312	12	12	Biostatistics	NA	24	707		NON LAB Classroom assigned to Registrar
IN 328	Biol 559	24	1	Fungi & Ecosystems	NA	24	724		NON LAB Classroom assigned to Registrar
R B374, R B358	Biol 103	24	866	Introductory Biology I	106.5	24	1707		Room R B358 IS 876 S.F.
R A408	Biol 124	18	278	Human Anatomy/Physiology	44	24	1076		
R B360	Biol 213	24	420	Cell Structure & Function	54.5	24	919		
R B368	Biol 303 Biol 320 Biol 473	36	133	Animal Biology, Comp Chordate Anatomy, and Animal Behavior Lab	26.94	24	873		
R A404	Biol 304	18	120	Plant Biology	19.25	24	1076		
DK 3021	Biol 306,	18	211	Biol Microorganisms Lab	27.16	24	883		
R A404	Biol 307	18	115	Ecology	19.25	24	1076		
DK 3031	Biol 311	18	107	General Genetics	19.5	24	884		
DK 3017	Biol 405	18	51	Microbial Genetics	8.5	24	868		
DK 3044	Biol 453	18	19	Immunology Lab	5.5	24	949		
	Average				**33**	**24**			
Effective (of 24 hours)					**33**	**24**			
Total net square footage teaching labs							10311		
			2320						

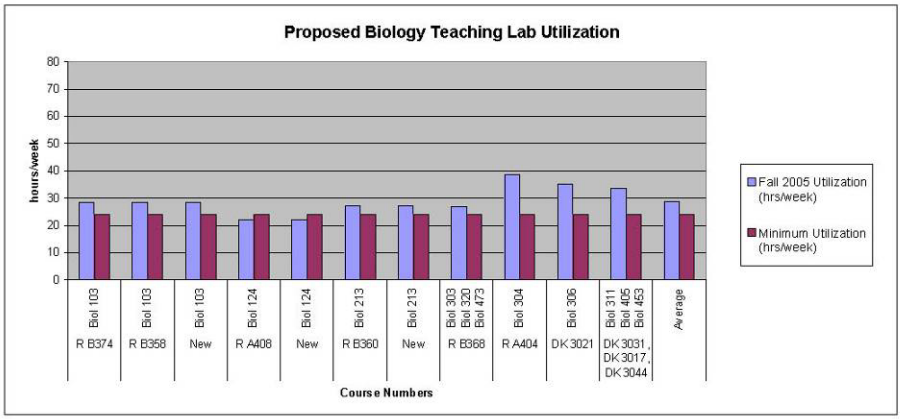


DK: David King Jr Hall
R: Robinson Hall
IN: Innovation Hall

Utilization Analysis of Molecular and Microbiology Teaching Labs - 2005
George Mason University

Proposed Utilization

Building / Room Number	Courses	Number of Students	Enrollment Count	Course Name	Fall 2005 Utilization (hrs/week)	Minimum Utilization (hrs/week)	Existing Square Footage (s.f.)	Proposed Square Footage (s.f.)	Comments
R B374	Biol 103	24	866	Introductory Biology I	28.4	24	1707	1240	
R B358	Biol 103	24		Introductory Biology I	28.4	24		1240	Room R B358 IS 876 S.F.
New	**Biol 103**	**24**		**Introductory Biology I**	**28.4**	**24**		**1240**	**Proposed**
R A408	Biol 124	18	278	Human Anatomy/Physiology	22	24	1076	**1240**	
New	**Biol 124**	**18**		**Human Anatomy/Physiology**	**22**	**24**		**1240**	**Proposed**
R B360	Biol 213	24	420	Cell Structure & Function	27	24	919	**1240**	
New	**Biol 213**	**24**		**Cell Structure & Function**	**27**	**24**		**1240**	**Proposed**
R B368	Biol 303 Biol 320 Biol 473	18	133	Animal Biology, Comp Chordate Anatomy, and Animal Behavior Lab	26.94	24	873	930	
R A404	Biol 304	18	120	Plant Biology/Ecology	38.5	24	1076	**930**	
DK 3021	Biol 306	18	211	Biol Microorganisms Lab	35.16	24	883	**930**	
DK 3031, DK 3017, DK 3044	Biol 311 Biol 405 Biol 453	18	189	General Genetics, Biostatistics, Microbial Genetics, and Immunology Lab	33.5	24	3468	**1240**	
	Average				**29**	**24**			
Effective (of 24 hours)					**29**	**24**			
total net square footage- teaching labs proposed.							10002	**12710**	
			2217						



DK: David King Jr Hall
R: Robinson Hall
IN: Innovation Hall

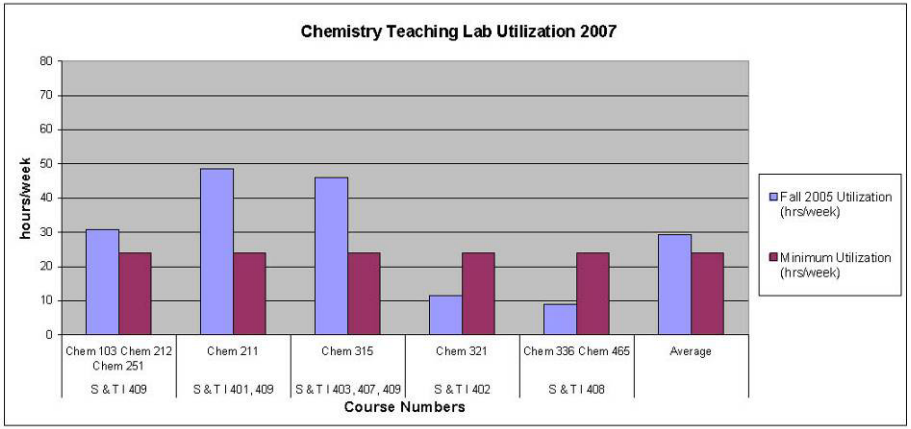
Fairfax Utilization Analysis

PERKINS +WILL

Utilization Analysis of Chemistry Teaching Labs - 2007
George Mason University

Current Utilization

Building / Room Number	Courses	Number of Students	Enrollment Count	Course Name	Fall 2005 Utilization (hrs/week)	Minimum Utilization (hrs/week)	Existing Square Footage (s.f.)	Proposed Square Footage (s.f.)	Comments
S & T I 409	Chem 103 Chem 212 Chem 251	18	209	Chem Sci in Mod Soc I Lab, General Chemistry II Lab and General Chem for Engineers Lab	30.8	24	1365		
S & T I 401, 409	Chem 211	24	376	General Chemistry I Lab	48.4	24	1411		
S & T I 403, 407, 409	Chem 315	24	304	Organic Chemistry I Lab	46	24	1130		Room 409 accounted for above. Add room S&T 403 sf ?
S & T I 402	Chem 321	18	30	Elem Quantatative Analysis Lab	11.5	24	1100		
S & T I 408	Chem 336 Chem 465	18	60	Physical Chemistry I Lab, Biochemistry Lab	9	24	1160		
	Average				**29**	**24**			
Effective (of 24 hours)					**29**	**24**			
Total net square footage teaching labs							2260		
			979						

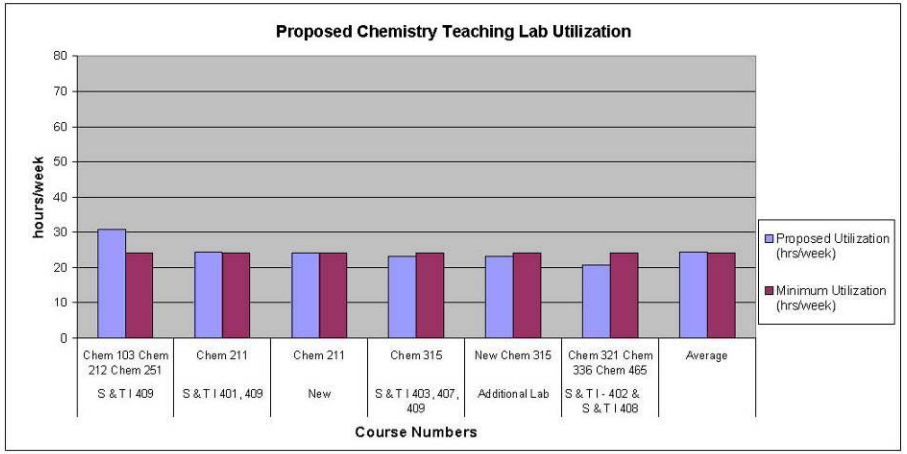


S & T 1 - Science and Technology Building 1

Utilization Analysis of Chemistry Teaching Labs - 2007
George Mason University

Proposed Utilization

Building / Room Number	Courses	Number of Students	Enrollment Count	Course Name	Proposed Utilization (hrs/week)	Minimum Utilization (hrs/week)	Existing Square Footage (s.f.)	Proposed Square Footage (s.f.)	Comments
S & T I 409	Chem 103 Chem 212 Chem 251	18	209	Chem Sci in Mod Soc I Lab, General Chemistry II Lab and General Chem for Engineers Lab	30.8	24	1365	930	
S & T I 401, 409	Chem 211	24	376	General Chemistry I Lab	24.4	24	1411	1240	
New	**Chem 211**	**24**		**General Chemistry I Lab**	**24**	**24**		**1240**	
S & T I 403, 407, 409	Chem 315	18	304	Organic Chemistry I Lab	23	24	1130	1240	Room 409 is 1365 s.f.
Additional Lab	**New Chem 315**	**18**		**Organic Chemistry I Lab**	**23**	**24**		**930**	
S & T I - 402 & S & T I 408	Chem 321 Chem 336 Chem 465	18	90	Elem Quantatative Analysis Lab and Physical Chemistry I Lab, Biochemistry Lab	20.5	24	1160	1240	Room 402 is 1100 s.f.
	Average				**24**	**24**			
Effective (of 24 hours)					**24**	**24**			
total net square footage- teaching labs proposed.							5066	6820	
			979						



S & T 1 - Science and Technology Building 1

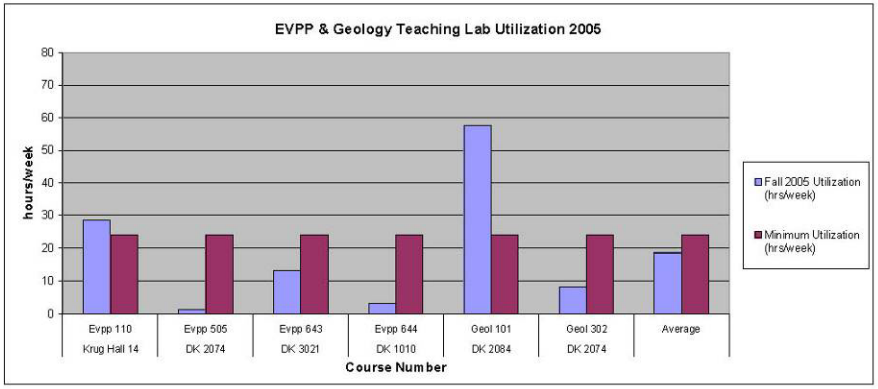
Fairfax Utilization Analysis

PERKINS +WILL

Utilization Analysis of EVPP & Geology Teaching labs - 2005
George Mason University

Current Utilization

Building / Room Number	Courses	Number of Students	Enrollment Count	Course Names	Fall 2005 Utilization (hrs/week)	Minimum Utilization (hrs/week)	Existing Square Footage (s.f.)	Proposed Square Footage (s.f.)	Comments
R B108	Geol 317	18	30	Geomorphology	NA	24	1201		NON LAB. Classroom assigned to Registrar
Krug Hall 14	Evpp 110	24	315	Ecosphere: Environ Sci I	28.5	24	816		
DK 2074	Evpp 505	15 ?	3	Rivers & Drainage Basins	1.25	24			Room s.f. accounted for
DK 3021	Evpp 643	3	3	Microbial Ecology	13.34	24	883		
DK 1010	Evpp 644	14	6	Wetland Ecology & Management	3	24	Need Info		COS to verify square footage and use?
DK 2084	Geol 101	28 ?	594	Introductory Geology I	57.5	24	1188		
DK 2074	Geol 302	15 ?	19	Mineralogy	8.25	24	663		
	Average				**19**	**24**			
Effective (of 24 hours)					**19**	**24**			
			970						
Total net square footage teaching labs							3550		



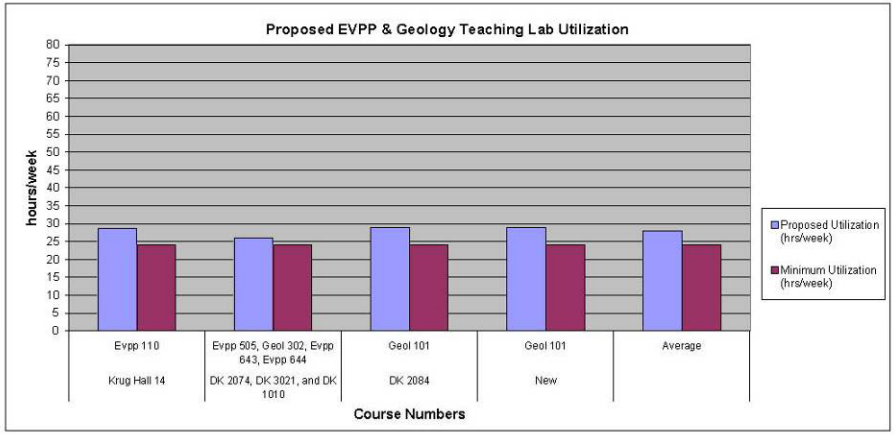
KH: Krug Hall
DK: David King Hall

Notes:
1. Need more info on EVPP 555 Lab-Waterscape Ecology.

Utilization Analysis of EVPP & Geology Teaching labs - 2005
George Mason University

Proposed Utilization

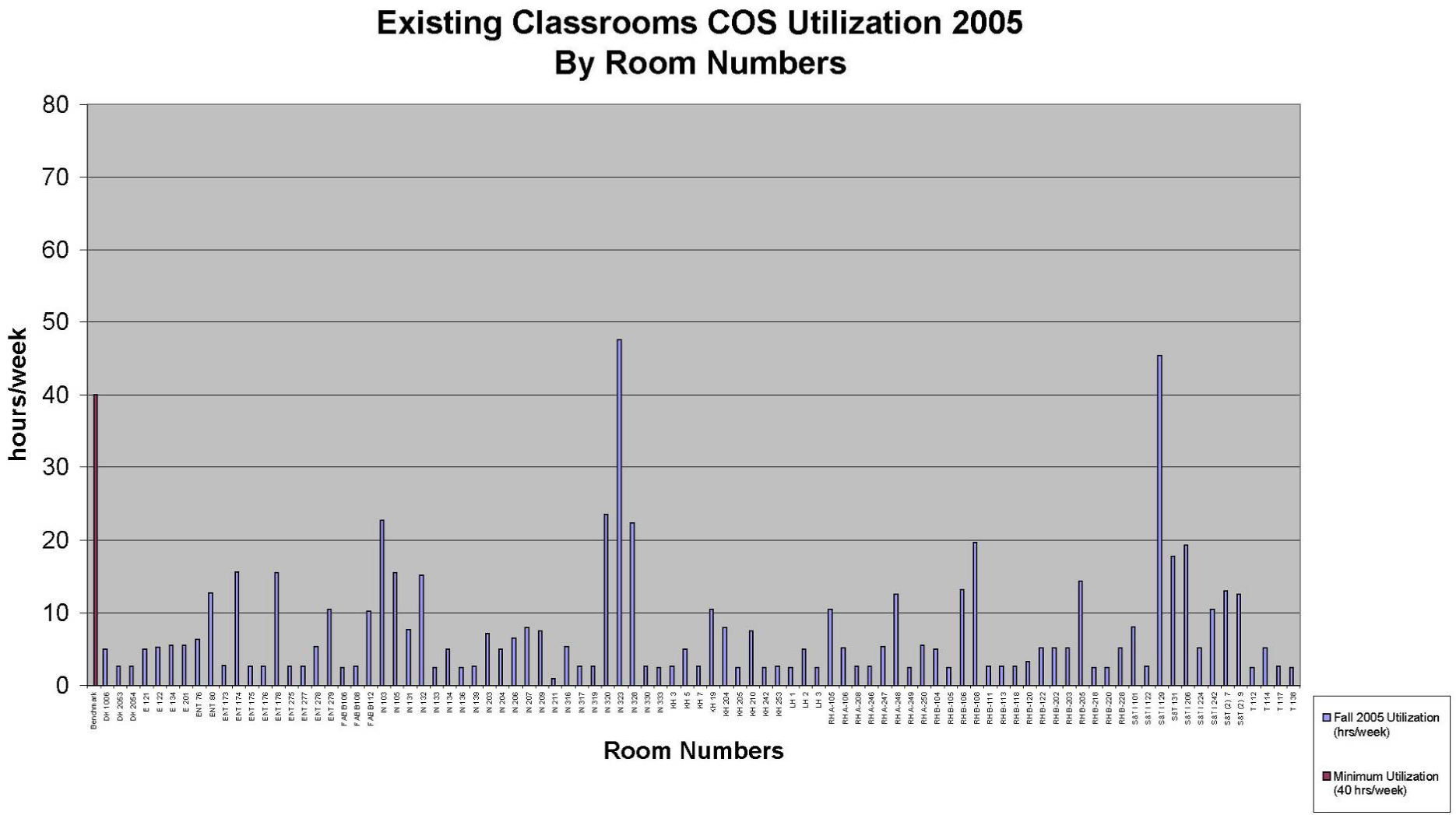
Building / Room Number	Courses	Number of Students	Enrollment Count	Course Name	Proposed Utilization (hrs/week)	Minimum Utilization (hrs/week)	Existing Square Footage (s.f.)	Proposed Square Footage (s.f.)	Comments
Krug Hall 14	Evpp 110	24	315	Ecosphere: Environ Sci I	28.5	24	816	1240	
DK 2074, DK 3021, and DK 1010	Evpp 505, Geol 302, Evpp 643, Evpp 644	18	61	Rivers & Drainage Basins, Mineralogy, Microbial Ecology, and Wetland Ecology & Management	25.84	24	663	930	Verify size of room and # of students??
DK 2084	Geol 101	24	594	Introductory Geology I	28.75	24	1188	1240	
New	**Geol 101**	**24**		**Introductory Geology I**	**28.75**	**24**		**1240**	**Proposed**
	Average				**28**	**24**			
Effective (of 24 hours)					**28**	**24**			
total net square footage									
total gross Square footage teaching labs recommended			970						



KH: Krug Hall
DK: David King Hall

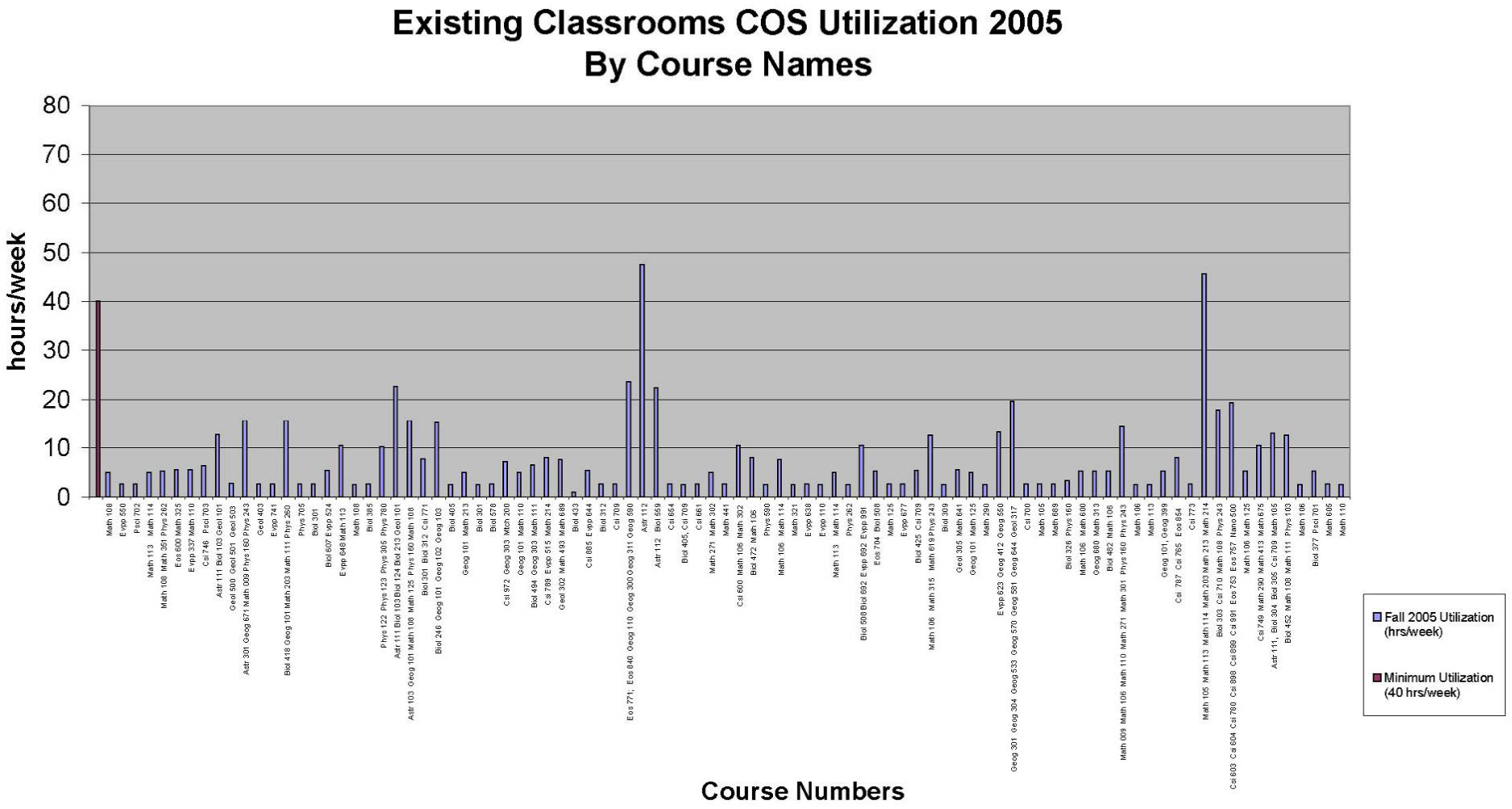
Fairfax Utilization Analysis

PERKINS +WILL



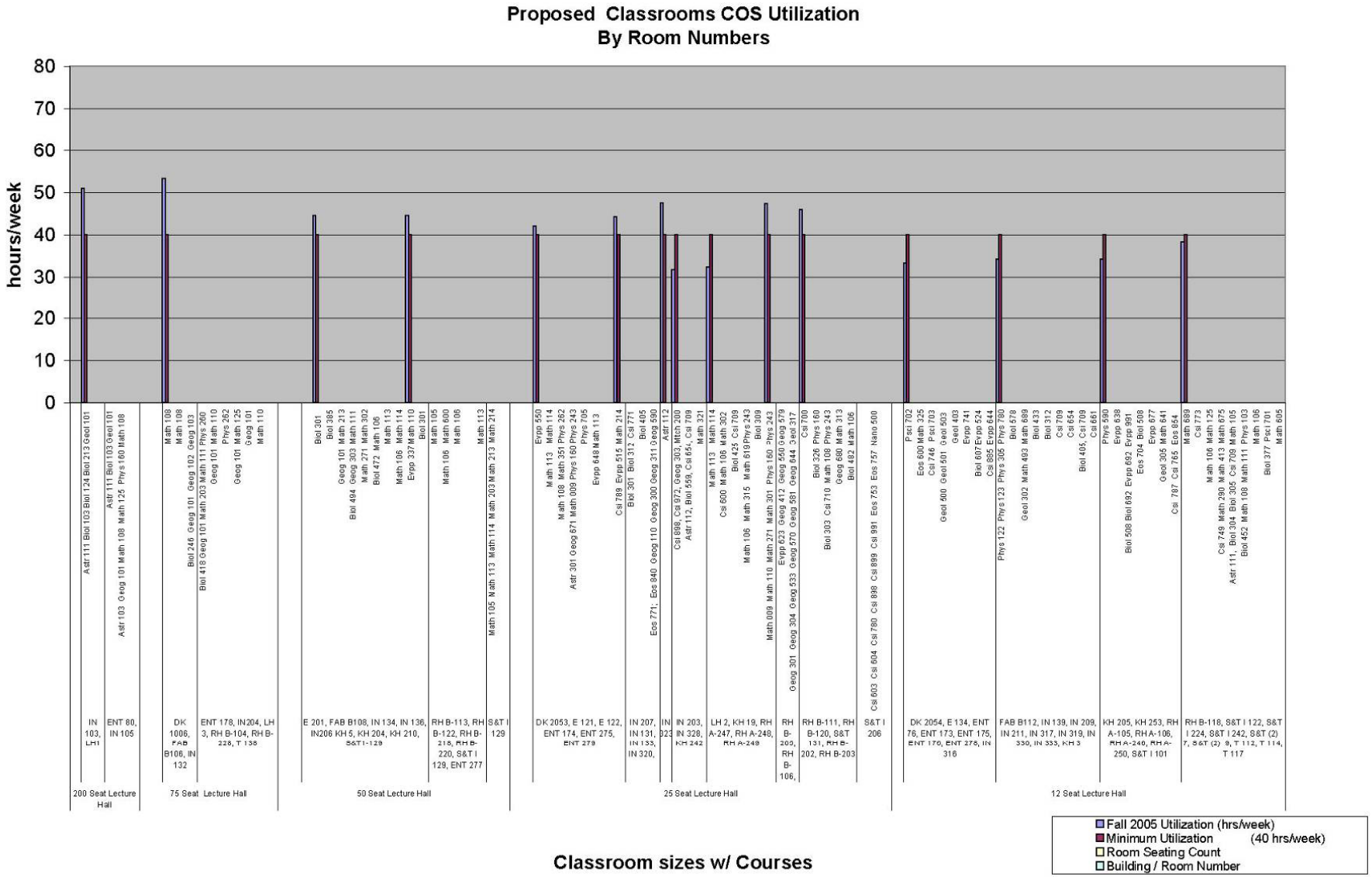
Fairfax Utilization Analysis

PERKINS +WILL



Fairfax Utilization Analysis

PERKINS +WILL



Fairfax Research Centers Program Summary

PERKINS + WILL

D. Fairfax Research Centers Program

As mentioned in the Fairfax academic discussion, Research 1 should be reconfigured to allow for primarily research based work. As well as serving established centers and research units, the building should contain research incubator suites to be made available for new research opportunities. The building's current configuration should be reconfigured to a design that will encourage increased interaction and will impart a atmosphere for a community of science to prosper.

Program Summary - Fairfax		
Research / Center Programs	**Existing**	**New**
Joint Center for Intelligent Spatial Computing	0	1,332
Ctr. For Earth Observing and Space Research	10456	1,482
Center for Spatial Informational Science & System (CS	2331	3,600
Geo Int/ Partner with Draper Labs, USGIF, & NOAA	0	3,978
Partner with COLA	0	3,312
Clean Water and Sustainable Technologies	0	0
Center For Neural Dynamics	0	0
Center for Quantum Science	537	1,776
Computational Materials Science Center	0	432
Computational Fluid Dynamics	0	864
Lab for Space Weather	0	1,482
Climate and Society COS	0	2,676
Net Subtotal	13,324	20,934
Contingency 10%	1,332	2,093
Total Net Square Feet	**14,656**	**23,027**
Net to Gross Efficiency (Estimated)	0.55%	0.55%
Total Gross Square Feet	**26,648**	**41,868**

Fairfax Research Centers Distribution Summary

PERKINS + WILL

Program Summary - Fairfax			Available COS Buildings (Available NSF inc. University Space)								
	Existing	New	15589	54676	28500	53806	29457	701			
	Total NSF	Total NSF	3rd of DKH	S&T 1	Exp. to S&T 2	S&T 2	Res 1	JC	Future Project	Balance	Notes on What is Defferred/Future Project
Program Summary - Fairfax											
Research / Center Programs	**Existing**	**New**	3rd of DKH	S&T 1	Exp. to S&T 2	S&T 2	Res 1	JC	Future Project	Balance	
Joint Center for Intelligent Spatial Computing	0	1,332					1,332				
Ctr. For Earth Observing and Space Research	10456	1,482					1,482				
Center for Spatial Informational Science & System (CS	2331	3,600					2,880		720		
Geo Init/ Partner with □Draper Labs, USGIF, & NOAA	0	3,978					3,978				
Partner with COLA	0	3,312					3,312				
Clean Water and Sustainable Technologies	0	0					0				
Center For Neural Dynamics	0	0					0				In Krasnow
Center for Quantum Science	537	1,776					1,776				
Computational Materials Science Center	0	432					432				Broken out from CDS
Computational Fluid Dynamics	0	864					864				Broken out from CDS
Lab for Space Weather	0	1,482					1,482				
Climate and Society COS	0	2,676					2,676				
Net Subtotal	13,324	20,934	0	0	0	0	20,214	0	720	0	
Contingency 10%	1,332	2,093									
Total Net Square Feet	**14,656**	**23,027**									
Net to Gross Efficiency (Estimated)	0.55%	0.55%									
Total Gross Square Feet	**26,648**	**41,868**									

Fairfax Research Centers Program

PERKINS +WILL

George Mason University- COS Research Centers

5.04.09	Program Summary - Fairfax	Existing Spaces			Academic Year 2016-17			Comments
							New	
	Room Name		NSF	Total NSF		NSF	Total NSF	
	Research / Center Programs							
	Joint Center for Intelligent Spatial Computing			0			1,332	
	Ctr. For Earth Observing and Space Research			10,456			1,482	
	Center for Spatial Informational Science & System (CSISS) - Formerly LAITS at Greenbelt			2,331			3,600	
	Geo Int/ Partner with Draper Labs, USGIF, & NOAA			0			3,978	
	Partner with COLA			0			3,312	
	Clean Water and Sustainable Technologies			0			0	no space needed
	Center For Neural Dynamics			0			0	located at Krasnow
	Center for Quantum Science			537			1,776	
	Computational Materials Science Center			0			432	
	Computational Fluid Dynamics			0			864	
	Lab for Space Weather			0			1,482	
	Climate and Society COS			0			2,676	
	Net Subtotal			13,324			20,934	
	Contingency 10%			10%			10%	
	Total Net Square Feet			**14,656**			**23,027**	
	Net to Gross Efficiency (Estimated)			0.55%			0.55%	
	Total Gross Square Feet			**26,648**			**41,868**	

Fairfax Research Centers Program

PERKINS +WILL

George Mason University- COS Research Centers

5.04.09	Intelligent Spatial Computing - Fairfax		Existing Spaces			Based on FY 16-17 Program				Comments
								New	Floor	
Course Number	Room Name	Number Students				Quantity	NSF	Total NSF		
	Research Labs									
	Research Lab		0	0	0	1	900	900		
	Office Research Non Fac		0	0	0	0	0	0		
	Workroom		0	0	0	1	288	288		
				Total	**0**		**Total**	**1,188**		
	Offices									
	Full-time Faculty		0	0	0	1	144	144		
	Part-time Faculty		0	0	0	0	0	0		
	GRA		0	0	0	0	0	0		5 counted in GGS center
				Total	**0**		**Total**	**144**		
	Conference Rooms		0	0	0	0	0	0		
	Seminar / Conference Room		0	0	0	0	0	0		
			0	0	0	0	0	0		
				Total	**0**		**Total**	**0**		
	Storage									
	Equipment Storage		0	0	0	0	0	0		
				Total	**0**		**Total**	**0**		
	Total NSF				**0**			**1,332**		
	Net/ Gross Factor				0.55%			0.55%		
	Total Gross Square Feet				**0**			**2,422**		

Notes: Potential Incubator type space. Limited funding source.

Fairfax Research Centers Program

PERKINS + WILL

George Mason University- COS Research Centers

5.04.09	Center For Earth Observing and Space Research - Fairfax		Existing Spaces			Based on FY 16-17 Program				Comments	Proposed Hours Per Week
								New	Floor		
Course Number	Room Name	Number Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Research Labs										
	Research / Non Class Lab		2	0	1,399	1	900	900			
	Service - Prep room		0	0	0			0			
	Workroom		0	0	0	1		288			
				Total	**1,399**		**Total**	**1,188**			
	Offices										
	Office - Faculty		5	0	694	0	0	0			
	Office Research / Non Fac.		21	0	2,931	0	0	0			
	Staff/Admin Workstation		4	0	468	0	64	0			
	FT Instructional Faculty		0	0	0	0	144	0			
	PT Instructional Faculty		0	0	0	0	100	0			
	FT Research Faculty		0	144	0	1	144	144			
	PT Research Faculty		0	100	0	0	100	0			
	Admin Faculty		0	120	0	0	120	0			
	Visiting Faculty		0	0	0	0	144	0			
	Adjunct Faculty		0	0	0	0	100	0			
	Senior Research		0	0	0	0	64	0			
	GRA		3	0	1,997	5	30	150			
	GTA		0	0	0	0	56	0			
	Circulation		0	0	2,480	0	0	0			
				Total	**8,570**		**Total**	**294**			
	Conference Rooms										
	Seminar / Conference Room		1	0	202	0	0	0			
	Student Group Study		0	0	0	0	0	0			
				Total	**202**		**Total**	**0**			
	Storage										
	Work Room		0	0	0	0	0	0			
	Filing/Copy/Storage/Mail		1	178	178	0	0	0			
	Dept. Storage		1	107	107	0	0	0			
				Total	**285**		**Total**	**0**			
	Total NSF				10,456			1,482			
	Net/ Gross Factor				0.55%			0.55%			
	Total Gross Square Feet				**19,011**			**2,695**			

Notes: Six areas at Research 1 were given for Dept. Circulation. Corr1,2,3,4,7& 8 totaling 2765 sf. - not included in total Existing NSF.

Fairfax Research Centers Program

PERKINS + WILL

George Mason University- COS Research Centers

5.04.09	Informational Science & System (CSISS)		Existing Spaces			Based on FY 16-17 Program				Comments
								New	Floor	
Course Number	Room Name	Number of People	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF		
	Offices									
	Waiting/Reception		1	0	321	0	64	0		
	Office Research Non Lab		4	0	622	0	64	0		
	Staff/Admin Workstation		0	0	0	0	64	0		
	FT Instructional Faculty		0	0	0	0	144	0		
	PT Instructional Faculty		0	0	0	0	100	0		8 per 800sf Suite-includes conf.
	FT Research Faculty		0	0	0	25	144	3,600		
	PT Research Faculty		0	0	0	0	100	0		8 per 800sf Suite-includes conf.
	Admin Faculty		0	0	0	0	120	0		
	Visiting Faculty		0	0	0	0	144	0		
	Adjunct Faculty		0	0	0	0	100	0		8 per 800sf Suite-includes conf.
	Senior Research		0	0	0	0	64	0		
	GRA		5	0	642	0	30	0		4 per 120sf Suite-includes conf.
	GTA		0	0	0	0	56	0		8 per 450sf Suite-includes conf.
	Circulation		0	0	261	0	56	0		8 per 450sf Suite-includes conf.
				Total	**1,846**		**0**	**3,600**		
	Conference Room									
	Seminar / Conference Room		1	270	270	0	0	0		
				Total	**270**		**Total**	**0**		
	Storage									
	Filing/Copy/Storage/Mail		3	0	215	0	0	0		Storage room is 15 s.f.
	Pantry		0	0	0	0	0	0		
				Total	**215**		**Total**	**0**		
	Total NSF				**2,331**			**3,600**		
	Net/ Gross Factor				0			0		
	Total Gross Square Feet				**4,238**			**6,545**		

Fairfax Research Centers Program

PERKINS + WILL

George Mason University- COS Research Centers

5.04.09	Draper Labs, USGIF, and NOAA		Existing Spaces			Based on FY 16-17 Program				Comments
								New	Floor	
Course Number	Room Name	Number Students				Quantity	NSF	Total NSF		
	Research Labs									
	Research Lab		0	0	0	2	900	1,800		Research 1 room 290
	Office Research Non Fac		0	0	0	0	0	0		
	Workroom		0	0	0	2	288	576		
				Total	**0**		**Total**	**2,376**		
	Offices									
	Full-time Faculty		0	0	0	6	144	864		
	Part-time Faculty		0	0	0	0	0	0		
	GRA		0	0	0	15	30	450		
				Total	**0**		**Total**	**1,314**		
	Conference Rooms									
	Seminar / Conference Room		0	0	0	1	288	288		
				Total	**0**		**Total**	**288**		
	Storage									
	Equipment Storage		0	0	0	0	0	0		
				Total	**0**		**Total**	**0**		
	Total NSF				**0**			**3,978**		
	Net/ Gross Factor				0.55%			0.55%		
	Total Gross Square Feet				**0**			**7,233**		

Fairfax Research Centers Program

PERKINS + WILL

George Mason University- COS Research Centers

5.04.09	Partner with COLA - Fairfax		Existing Spaces			Based on FY 16-17 Program				Comments
								New	Floor	
Course Number	Room Name	Number Students				Quantity	NSF	Total NSF		
	Research Labs									
	Research Lab		0	0	0	0	0	0		
	Office Research Non Fac		0	0	0	0	0	0		
	Workroom		0	0	0	1	288	288		
				Total	**0**		**Total**	**288**		
	Offices									
	Full-time Faculty		0	144	0	21	144	3,024		
	Part-time Faculty		0	0	0	0	0	0		
	GRA		0	0	0	0	0	0		
				Total	**0**		**Total**	**3,024**		
	Conference Rooms									
	Seminar / Conference Room		0	0	0	0	0	0		
	Faculty Break Room		0	0	0	0	0	0		Share with COS
				Total	**0**		**Total**	**0**		
	Storage									
	Equipment Storage		0	0	0	0	0	0		
				Total	**0**		**Total**	**0**		
	Total NSF				**0**			**3,312**		
	Net/ Gross Factor				0.55%			0.55%		
	Total Gross Square Feet				**0**			**6,022**		

Notes: Currently off site (MD) staff to come to Fairfax eventually.

Fairfax Research Centers Program

PERKINS + WILL

George Mason University- COS Research Centers

5.04.09	Sustainable Technologies - Fairfax		Existing Spaces			Based on FY 16-17 Program				Comments
								New	Floor	
Course Number	Room Name	Number Students				Quantity	NSF	Total NSF		
	Research Labs									
	Research Lab		0	0	0	0	0	0		
	Office Research Non Fac		0	0	0	0	0	0		
	Workroom		0	0	0	0	0	0		
				Total	**0**		**Total**	**0**		
	Offices									
	Full-time Faculty		0	0	0	0	0	0		
	Part-time Faculty		0	0	0	0	0	0		
	GRA		0	0	0	0	0	0		
				Total	**0**		**Total**	**0**		
	Conference Rooms									
	Seminar / Conference Room		0	0	0	0	0	0		
	Faculty Break Room		0	0	0	0	0	0		Shared COS
				Total	**0**		**Total**	**0**		
	Storage									
	Equipment Storage		0	0	0	0	0	0		
				Total	**0**		**Total**	**0**		
	Total NSF				**0**			**0**		
	Net/ Gross Factor				0.55%			0.55%		
	Total Gross Square Feet				**0**			**0**		

Notes: No new space requirements are needed for this center. Currently, Located at Chemistry S&T 1 room 402.

Fairfax Research Centers Program

PERKINS +WILL

George Mason University- COS Research Centers

5.04.09	Center For Neural Dynamics - Fairfax		Existing Spaces			Based on FY 16-17 Program				Comments
								New	Floor	
Course Number	Room Name	Number Students				Quantity	NSF	Total NSF		
	Research Labs									
	Research Lab		0	0	0	0	0	0		
	Office Research Non Fac		0	0	0	0	0	0		
	Workroom		0	0	0	0	0	0		
				Total	**0**		**Total**	**0**		
	Offices									
	Full-time Faculty		0	0	0	0	0	0		
	Part-time Faculty		0	0	0	0	0	0		
	GRA		0	0	0	0	0	0		
				Total	**0**		**Total**	**0**		
	Conference Rooms									
	Seminar / Conference Room		0	0	0	0	0	0		
				Total	**0**		**Total**	**0**		
	Storage									
	Equipment Storage		0	0	0	0	0	0		
				Total	**0**		**Total**	**0**		
	Total NSF				**0**			**0**		
	Net/ Gross Factor				0.55%			0.55%		
	Total Gross Square Feet				**0**			**0**		

Notes: Located within Krasnow.

Fairfax Research Centers Program

PERKINS + WILL

George Mason University- COS Research Centers

5.04.09	Center for Quantum Science - Fairfax		Existing Spaces			Based on FY 16-17 Program					Comments
								New	Renovate	Floor	
Course Number	Room Name	Number of People	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF	Total NSF		
	Research Labs										
	Computer Workshop (Lab)		0	0	0	1	900	900	0		
	Office - Research/Non-Fac		0	144	0	0	0	0			
	Workroom		0	0	0	1	288	288	0		
				Total	**0**		**Total**	**1,188**	0		
	Offices										
	Office - Research Non Faculty		1	144	144	0	0	0			
	FT Instructional Faculty		0	0	0	0	0	0			
	PT Instructional Faculty		0	100	0	0	100	0			
	FT Research Faculty		2	144	393	2	144	288			
	PT Research Faculty		0	100	0	0	100	0			
	Admin Faculty		0	120	0	0	120	0			
	Visiting Faculty		0	144	0	0	144	0			
	Adjunct Faculty		0	100	0	0	100	0			
	Senior Research		0	64	0	0	64	0	0		
	GRA		0	0	0	10	30	300			
	GTA		0	0	0	0	56	0	0		
				Total	**537**		**Total**	**588**	0		
	Conference Rooms										
	Seminar / Conference Room		0	0	0	0	0	0	0		
				Total	**0**		**Total**	**0**	0		
	Storage										
	Equipment Storage		0	0	0	0	0	0	0		
				Total	**0**		**Total**	**0**	0		
	Total NSF				**537**			**1,776**	**0**		
	Net/ Gross Factor				0.55%			0.55%	0.55%		
	Total Gross Square Feet				**976**			**3,229**	**0**		

Fairfax Research Centers Program

PERKINS + WILL

George Mason University- COS Research Centers

5.04.09	Materials Science Center - Fairfax		Existing Spaces			Based on FY 16-17 Program				Comments
								New	Floor	
Course Number	Room Name	Number Students				Quantity	NSF	Total NSF		
	Research Labs									
	Research Lab		0	0	0	0	0	0		
	Office Research Non Fac		0	0	0	0	0	0		
	Workroom		0	0	0	0	0	0		
				Total	**0**			**Total**	**0**	
	Offices									
	Full-time Faculty		0	0	0	3	144	432		
	Part-time Faculty		0	0	0	0	0	0		
	GRA		0	0	0	0	0	0		
				Total	**0**			**Total**	**432**	
	Conference Rooms									
	Seminar / Conference Room		0	0	0	0	0	0		
				Total	**0**			**Total**	**0**	
	Storage									
	Equipment Storage		0	0	0	0	0	0		
				Total	**0**			**Total**	**0**	
	Total NSF				0			432		
	Net/ Gross Factor				0.55%			0.55%		
	Total Gross Square Feet				**0**			**785**		

Fairfax Research Centers Program

PERKINS + WILL

George Mason University- COS Research Centers

5.04.09	Computational Fluid Dynamics - Fairfax		Existing Spaces			Based on FY 16-17 Program				Comments
								New	Floor	
Course Number	Room Name	Number Students				Quantity	NSF	Total NSF		
	Research Labs									
	Research Lab		0	0	0	0	0	0		
	Office Research Non Fac		0	0	0	0	0	0		
	Workroom		0	0	0	0	0	0		
				Total	0		Total	0		
	Offices									
	Full-time Faculty		0	0	0	6	144	864		
	Part-time Faculty		0	0	0	0	0	0		
	GRA		0	0	0	0	0	0		
				Total	0		Total	864		
	Conference Rooms									
	Seminar / Conference Room		0	0	0	0	0	0		
				Total	0		Total	0		
	Storage									
	Equipment Storage		0	0	0	0	0	0		
				Total	0		Total	0		
	Total NSF				0			864		
	Net/ Gross Factor				0.55%			0.55%		
	Total Gross Square Feet				0			1,571		

Notes: Located within Krasnow.

Fairfax Research Centers Program

PERKINS + WILL

George Mason University- COS Research Centers

5.04.09	Lab for Space Weather - Fairfax		Existing Spaces			Based on FY 16-17 Program				Comments
								New	Floor	
Course Number	Room Name	Number Students				Quantity	NSF	Total NSF		
	Research Labs									
	Research Lab		0	0	0	1	900	900		
	Office Research Non Fac		0	0	0	0	0	0		
	Workroom		0	0	0	1	288	288		
				Total	**0**		**Total**	**1,188**		
	Offices									
	Full-time Faculty		0	0	0	1	144	144		
	Part-time Faculty		0	0	0	0	0	0		
	GRA		0	0	0	5	30	150		
				Total	**0**		**Total**	**294**		
	Conference Rooms									
	Seminar / Conference Room		0	0	0	0	0	0		Shared COS
				Total	**0**		**Total**	**0**		
	Storage									
	Equipment Storage		0	0	0	0	0	0		
				Total	**0**		**Total**	**0**		
	Total NSF				**0**			**1,482**		
	Net/ Gross Factor				0.55%			0.55%		
	Total Gross Square Feet				**0**			**2,695**		

Notes: Existing included in CDS-- one office.

Fairfax Research Centers Program

PERKINS + WILL

George Mason University- COS Research Centers

5.04.09	Climate and Society COS - Fairfax		Existing Spaces			Based on FY 16-17 Program				Comments
								New	Floor	
Course Number	Room Name	Number Students				Quantity	NSF	Total NSF		
	Research Labs									
	Research Lab		0	0	0	2	900	1800		
	Office Research Non Fac		0	0	0	0	0	0		
	Workroom		0	0	0	1	288	288		
				Total	**0**		**Total**	**2088**		
	Offices									
	Full-time Faculty		0	0	0	2	144	288		
	Part-time Faculty		0	0	0	0	0	0		
	GRA		0	0	0	10	30	300		
				Total	**0**		**Total**	**588**		
	Conference Rooms									
	Seminar / Conference Room		0	0	0	0	0	0		
				Total	**0**		**Total**	**0**		
	Storage									
	Equipment Storage		0	0	0	0	0	0		
				Total	**0**		**Total**	**0**		
	Total NSF				**0**			**2,676**		
	Net/ Gross Factor				0.55%			0.55%		
	Total Gross Square Feet				**0**			**4,865**		

E. Prince William Campus Program

On the Prince William campus (PWC) ongoing projects, the business plan, and the master plan have determined the following upcoming projects for the COS:

- The Biomedical Research Laboratory (BRL) space, BSL-3 lab, which is currently nearing completion.
- A new 33,000 nsf lease space or new building for current CAPMM and future research growth needs.
- A new building or 45,000 nsf of lease space within 5 years to allow for biomedical education partnerships.

The Prince William campus is focused on life science research. While research is the primary endeavor some upper level graduate courses are taught on the campus.

To accommodate the projected growth out in PW, Mason may need to look into leasing. Growth over the next five years will not be sustained without space. The business plan and programming document points to a need for a building.

The BRL space will be ready January 2010. 3 to 4 labs will become available in existing space. One is located in Bull Run and the other three are in Discovery Hall. Discovery Hall is not a teaching conducive building due to security issues. Some users will need to be shuffled around. CAPMM would be expensive to move. Biochemist might be able to switch labs. Forensics will take over vacated space with some shuffling.

MMB and Life Sciences are the largest occupants at the PW campus. A new Forensics program was slated to begin the fall of 2009. It will be part of the Chemistry department. The program will have 25-30 students per year. The 2 year masters program will offer full time classes in the day time. There will be a need for 2 additional forensic chemistry labs and forensic biology labs. 2 adjuncts will be hired and 2 additional faculty will need labs- one teaching and one research. The Forensics group will need a total of 2 classrooms for 24 students each and 2 teaching labs at 930 sf.

Prince William Campus Program Summary

PERKINS +WILL

George Mason University- Prince William Campus												
05.04.09	Program Summary		Existing				Recommended Program					Comments
					Existing				New		Floor	
Course Number	Room Name			NSF	Total NSF			NSF	Total NSF			
	College of Science Administration			962	962			1,800	1,800			
	Molecular and Microbiology			3,272	3,272			3,416	3,416			
	Geographic Information Science			1,136	1,136			1,289	1,289			
	Chemistry			2,683	2,683			7,311	7,311			
	Environmental Science & Policy			8,594	8,594			9,482	9,482			
	BioInformatics			10,605	10,605			11,828	11,828			
	Life Sciences			25,356	25,356			30,325	30,325			
	BRL			5,109	5,109			58,105	58,105			new bldg under construction
	CAPMM							10,995	10,995			
	New Growth Space							14,175	14,175			
	Total Net Square Feet			**57,717**	**57,717**			**148,726**	**148,726**			
	Net to Gross Efficiency			0.55%	0.55%			0.55%	0.55%			
	Total Gross Square Feet			**104,940**	**104,940**			**270,411**	**270,411**			
Note: 10% growth is 115,898 nsf. 149,000 nsf needs based on newly planned project for BRL, CAPMM projected growth from programming done in fall of 2008 ,and Forensics program needs. A pending future project has not been factored into growth p												

Prince William Campus Program

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George Mason University- Prince William Campus

05.04.09	College of Science Administration		Existing				Recommended Program					Comments
					New	Renovate			New		Floor	
Course Number	Room Name	Number of People	Quantity	NSF	Total NSF	Total NSF	Quantity	NSF	Total NSF			
	Administrative Offices											
	Chair		0	184	-	-	0	184	-			
	Reception		0	144	-	-	0	144	-			
	Office		0	144	-	-	0	144	-			
	PT Office		0	100			0	100	-			
	GRA		0	30			0	30	-			
									-			
				Total	-	-		**Total**	-			
	Research Labs											
	Research/ Non-Class Lab		1	962	962	-	2	900	1,800			
				Total	**962**	**-**		**Total**	**1,800**			
	Conference Room											
	Conference Room		0	200	-	-	0	200	-			
				Total	**-**	**-**			**-**			
	Shops/ Storage											
	Filing/Copy/Storage		0	150	-		0	150	-			
				Total	**-**	**-**		**Total**	**-**			
	Total NSF				**962**	**-**			**1,800**			
	Net/ Gross Factor				0.55%	0.55%			0.55%			
	Total Gross Square Feet				**1,749**	**-**			**3,273**			

Prince William Campus Program

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George Mason University- Prince William Campus

05.04.09	Molecular and Microbiology		Existing				Recommended Program					Comments	Proposed Hours Per Week
					Existing				New		Floor		
Course Number	Course Name	Number of Students	Quantity	NSF	Total NSF		Quantity	NSF	Total NSF				
	Teaching Labs						0						
	Research/Nonclass Lab		1	632	632		1	632	632				
	Research/Nonclass Lab		1	630	630		1	630	630				
	Research/ Nonclass Lab		1	634	634	-	1	634	634				
	Research/ Nonclass Lab		1	311	311	-	1	311	311				
					-	-			-				
					-	-			-				
				Total	**2,207**	**-**		**Total**	**2,207**				
	Research Labs												
	Research Lab		0		-	-	0		-				
				Total	**-**	**-**		**Total**	**-**				
	Administrative Offices												
	Office Services- Dept Circulation		1	48	48	-	1	48	48				
	Office- Research/ Non-Fac		1	117	117	-	1	117	117				
	Office- Research/ Non-Fac		1	83	83	-	1	83	83				
	Office- Research/ Non-Fac		1	111	111	-	1	111	111				
	Office -GRA		1	489	489	-	1	489	489				
	Office -Faculty		1	110	110		1	110	110				
	Office-Faculty		1	107	107		1	107	107				
	Office-Faculty		0	144	-		1	144	144			new per 3% growth	
				Total	**1,065**	**-**		**Total**	**1,209**				
	Conference Room												
				Total	**-**	**-**			**-**				
	Shops/ Storage												
			0		-		0		-				
			0	-	-	-	0	-	-				
			0	-	-	-	0	-	-				
				Total	**-**	**-**		**Total**	**-**				
	Total NSF				**3,272**	**-**			**3,416**				
	Net/ Gross Factor				0.55%	0.55%			0.55%				
	Total Gross Square Feet				**5,949**	**-**			**6,211**				

Notes:
MMB's faculty offices and research are accommodated on the Prince William campus. All of the undergraduate teaching takes place in Fairfax, however.

Prince William Campus Program

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George Mason University- Prince William Campus

05.04.09	Geographic Information Scienc		Existing				Recommended Program					Comments	Proposed Hours Per Week
					New	Renovate			New		Floor		
Course Number	Room Name	Number of People	Quantity	NSF	Total NSF	Total NSF	Quantity	NSF	Total NSF				
	Teaching Labs												
				Total	**-**	**-**		**Total**	**-**				
	Research Labs												
	Research Non Class Lab		1	925	925	-	1	925	925				
				Total	**925**	**-**		**Total**	**925**				
	Administrative Offices												
	Office Faculty		1	124	124	-	1	144	144				
	Office Faculty		1	87	87	-	1	100	100				
	GRA						4	30	120				
				Total	**211**	**-**		**Total**	**364**				
	Conference Rooms												
				Total	**-**	**-**		**Total**	**-**				
	Shops/ Storage												
				Total	**-**	**-**		**Total**	**-**				
	Total NSF				1,136	-			1,289				
	Net/ Gross Factor				0.55%	0.55%			0.55%				
	Total Gross Square Feet				**2,065**	-			**2,344**				

Notes: 10% growth

Prince William Campus Program

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George Mason University- Prince William Campus

05.04.09	Chemistry		Existing				Recommended Program					Comments
					Existing				New		Floor	
Course Number	Course Name	Number of Students	Quantity	NSF	Total NSF		Quantity	NSF	Total NSF			
	Teaching Labs											
	Foresenics Classroom	24					2	1,240	2,480			
	Forensics Teaching Lab						2	930	1,860			
				Total	**-**	**-**		**Total**	**4,340**			
	Research Labs											
	Research/ Non-Class Lab		1	385	385	-	1	385	385			
	Research/ Non-Class Lab		1	978	978	-	1	978	978			
	Research/ Non Class Lab		1	929	929	-	1	929	929			
				Total	**2,292**	**-**		**Total**	**2,292**			
	Administrative Offices											
	Office- Faculty		1	126	126		1	126	126			
	Office - Faculty		1	96	96		1	96	96			
	Office- Faculty		1	169	169	-	1	169	169			
	Office						2	144	288			
				Total	**391**	**-**		**Total**	**679**			
	Conference Rooms											
	Faculty Conference		0	200	-	-	0		-			
	Student Group Study		0	300	-	-	0		-			
	Seminar Room		0	1,000	-	-	0		-			
	Coffee		0	-	-	-	0	-	-			
				Total	**-**	**-**		**Total**	**-**			
	Shops/ Storage											
	Filing/Copy/Storage		0	150	-	-	0	150	-			
	Dept. Storage		0	150	-	-	0	150	-			
	Equipment Storage			-	-	-		-	-			
				Total	**-**	**-**		**Total**	**-**			
	Total NSF				**2,683**	**-**			**7,311**			
	Net/ Gross Factor				0.55%	0.55%			0.55%			
	Total Gross Square Feet				**4,878**	**-**			**13,293**			

Prince William Campus Program

PERKINS + WILL

George Mason University- Prince William Campus

05.04.09	Environmental Science & Policy		Existing				Recommended Program per P+W					Comments
					New	Renovate			New		Floor	
Course Number	Course Name	Number of Students	Quantity	NSF	Total NSF	Total NSF	Quantity	NSF	Total NSF			
	Teaching Labs											
				Total	**-**	**-**			**Total**	**-**		
	Research Labs											
	Research/ Nonclass Lab		1	367	367		1	367	367			
	Research/ Nonclass Lab		2	448	896		2	448	896			
	Research/ Nonclass Lab		2	514	1,028		2	514	1,028			
	Research/ Nonclass Lab		2	466	932		2	466	932			
	Research/ Nonclass Lab		1	105	105		1	105	105			
	Research/ Nonclass Lab		3	102	306		3	102	306			
	Research/ Nonclass Lab		1	124	124		1	124	124			
	Research/ Nonclass Lab		1	371	371		1	371	371			
	Research/ Nonclass Lab		2	452	904	-	2	452	904			
	Research/ Nonclass Lab		1	366	366	-	1	366	366			
	Research/ Nonclass Lab-S		1	26	26	-	1	26	26			
	Research/ Nonclass Lab		1	388	388	-	1	388	388			
	Research/ Nonclass Lab				-	-	1	600	600			
				Total	**5,813**	**-**			**Total**	**6,413**		
	Administrative Offices											
	Office -GRA		1	452	452	-	1	452	452			
	Office- Research/ Non-Fac		9	124	1,116	-	9	124	1,116			
	Office- Research/ Non-Fac		2	126	252	-	2	126	252			
	Office- Research/ Non-Fac		1	202	202	-	1	202	202			
	Office- Research/ Non-Fac		1	107	107	-	1	107	107			
	Office-Research/ Non-Fac		1	120	120	-	1	120	120			
	Office- Research/ Non-Fac		1	203	203	-	1	203	203			
	Office						2	144	288			
				Total	**2,452**	**-**			**Total**	**2,740**		
	Conference Rooms											
	Conference		1	203	203	-	1	203	203			
	Conference		1	126	126	-	1	126	126			
				Total	**329**	**-**			**Total**	**329**		
	Shops/ Storage											
			0		-	-	0		-			

Prince William Campus Program

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George Mason University- Prince William Campus												
05.04.09	Environmental Science & Policy		Existing				Recommended Program per P+W					Comments
					New	Renovate			New		Floor	
Course Number	Course Name	Number of Students	Quantity	NSF	Total NSF	Total NSF	Quantity	NSF	Total NSF			
			0	-	-	-	0	-	-			
			0	-	-	-	0	-	-			
				Total	-	-		Total	-			
	Total NSF				8,594	-			9,482			
	Net/ Gross Factor				0.55%	0.55%			0.55%			
	Total Gross Square Feet				15,625	-			17,240			

Prince William Campus Program

PERKINS + WILL

George Mason University- Prince William Campus

05.04.09	Bioinformatics		Existing				Recommended Program					Comments
					Existing				New		Floor	
Course Number	Room Name	Number of People	Quantity	NSF	Total NSF		Quantity	NSF	Total NSF			
	Teaching Labs											
	Class Laboratory		1	959	959		1	959	959			
				Total	**959**	-		**Total**	**959**			
	Research Labs											
	Research/Non Class Lab		1	97	97							
	Research/Non Class Lab		1	107	107							
	Research/Non Class Lab		1	239	239							
	Research/Non Class Lab		2	222	444							
	Research/Non Class Lab		1	524	524							
	Open Laboratory		1	515	515							
	Open Laboratory		1	1,063	1,063							
	Research/Non Class Lab		1	223	223							
	Research/Non Class Lab		2	452	904							
	Research/Non Class Lab		1	221	221							
	Research/Non Class Lab		1	273	273							
	Research Lab						6	1,000	6,000			
						-	0		-			
				Total	**4,610**	-		**Total**	**6,959**			
	Administrative Offices											
	Office Adjunct Faculty		1	119	119	-	0		-			
	Office Faculty		1	119	119	-			-			
	Office Staff		1	120	120							
	Office Faculty		1	219	219							
	Office Faculty		1	122	122							
	Office Faculty		1	121	121							
	Office Staff		2	118	236							
	OfficeFaculty		1	118	118	-			-			
	Office Adjunct Faculty		1	118	118							
	Office Faculty		1	247	247							
	Office Faculty		1	123	123							
	Office Faculty		1	129	129							
	Office GRA		1	122	122							
	Office - Research/ Non-Fac		1	216	216							
	Office GRA		1	490	490							
	Office GRA		1	119	119							
	Office Faculty		1	120	120							
	Office GRA		1	126	126							
	Office GRA		1	734	734							
	Waiting/ Reception		1	517	517							
	Waiting/ Reception		1	269	269							

Prince William Campus Program

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George Mason University- Prince William Campus

05.04.09	Bioinformatics		Existing				Recommended Program					Comments
					Existing				New		Floor	
Course Number	Room Name	Number of People	Quantity	NSF	Total NSF		Quantity	NSF	Total NSF			
	Department Chair Office						1	180	180			
	Waiting/Reception						1	240	240			
	FT Instructional Faculty						10	144	1,440			
	PT Research Faculty						6	100	600			
	GRA		10	30			15	30	450			
	GTA			56				56				
									-			
				Total	4,504	-		Total	2,910			
	Conference Rooms											
	Conference		1	232	232	-	0		-			
	Conference		1	88	88							
	Copy/ Supply		1	212	212							
	Conference		0	-	-	-	2	500	1,000			
				Total	532	-		Total	1,000			
	Shops/ Storage											
	Dept. Storage		0	-	-	-		-	-			
	Equipment Storage		0	-	-	-		-	-			
				Total	-	-		Total	-			
	Total NSF				10,605	-			11,828			
	Net/ Gross Factor				0.55%	0.55%			0.55%			
	Total Gross Square Feet				19,282	-			21,505			

Prince William Campus Program

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George Mason University- Prince William Campus

05.04.09	Life Sciences		Existing				Recommended Program					Comments
					Existing				New		Floor	
Course Number	Course Name	Number of Students	Quantity	NSF	Total NSF		Quantity	NSF	Total NSF			
	Teaching Labs						0					
					-	-			-			
				Total	**-**	**-**		**Total**	**-**			
	Research Labs											
	Class Lab Service		1	438	438		1	438	438			
	Research Non Class Lab		1	976	976		1	976	976			
	Research Non Class Lab		1	1,277	1,277		1	1,277	1,277			
	Research Non Class Lab		0	1,002	-		0	1,002	-			BRL space to remain BR rm 353
	Research Non Class Lab		1	986	986		1	986	986			
	Research Non Class Lab		1	641	641		1	641	641			
	Research Non Class Lab		1	625	625		1	625	625			
	Research Non Class Lab		1	624	624		1	624	624			
	Research Non Class Lab		2	632	1,264		2	632	1,264			
	Research Non Class Lab		0	630	-		1	630	630			formerly BRL space in Discovery hall 2m 254W
	Research Non Class Lab		1	960	960		1	960	960			
	Research Non Class Lab		1	447	447		1	447	447			
	Research Non Class Lab		1	207	207		1	207	207			
	Research Non Class Lab		1	184	184		1	184	184			
	Research Non Class Lab		1	396	396		1	396	396			
	Research Non Class Lab		1	342	342		1	342	342			
	Research Non Class Lab		1	325	325		1	325	325			
	Research Non Class Lab		0	630	-		2	630	1,260			formerly BRL space in Discovery hall rm 230W & 23
	Research Non Class Lab		1	650	650	-	1	650	650			
	Research Non Class Lab-S		2	253	506		2	253	506			
	Research Non Class Lab-S		1	126	126		1	126	126			
	Research Non Class Lab-S		1	159	159		1	159	159			
	Research Non Class Lab-S		1	191	191		1	191	191			
	Research Non Class Lab-S		1	407	407		1	407	407			
	Research Non Class Lab-S		1	412	412	-	1	412	412			
	Research Non Class Lab		1	1,438	1,438	-	1	1,438	1,438			
	Research Non Class Lab						2	900	1,800			
				Total	**13,581**	**-**		**Total**	**17,271**			
	Administrative Offices											
	Office- Research/ Non-Fac		1	117	117	-	1	117	117			
	Office- Research/ Non-Fac		1	203	203	-	1	203	203			
	Office- Research/ Non-Fac		1	126	126	-	1	126	126			
	Office- Research/ Non-Fac		3	124	372		3	124	372			
	Office- Research/ Non-Fac		0	78	-		1	78	78			formerly BRL space in Discovery hall rm 156A
	Office- Research/ Non-Fac		1	102	102		1	102	102			
	Office- Research/ Non-Fac		0	103	-		0	103	-			BRL space rm 362
	Office- Research/ Non-Fac		0	98	-	-	1	98	98			formerly BRL space in Discovery hall rm 156A
	Office- Research/ Non-Fac		0	97	-	-	1	97	97			formerly BRL space in Discovery hall rm 156B
	Office- Research/ Non-Fac		1	96	96		1	96	96			
	Office- Research/ Non-Fac		0	112	-		1	112	112			formerly BRL space in Discovery hall rm 156D

Prince William Campus Program

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George Mason University- Prince William Campus

05.04.09	Life Sciences		Existing				Recommended Program					Comments
					Existing				New		Floor	
Course Number	Course Name	Number of Students	Quantity	NSF	Total NSF		Quantity	NSF	Total NSF			
	Office- Research/ Non-Fac		1	116	116		1	116	116			
	Office- Research/ Non-Fac		0	113	-		1	113	113			formerly BRL space in Discovery hall rm 156D
	Office Adjunct Faculty		1	100	100		1	100	100			
	Office Faculty		1	112	112		1	112	112			
	Office Faculty		1	138	138		1	138	138			
	Office Faculty		1	131	131		1	131	131			
	Office Faculty		0	126	-		1	126	126			formerly BRL space in Discovery hall rm 182B
	Office Faculty		0	122	-		1	122	122			formerly BRL space in Discovery hall rm 182C
	Office Faculty		1	102	102		1	102	102			
	Office Faculty		1	104	104		1	104	104			
	Office Faculty		1	105	105		1	105	105			
	Office Faculty		1	237	237		1	237	237			
	Office Faculty		1	95	95		1	95	95			
	Office Faculty		1	91	91		1	91	91			
	Office Faculty		0	87	-		1	87	87			formerly BRL space in Discovery hall rm 157
	Office Faculty		1	374	374		1	374	374			
	Office Faculty		1	398	398		1	398	398			
	Office Faculty		0	103	-		1	103	103			formerly BRL space in Discovery hall rm 154C
	Office Faculty		2	117	234		2	117	234			
	Office Faculty		1	175	175		1	175	175			
	Office Faculty		1	132	132		1	132	132			
	Office Faculty		1	197	197		1	197	197			
	Office Staff		0	153	-		1	153	153			formerly BRL space in Discovery hall rm 182F
	Office Staff		1	107	107		1	107	107			
	Office Staff		0	121	-		1	121	121			formerly BRL space in Discovery hall rm 182D
	Offiec GRA		1	488	488		1	488	488			
	Office GRA		1	477	477		1	477	477			
	Office GRA		1	456	456		1	456	456			
	Office GRA		0	443	-		1	443	443			formerly BRL space in Discovery hall rm 160
	Office GRA		1	1,353	1,353		1	1,353	1,353			
	Office GRA		0	461	-		1	461	461			formerly BRL space in Discovery hall rm 159
	Waiting/ Reception		1	230	230		1	230	230			
	Waiting/ Reception		1	251	251		1	251	251			
	Office						7	144	1,008			
					Total	**7,219**			**Total**	**10,341**		
	Conference Room											
	Conference		1	273	273		1	273	273			
	Conference		1	338	338		1	338	338			
	Conference		1	225	225		1	225	225			
	Seminar/Conference		1	606	606	-	1	606	606			
	Conference Room Supoort		1	54	54		1	54	54			
	Lounge		1	353	353		1	353	353			
	Conference/ Lounge						1	185	185			
					Total	**1,849**	**-**			**1,198**		

Prince William Campus Program

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George Mason University- Prince William Campus

05.04.09	Life Sciences		Existing				Recommended Program					Comments
					Existing				New		Floor	
Course Number	Course Name	Number of Students	Quantity	NSF	Total NSF		Quantity	NSF	Total NSF			
	Shops/ Storage											
	Dept. Circulation		1	100	100		1	100	100			
	Dept. Circulation		1	129	129		1	129	129			
	Dept. Circulation		1	232	232		1	232	232			
	Dept. Circulation		1	133	133		1	133	133			
	Storage		1	8	8		1	8	8			
	Storage		1	31	31		1	31	31			
	Storage		1	11	11		1	11	11			
	Copy/ Supply		1	114	114		1	114	114			
	Copy/ Supply		1	97	97		1	97	97			
	File Room		1	390	390		1	390	390			
	Inactive area		1	737	737	-	0	-	-			
	Inactive area		1	725	725	-	0					
	Storage/ File						1	270	270			
								-	-			
				Total	**2,707**	**-**		**Total**	**1,515**			
	Total NSF				25,356	-			30,325			
	Net/ Gross Factor				0.55%				0.55%			
	Total Gross Square Feet				46,102	-			55,136			

Notes:
Existing program includes CAPMM, RBL, Study of Genomics in Liver Disease, Biomedical Genomics, and INNOVA– need breakdown especially for RBL.
Inactive areas should be programmed for growth.

Prince William Campus Program

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George Mason University- Prince William Campus

05.04.09	Biomedical Research Lab (BRL)		Existing				Currently planned					Comments
					Existing				New		Floor	
Course Number	Course Name	Number of Students	Quantity	NSF	Total NSF		Quantity	NSF	Total NSF			
	Research Labs											
	Research Non Class Lab		1	1,002	1,002		1	1,002	1,002			Exist Bull Run Rm 353 remains
	Research Non Class Lab		3	630	1,890							
				Total	**2,892**			**Total**	**1,002**			
	Administrative Offices											
	Office- Research/ Non-Fac		1	78	78	-						
	Office- Research/ Non-Fac		1	98	98	-						
	Office- Research/ Non-Fac		1	97	97	-						
	Office- Research/ Non-Fac		1	112	112							
	Office- Research/ Non-Fac		1	113	113							
	Office- Research/ Non-Fac		1	87	87							
	Office- Research/ Non-Fac		2	103	206		1	103	103			Exist. Bull Run rm. 362 remains
	Office- Research/ Non-Fac		1	126	126	-						
	Office- Research/ Non-Fac		1	122	122	-						
	Office- Research/ Non-Fac		1	121	121							
	Office- Research/ Non-Fac		1	153	153							
	GRA		1	443	443							
	GRA		1	461	461							
				Total	**2,217**			**Total**	**103**			
	New Building				-							
	New Building					-	1	57,000	57,000			BL-3 Lab under construction
				Total	**-**	**-**		**Total**	**57,000**			
	Total NSF				5,109	-			58,105			
	Net/ Gross Factor				0.55%				0.55%			
	Total Gross Square Feet				**9,289**	**-**			**105,645**			

Notes: BL-3 Laboratory and Animal Facility funded through a grant from NIH/ NIAID. Construction budget of $33,220,000. Currently under construction due to be completed Feb 2010.

Prince William Campus Program

PERKINS +WILL

George Mason University- Prince William Campus

05.04.09 CAPMM		Existing				Recommended Program					Comments
				Existing				New		Floor	
Course Number	Course Name	Number of Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Research Labs										
	Biology Lab Modules 10.5' x 32'					2	330	660			
	CLIA Biology Lab Modules 10.5' x 32'					5	330	1,650			
	Organic Chemistry Lab Modules					2	330	660			
	Mass Spec Lab Modules					1	330	330			
	Equipment Corridors					2	330	660			
	Mass Spec Support					1	330	330			
	Fume Hood Alcoves					3	110	330			
	Tissue Culture					3	110	330			
	Histology					1	165	165			
	Nano Lab					1	330	330			
	Cold Room					1	110	110			
	Satellite Animal Holding					1	220	220			
	Procedure Room					1	110	110			
	General Storage					1	110	110			
	Dedicated Autoclave					1	220	220			
				Total	-	-		**Total**	**6,215**		
	Administrative Offices										
	Private Offices					7	150	1,110			
	T.A. / Flex Open Workstation Cubicles					13	85	1,105			
				Total	-			**Total**	**2,215**		
	Conference Room										
	Break / pantry areas					1	200	200			
	Conference Rooms - 18 persons					1	250	250			
	Copy Room					1	80	80			
	Large Conference Room - 24 persons				-	1	400	400			
	Table / Chair Storage					1	50	50			
	Shower/Locker Rooms				-	2	50	100			
				Total	-	-			**1,080**		
	Shops/ Storage										
	Autoclave & Glasswash					1	440	440			
	Server Room					1	220	220			
	Machine Shop					1	440	440			
	HazMat Storage					1	165	165			
	General Storage					1	220	220			
					-	0	-	-			
				Total	-	-		**Total**	**1,485**		

Prince William Campus Program

PERKINS + WILL

George Mason University- Prince William Campus												
05.04.09	CAPMM		Existing				Recommended Program					Comments
					Existing				New		Floor	
Course Number	Course Name	Number of Students	Quantity	NSF	Total NSF		Quantity	NSF	Total NSF			
	Total NSF				-	-			10,995			
	Net/ Gross Factor				0.55%				0.55%			
	Total Gross Square Feet				-	-			19,991			

Prince William Campus Program

PERKINS +WILL

George Mason University- Prince William Campus

05.04.09 New Growth Space		Existing				Recommended Program					Comments
				Existing				New		Floor	
Course Number	Course Name	Number of Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF			
	Research Labs										
	Generic Open Lab Modules 10.5' x 32'					16	330	5,280			
	Equipment Corridors					4	330	1,320			
	Fume Hood Alcoves					5	110	550			
	Tissue Culture					5	165	825			
	Undefined Special Purpose					14	110	1,540			
	Cold Rooms					2	110	220			
								-			
				Total	-			**Total**	**9,735**		
	Administrative Offices										
	Private Offices					11	150	1,710			
	T.A. / Flex Open Workstation Cubicles					22	85	1,870			
				Total	-			**Total**	**3,580**		
	Conference Room										
	Break / pantry areas					1	200	200			
	Conference Rooms - 18 persons					2	250	500			
	Copy Room					2	80	160			
					-	0		-			
					-	0		-			
				Total	-			**Total**	**860**		
	Shops/ Storage										
					-	0	-	-			
				Total	-			**Total**	-		
	Total NSF				-			14,175			
	Net/ Gross Factor				0.55%			0.55%			
	Total Gross Square Feet				-			25,773			

F. Belmont Bay Program

At the Belmont Bay site, planning is underway for a temporary module to later be replaced by a permanent building. The ESP and GGS departments are the proposed occupants of the Belmont Bay site. The planning for the Belmont Bay facility is dynamic and changing based on funding approval by the Virginia General Assembly.

The ESP department's PEREC research center would be the primary occupant of the Belmont Bay site. Growth space is scheduled in the program for ESP. In addition, the GIS group has a need for training classrooms.

There will continue to be a need for ESP research space in Fairfax even after the Belmont Bay space has been provided.

The program included is based on preliminary information and should serve mainly as a broad brush assessment of the projected space needs for the site. As the project proceeds a more detailed program will be developed.

Belmont Bay Program

PERKINS + WILL

George Mason University- Belmont Bay Campus										
5.04.09	Program Summary		Temporary Space			Recommended Program				Comments
					Existing			New		
Course Number	Room Name			NSF	Total NSF		NSF	Total NSF		
	GIS			1,550	1,550		10,000	10,000		
	PEREC			5,000	5,000		25,000	25,000		
	Future Growth			-	-		9,700	9,700		
	Common Amenities			300	300		4,250	4,250		
	Total Net Square Feet			**6,850**	**6,850**		**48,950**	**48,950**		
	Net to Gross Efficiency			0.55%	0.55%		0.55%	0.55%		
	Total Gross Square Feet			**12,455**	**12,455**		**89,000**	**89,000**		

Belmont Bay Program

PERKINS +WILL

GIS

5.04.09	GIS		Temporary Space			Recommended Program				Comments
					New			New		
Course Number	Room Name	Number of People	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF		
	Teaching Labs									
	Geospatial Training Room		1	1,000	1,000	6	1,000	6,000		
				Total	**1,000**		**Total**	**6,000**		
	Research Labs									
	Research lab		0	-	-	1	1,000	1,000		
				Total	**-**		**Total**	**1,000**		
	Administrative Offices									
	Office Faculty		1	200	200	1	200	200		
	Office Faculty		1	150	150	10	150	1,500		
	Graduate Student work stations					15	30	450		
	Reception					1	200	200		
				Total	**350**		**Total**	**2,350**		
	Conference Rooms									
	Conference Room					1	250	250		
				Total	**-**		**Total**	**250**		
	Shops/ Storage									
	Server Room		1	200	200	1	400	400		
				Total	**200**		**Total**	**400**		
	Total NSF				**1,550**			**10,000**		
	Net/ Gross Factor				0.55%			0.55%		
	Total Gross Square Feet				**2,818**			**18,182**		

Belmont Bay Program

PERKINS + WILL

George Mason University- Belmont Bay Campus

5.04.09	PEREC		Temporary Space			Recommended Program			Comments
					New			New	
Course Number	Course Name	Number of Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF	
	Teaching Labs								
	Classroom		1	700	700	4	900	3,600	
	Teaching Lab		1	900	900	2	900	1,800	
					-			-	
				Total	**1,600**		**Total**	**5,400**	
	Research Labs								
	Research Lab/ Director		1	500	500	1	900	900	
	Research Lab/ Asst. Director		1	500	500	1	900	900	
	Center Fellows Shared lab		1	300	300	7	600	4,200	
	Prep Room		1	200	200	4	200	800	
					-			-	
				Total	**1,500**		**Total**	**6,800**	
	Administrative Offices								
	Director's Office		1	200	200	1	200	200	
	Assistant Director's Office		1	150	150	1	150	150	
	Center Fellows Office		1	150	150	7	150	1,050	
	Visiting Scholar's Office		1	100	100	5	100	500	
	Reception Display		1	200	200	1	500	500	
	Graduate Student office		1	200	200	40	200	8,000	
				Total	**1,000**		**Total**	**10,400**	
	Conference Rooms								
	Library Conference Room		1	300	300	2	300	600	
				Total	**300**		**Total**	**600**	
	Shops/ Storage								
	Sample Storage Room		1	300	300	3	300	900	
	Equipment Storage and Maint.		1	300	300	3	300	900	
				Total	**600**		**Total**	**1,800**	
	Total NSF				5,000			25,000	
	Net/ Gross Factor				0.55%			0.55%	

Belmont Bay Program

PERKINS + WILL

George Mason University- Belmont Bay Campus										
5.04.09	PEREC		Temporary Space			Recommended Program				Comments
					New			New		
Course Number	Course Name	Number of Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF		
	Total Gross Square Feet				9,091			45,455		

Belmont Bay Program

PERKINS +WILL

George Mason University- Belmont Bay Campus

5.04.09	Growth Space		Temporary Space			Recommended Program				Comments
					Existing			New		
Course Number	Course Name	Number of Students	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF		
	Research Labs					1	7,000	7,000		
								-		
					Total	**-**		**Total**	**7,000**	
	Administrative Offices									
	Private Offices					7	150	1,110		
	T.A. / Flex Open Workstation Cubicles					15	64	960		
					Total	**-**		**Total**	**2,070**	
	Conference Room									
	Break / pantry areas					1	200	200		
	Conference Rooms - 18 persons					1	250	250		
	Copy Room					1	80	80		
						0		-		
					Total	**-**		**Total**	**530**	
	Shops/ Storage									
						1	100	100		
					Total	**-**		**Total**	**100**	
	Total NSF				-			9,700		
	Net/ Gross Factor				0.55%			0.55%		
	Total Gross Square Feet				-			**17,636**		

Belmont Bay Program

PERKINS + WILL

George Mason University- Belmont Bay Campus										
5.04.09	**Common Amenities**		**Temporary Space**			**Recommended Program**				**Comments**
					New			**New**		
Course Number	Room Name	Number of People	Quantity	NSF	Total NSF	Quantity	NSF	Total NSF		
	Lounges									
	Break/ Coffee Room/ Lounge		1	100	100	2	150	300		
	Conference Room		0		-	2	250	500		
	Study Room		0		-	1	500	500		
	Recycling Closet		0		-	1	150	150		
	Raised Loading Dock				-	1	2,000	2,000		
	bathroom		1	200	200	4	200	800		
				Total	**300**		**Total**	**4,250**		
	Total Net Square Feet				**300**			**4,250**		

Space and System Prototypes

PERKINS +WILL

Section 6 – Space and System Prototypes

A. Learning Community Models
B. Shared Spaces
C. Communication Strategies
D. Stewardship
E. Research Models
F. Detailed Lab Diagrams
G. Office Diagrams
H. Classroom Diagrams
I. Architectural Systems Narrative
J. MEP Systems Narrative

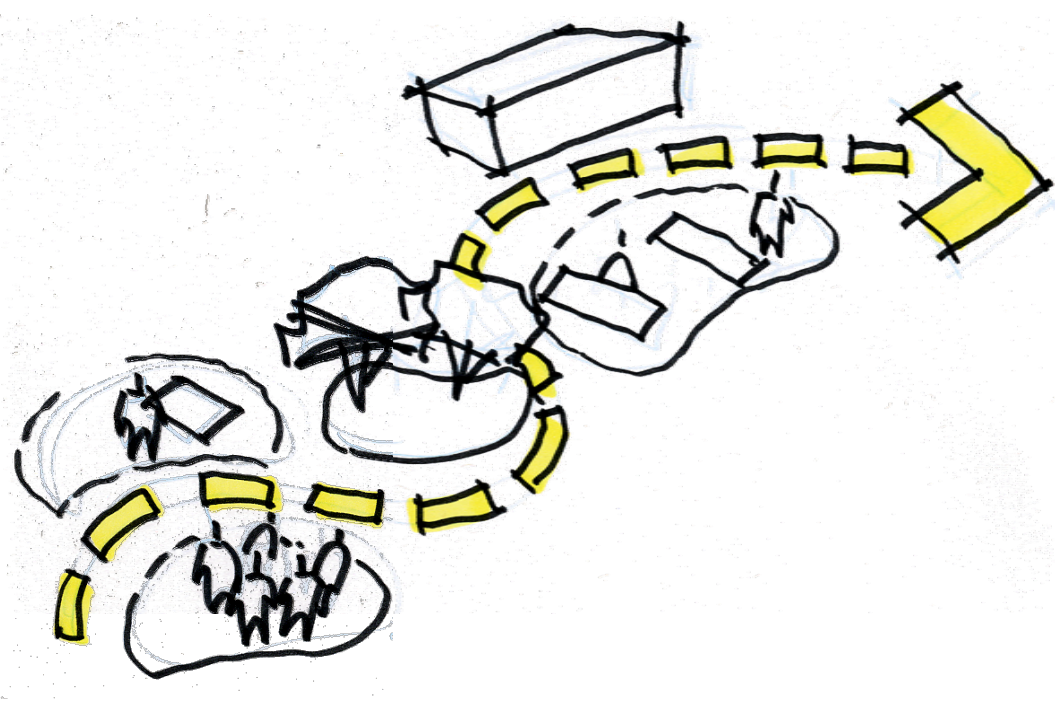
GEORGE MASON UNIVERSITY

A. Learning Community Models

Hands on Learning – Faculty as Guide

The College of Science undergraduate environment is a learning community which will grow and evolve. The college successfully imparts an engaging, yet rigorous education to science majors and general education students focusing on the best education model for each. The courses will occur in open and flexible, yet comfortable, spaces. The College of Science's learning methods are hands-on and collaborative, encouraging peer-to-peer instruction, faculty mentoring, group learning, and directed individual study and inquiry. The academically intense nature of the course work further leads students to develop close academic and personal friendships.

Because learning also happens spontaneously beyond labs and classrooms, the science community will provide spaces that encourage small group discussions, brainstorming, and individual learning opportunities. These spaces should be adaptable to accommodate varied spatial relationships, and technology must be in place to facilitate a free and continuous flow of information.

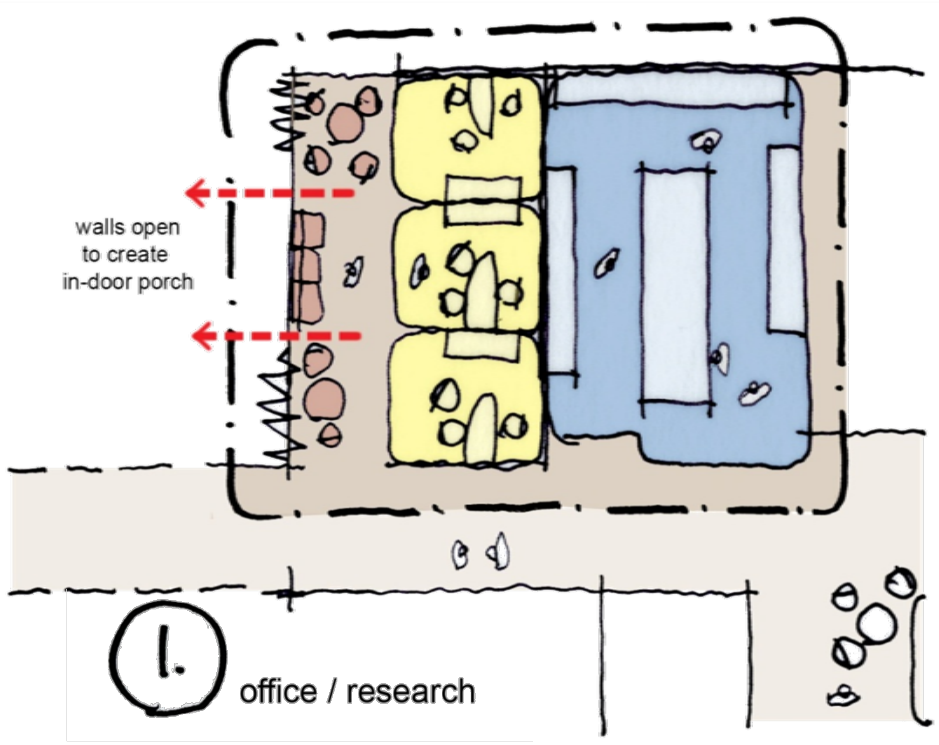


Pathway to Discovery

Dynamic displays are an interactive way to communicate and complement the curriculum within. They engage the students and help define zones within the building. These installations can be thoughtful extensions of each professor and the care and excitement each has for his or her field of study. Students and faculty may take ownership of these spaces to present their research findings to the entire campus. Displays can also promote way-finding without the use of explicit signage.

These spaces should be carefully integrated into the building circulation to support learning 24/7. They are rich with opportunity and can evolve with the building.

A large central display can accommodate revolving exhibitions and create a gallery setting within a larger public area where faculty and students of all disciplines converge. This social place is inviting, educational and interactive.



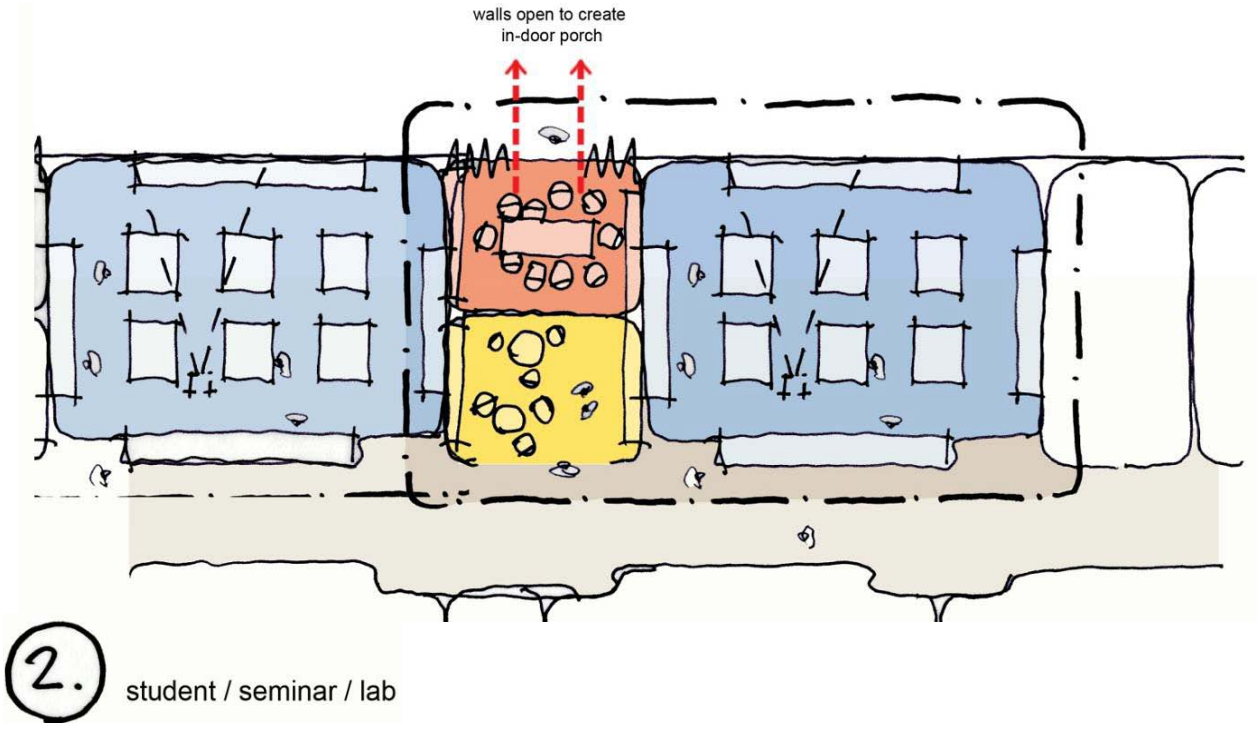
Front Porches - Faculty as Mentor

This diagram represents one of many arrangements to be explored during design of future buildings. In this model, students and faculty come together in neighborhood zones for student -faculty interaction and learning that is more comfortable and relaxed.

Each office neighborhood (above left sketch) has is own seating area along an exterior wall adjacent to the offices. Each group of three has an inspirational view to the sky or landscape. During nice weather, the exterior windows can be opened to create a covered porch for small group meetings of faculty mentoring, or to provide a comfortable area for students waiting to meet with professors.

Adjacent to these offices are research zones, a laboratory or a classroom, based on the location and needs of the academic unit.

The undergraduate research opportunities offer an effective way to enhance lessons learned in a teaching lab or classroom. For professors mentoring student research, this close spatial relationship and direct line of sight into the research labs is a great way to be engaged in research activities and help maintain a safe learning environment.



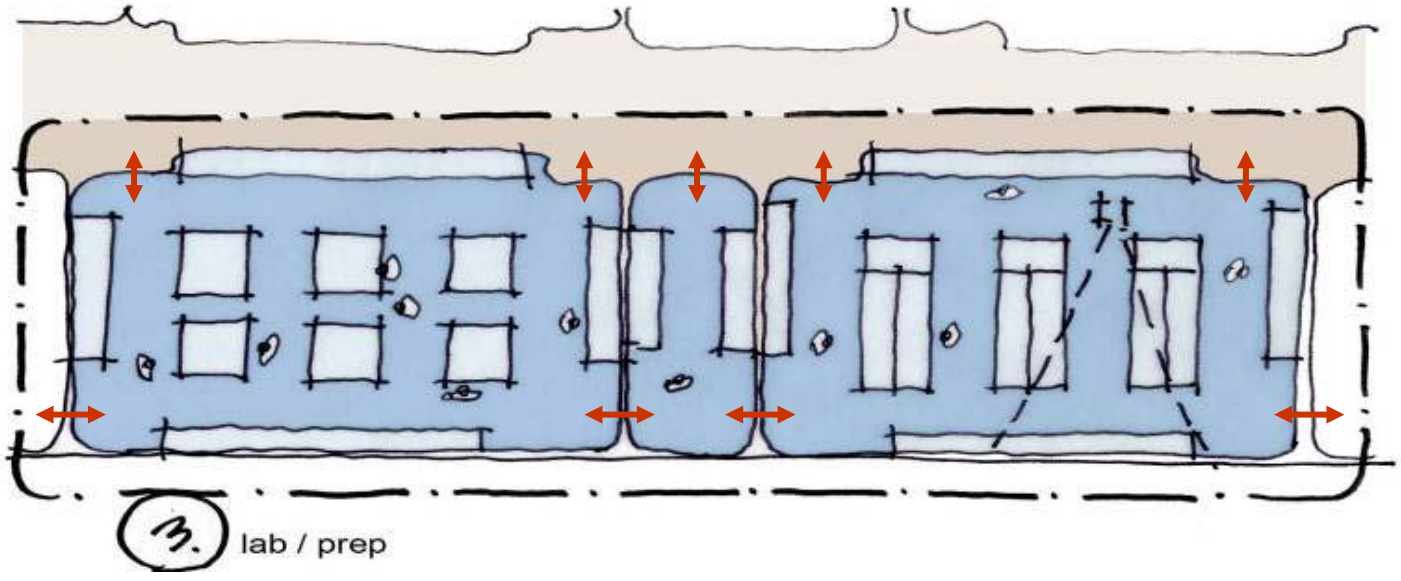
Seminar and Student Spaces

Student study spaces (shown in the gold) are away from the faculty offices so that students and faculty are provided with separate areas to work among peers. However, the areas are close enough to still encourage and facilitate spontaneous communication.

To encourage students to use the space in a spontaneous and casual manner, the student commons area is open to the corridor. These are good places for small group work space or to gather before or after classes to review class materials or wait for friends.

A seminar space (in pink directly behind the student area) is ideal for smaller classes, case studies, for small-group discussions, after-hours study or to practice small-group presentations. During nice weather, this area may have operable windows open to the landscape. Those in the adjacent student commons area can also enjoy this space by opening up the glass wall between the seminar and student space to create one larger area.

These two space types are situated between lab areas so that they are in a central location accessible to all students. The wall area between the labs and the seminar and student spaces can also be used for instructional displays, offering another way to give personality and define neighborhoods within the science community.



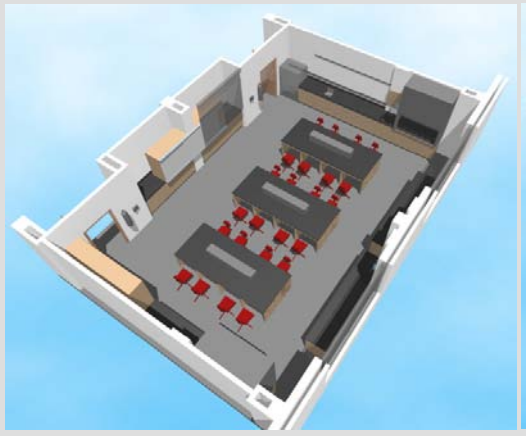
Dynamic Adjacencies

Well organized connections between labs and support spaces allow faculty to spend more of their time with their students and provides immediate access to tools of learning. Access to prep spaces can occur from the corridor, or from the lab allowing lab instruction to continue without interruption. Short walking distances between the offices, student spaces and the labs strengthens the connection between students and faculty.

Large windows in the wall between the corridor and the labs will promote connections across disciplines and provide dramatic views to the landscape beyond. As prospective students and their families tour the building, they will realize that the College of Science is an important destination for science education.

Large windows to the exterior will allow glare free natural light to illuminate the spaces and provide views that connect tot the larger campus. In some instances direct physical connections between the landscape and a lab may be possible.






Flexible Laboratories - 1240sf Learning Space

The teaching labs accommodate both lectures and laboratory activities. In many labs, furniture at the center will be movable to accommodate curriculum changes or large equipment. Teams of 2-4 students may occupy individual tables. In some labs teams of 2-4 students may work at benches with bench top exhaust or in fume hoods. Multiple writing surfaces, sophisticated media delivery systems and wireless projectors allow the faculty to move around the room to work with all students while seamlessly accessing A/V systems.

Students and faculty will share the projector wirelessly while receiving information from around the world through robust Internet connections. In many labs, reconfigurable overhead data and power will serve team tables, while laboratory services, plumbing, fume hoods and equipment space line the perimeter of the room.

Storage for equipment, microscopes, specimens, and supplies will support the needs of all disciplines, while keeping everything close to the work areas. Student/faculty research labs will provide the opportunity for more intensive work while offering a glimpse into the world beyond undergraduate education. Shared instrument labs will be equipped with industry standard analytical tools to bring together students from multiple disciplines.

Sandbox Laboratory - Black Box Classroom - Multidisciplinary Virtual Learning Environment

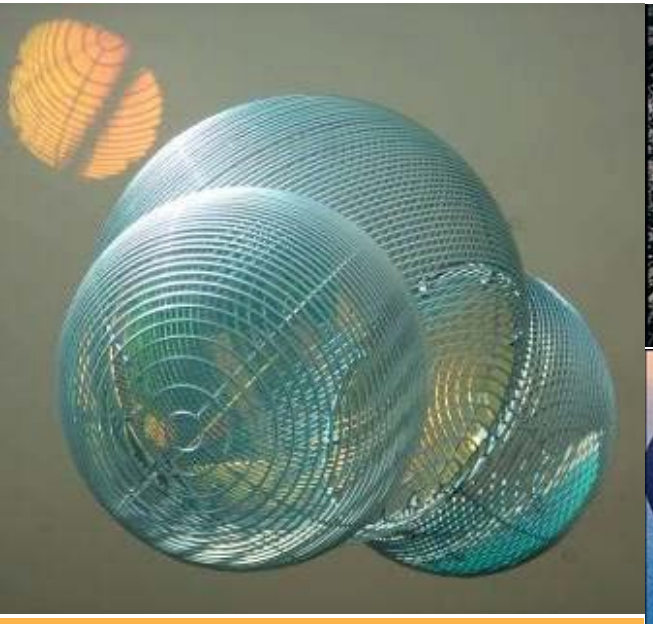
The **Sandbox Laboratory** will elevate learning. The notion of "sandbox," which accommodates change and renewal, has long been a part of the COS community. This lab space will include more movable furniture than other labs and will offer a wider array of laboratory utilities and services. It is imagined that student and faculty teams will produce proposals for the use of this special space, creating exciting possibilities.

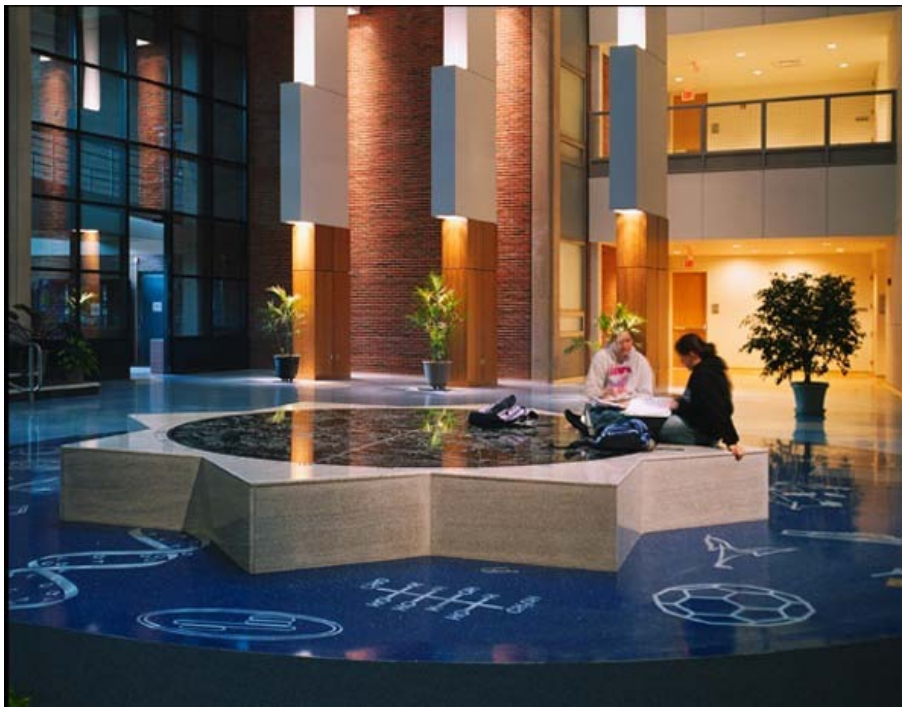
Unique learning events without disciplinary limits will occur in this lab. These events will be treated as active science on display for the COS community. Grant funding for leading-edge teaching or undergraduate research may be easier to capture with the mention of this special space in the proposals.

This space could be used to overcome scheduling conflicts or meet the needs of an increased student population, as it would be flexible enough to meet the needs of a variety of disciplines.

The **Black Box Classroom** is the place to experiment with unique pedagogies and instructional media technologies. When considering new teaching methods or technologies, this is the place for faculty and students to test their ideas and tools. The classroom would provide a wide range of resources for students and faculty to try out new techniques and technologies and for student groups to practice presentations.

The **virtual learning environment** is designed to become a magnet for students, faculty and the community to come together in a richly layered, three-dimensional, multidisciplinary learning environment.. All divisions of the college would enjoy access to dramatic 3 dimensional models that are richer and more memorable than those provided on any projected image, flat panel screen or home entertainment system. Events in this space would capture the imagination of current and future students, faculty and community members – making this space an ideal destination for a new generation of people destined to become College of Science friends and supporters.





Instructional Science Art

Art within a science center can express the excitement of the lessons within. These exhibits remind us of our constant connection to the sciences. Unique pieces can provide all with a better appreciation of math and science, make concepts more accessible and inspire exploration of these fields. As the sciences inspire and inform the art, the art can inspire science. These instructional exhibits can become part of the hallmark of the Mason College of Science.

Such art can also make a powerful impression on K-12 students visiting the campus. They may be inspired to pursue a higher level of education or a future career. Many successful scientists were drawn to math and science at a very young age.

The content portrayed in these installations can be as simple and expressive as a water molecule (above left) or as complex as the engraving of constellations (above center) or a montage of symbols and ideas that reveal themselves over time (above right).

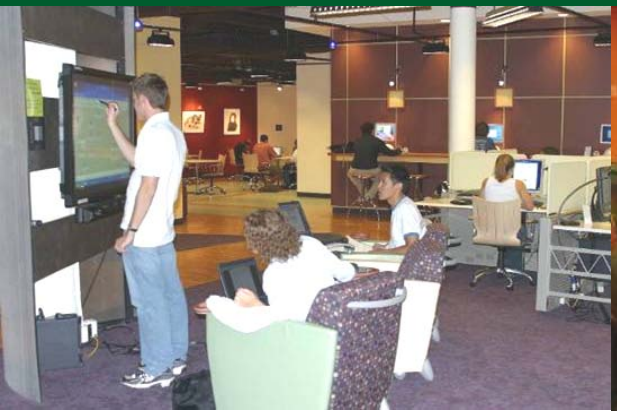
These interesting and often inhabitable pieces create a fun and interactive environment within the building. They become a place where students and/or faculty plan to meet or naturally converge between classes or study sessions.

Exterior Classrooms

In brainstorming sessions, faculty stressed the importance of outdoor learning environments, small and large. Students and faculty benefit from a landscape that is planned and cultivated around outdoor learning.

A space resembling the amphitheater above could easily take form on a part of the sloping site. This space and all other exterior learning environments warrant the full gamut of instructional aids. Thus all necessary technology should be available – from the ability to project images and connect to the campus network to simply sketch or write formulas on a slate board.

Students learn by doing. The ability to go out into adjacent woods and experience field-learning events makes a big impact. The key is to understand how the lessons taught within the college can inform the landscape, and vise versa. These spaces can be shared campus wide and provide inspirational space for a poetry class, a math atelier or a physics lesson, as well as a serve as a collection ground for field botany.




B. Shared Spaces

Many of the classroom space used by the College of Science are scheduled by the Registrar. The classroom distribution defined by the space schedule support delivery models to help the COS most effectively support education while helping the overall University meet Virginia state mandates for utilization .

Communication between COS leadership and the Registrar about the potential for higher utilization special needs of classrooms and preferred space requests should be a part of yearly planning. Heavily requested spaces are often available with a little flexibility in the time slot selected.

Utilization charts showing the space sizes most requested by the COS are available through the Registrar's office. The current COS utilization shows that a single large auditorium of 200 seats would be a good resource, but would not be used enough (40+ hrs week) to dedicate such a space to the COS. At the other end of the spectrum, there is high demand for smaller spaces- 12-25 seats for upper level seminars. These smaller spaces are not currently utilized enough to dedicate them to the COS, Often the times that are used are late in the day for upper level or graduate student seminars, so the usage figures are skewed in comparison to utilization of undergraduate spaces.

Current utilization shows that there is a high percentage of general studies students that create a heavy load for larger spaces and a very small number of upper level/graduate students that create a need for small seminar spaces. So, the space utilization for the COS is not yet in proportion to it's stated goals of increasing the number of majors in the sciences.

In the space schedule for College Shared, the rooms for 50-75 seats and above are shown as University shared to create the highest utilization possible. It is desired that some of the larger University shared space be fitted with technologies and have adjacent prep and storage areas to support specific science education needs. In the space schedule classroom type spaces that serve 50 and below are shown as dedicated COS space to support a more focused Science majors program yet allow for smaller classes for non- majors as well. In any case the spaces should support student cohort units of 12, 24, 48, and 72. This recommendation should be tested during the design phase with the Registrar and COS representatives to prove its validity.

A high priority is placed on creating collaboration spaces that will strengthen beneficial communication between faculty, within and across disciplines. Spaces that support peer-to-peer learning between students and that foster productive interactions between students and faculty are highly desired.

Shared computer labs/ tutoring spaces are intended to serve scheduled and walk in use. These should be located nearest to those disciplines that have the heaviest use. Spaces to serve as "homes" for science majors and neutral open spaces with seating and brainstorming technologies are included in the master plan program.




C. Communication Strategies

Communication Technologies

To foster more seamless multi-campus communication, new technologies must be embraced. In addition to more effective use of web meeting software and hardware, systems with highly functional communication technologies like the “Telepresence” models are being considered for communication between campuses, especially between Fairfax and Prince William.

For brainstorming between colleagues in a research environment large white board surfaces, writeable glass panels and interactive whiteboards should be evaluated during the programming and design of every space. Technologies that capture, print and transmit images and text are common collaboration tools. Collaboration technologies must be integrated into the fabric of learning and research.

In every lab and classroom, writeable surfaces that are not covered by projector screens are the backdrop for the teaching zone. Single or multiple projector screens , remote access to electronic media management systems, and effective acoustic and lighting controls are necessary to enhance communication between small or large numbers of students and faculty – even in chemistry labs.

Strategically placed electronic displays expressing active teaching and research, specimens or photos from scientific collections, and displays that can serve a double purpose as lab resource and display should become integrated into the fabric of every new or renovated space. Tour routes will be designed into every space to engage future students, faculty and researchers.




D. Stewardship

Integrated Design

The Mason College of Science's environmental vision promises to enrich both the college and the community. Educational and research opportunities will express sustainability during design, construction, and occupancy . The COS will show leadership that will benefit the University to encourage resource conservation.

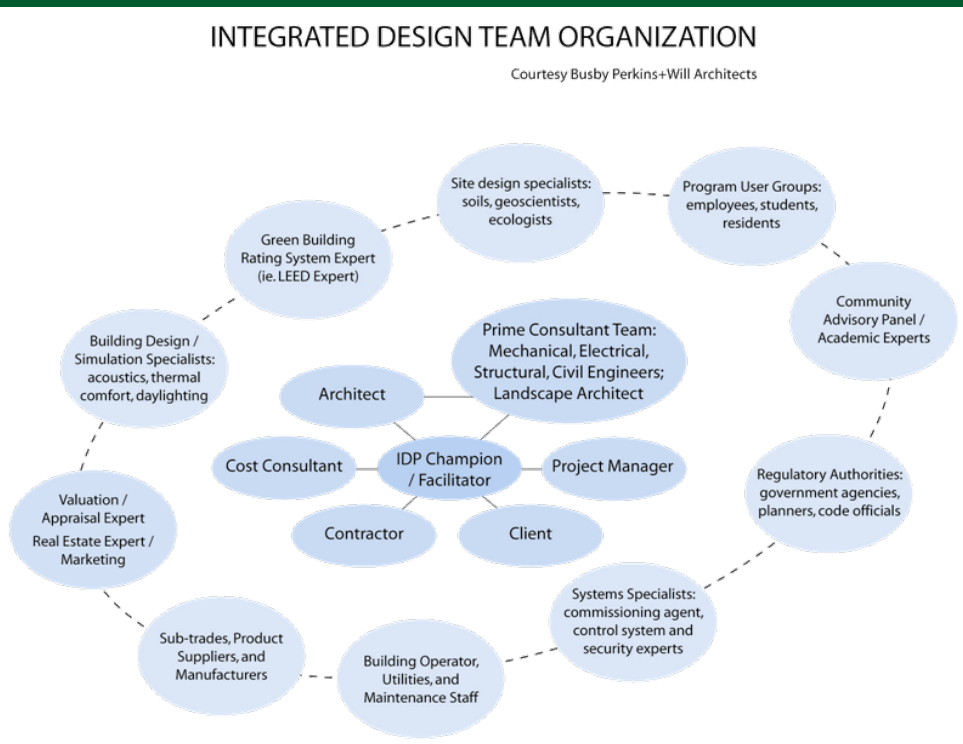
The University is most interested in modeling aggressive solutions that can exhibit energy reduction and effective water resource use. Through fostering new ways of thinking about people, materials, energy, water and ideas, the COS future projects will serve as a catalyst for regional sustainability.

The project teams should strive to move beyond sustaining current conditions to a model that includes regenerative development and design strategies.

Sustainable References

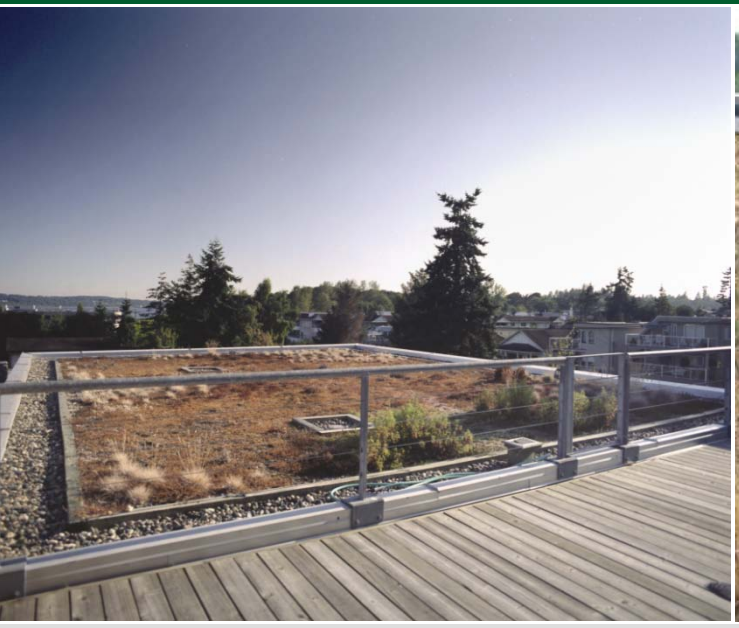
The Living Building Challenge was issued by the Cascadia Chapter of the US Green Building Council (USGBC). The COS and Mason may choose to explore producing some of their own energy and incorporating the cleaning and re-use of site storm and process water in future projects.

In addition to The USGBC's LEED certification program, laboratory projects should follow the recommendations of Labs 21, the federal government agency that assists design teams and owners in planning healthy, energy efficient lab buildings. LEED innovation credits often successfully incorporate Labs 21 design strategies.



Design and development processes should incorporate an integrated design process to discover the best opportunities for Mason. These strategies could become integrated into the COS curriculum. Students, faculty and others could be able to monitor the building energy use and performance online. Performance goals should be measured in real time as a learning opportunity. It is a Mason goal that all future projects achieve a minimum certification of LEED silver, while striving for the highest possible certification.

Renewable energy systems such as ground source heat pumps, solar hot water, and building integrated photovoltaic panels should be evaluated for market readiness and feasibility. Vegetated roofs slow the rainwater as it moves over a building and create opportunity for a variety of scientific experiments. Excess storm water flowing through bio-filtration gardens (another instructional opportunity) and be saved in underground cisterns for landscape irrigation. These systems and others should be explored in future projects.



Vegetated Roof

A vegetated or “green” roof is an effective storm water management tool because it absorbs and retains rainwater, thereby preventing storm water surges. Green roofs may require additional structural support as a standard 4” saturated roof may weigh as much as 26 lbs/sf and the roof system itself can cost twice that of a conventional roof. Costs are frequently offset by a reduction in the required amount of storm water retention, smaller roof drains and the life cycle savings of an increased life of the roof membrane. In addition, there is also a considerable value associated with the green roof as they create pleasant spaces to occupy and serve as a teaching tool or demonstration garden.

The vegetated roof is layered. It consists of a water proofing system and insulation; a root barrier; drainage, aeration and water storage layers; a growing medium; and vegetation consisting of drought-resistant local plants, such as sedums and grasses to aid habitat restoration and sense of place.

Bio filtration rain garden.

A **bio-retention rain garden** is an engineered system that, like natural wetland processes, uses soils and natural vegetation to capture and filter storm water and rainwater, condensate and ground water. This design element provides for restoration of habitat for wildlife, water re-use in the building, or for landscape irrigation.

49	12	2	Total Project Score LEED V. 2.2	Certified 26-32	Silver 33-38	Gold 39 -51	Platinum 52+	Possible Points 48

11	2	1	Sustainable Sites	Possible Points 11
Y	?	N		
Y			Prereq 1 **Erosion & Sedimentation Control**	0
Y			Credit 1 **Site Selection**	1
	?		Credit 2 **Density Development & Community Connectivity**	
		N	Credit 3 **Brownfield Redevelopment**	
	?		Credit 4.1 **Alternative Transportation**, Public Transportation Access	
Y			Credit 4.2 **Alternative Transportation**, Bicycle Storage & Changing Rooms	1
Y			Credit 4.3 **Alternative Transportation**, Low Emitting and Efficient Vehicles	1
Y			Credit 4.4 **Alternative Transportation**, Parking Capacity	1
Y			Credit 5.1 **Site Development**, Protect or Restore Habitat	1
Y			Credit 5.2 **Site Development**, Maximize Open Space	1
Y			Credit 6.1 **Stormwater Management**, Quantity Control	1
Y			Credit 6.2 **Stormwater Management**, Quality Control	1
Y			Credit 7.1 **Heat Islands Effect**, Non-Roof	1
Y			Credit 7.2 **Heat Islands Effect**, Roof	1
Y			Credit 8 **Light Pollution Reduction**	1

3	0	0	Water Efficiency	Possible Points 3
Y	?	N		
Y			Credit 1.1 **Water Efficient Landscaping**, Reduce by 50%	1
	?		Credit 1.2 **Water Efficient Landscaping**, No Potable Use or No Irrigation	?
	?		Credit 2 **Innovative Wastewater Technologies**	?
Y			Credit 3.1 **Water Use Reduction**, 20% Reduction	1
Y			Credit 3.2 **Water Use Reduction**, 30% Reduction	1

8	6	0	Energy & Atmosphere	Possible Points 8
Y	?	N		
Y			Prereq 1 **Fundamental Building Systems Commissioning**	0
Y			Prereq 2 **Minimum Energy Performance** ASHRAE 90.1-2004	0
Y			Prereq 3 **CFC Reduction in HVAC&R Equipment**	0
Y			Credit 1.1 **Optimize Energy Performance**, 10.5%	1
Y			Credit 1.2 **Optimize Energy Performance**, 14%	1
Y			Credit 1.3 **Optimize Energy Performance**, 17.5&	1
Y			Credit 1.4 **Optimize Energy Performance**, 21%	1
Y			Credit 1.5 **Optimize Energy Performance**, 24.5%	1
Y			Credit 1.6 **Optimize Energy Performance**, 28%	1
	?		Credit 1.7 **Optimize Energy Performance**, 31.5%	
	?		Credit 1.8 **Optimize Energy Performance**, 35%	
	?		Credit 1.9 **Optimize Energy Performance**, 38.5%	
	?		Credit 1.10 **Optimize Energy Performance**, 42%	
	?		Credit 2.1 **Renewable Energy**, 5%	
	?		Credit 2.2 **Renewable Energy**, 10%	
	?		Credit 2.3 **Renewable Energy**, 20%	
Y			Credit 3 **Additional Commissioning**	1
	?		Credit 4 **Enhanced Refrigerant Management**	
Y			Credit 5 **Measurement & Verification**	1
	?		Credit 6 **Green Power**	

9	2	1	Materials & Resources	Possible Points 8
Y	?	N		
Y			Prereq 1 **Storage & Collection of Recyclables**	0
Y			Credit 1.1 **Building Reuse**, Maintain 75% of Existing Shell	1
Y			Credit 1.2 **Building Reuse**, Maintain 100% of Existing Shell	1
	?		Credit 1.3 **Building Reuse**, Maintain 50% of Interior Non-Structural Elements	
Y			Credit 2.1 **Construction Waste Management**, Divert 50%	1
Y			Credit 2.2 **Construction Waste Management**, Divert 75%	
	?		Credit 3.1 **Resource Reuse**, Specify 5%	
		N	Credit 3.2 **Resource Reuse**, Specify 10%	
Y			Credit 4.1 **Recycled Content**, 10% (post-consumer + ½ pre-consumer	1
Y			Credit 4.2 **Recycled Content**, 20% (post-consumer + ½ pre-consumer	1
Y			Credit 5.1 **Local/Regional Materials**, 10% Extracted, Processed & Manufactured R	1
Y			Credit 5.2 **Local/Regional Materials**, 20% Extracted, Processed & Manufactured Re	1
	?		Credit 6 **Rapidly Renewable Materials**	
Y			Credit 7 **Certified Wood**	1

13	2	0	Indoor Environmental Quality	Possible Points 13
Y	?	N		
Y			Prereq 1 **Minimum IAQ Performance** ASHRAE 62.1-2004	0
Y			Prereq 2 **Environmental Tobacco Smoke** (ETS) **Control**	0
Y			Credit 1 **Carbon Dioxide** (CO_2) **Monitoring**	1
Y			Credit 2 **Increase Ventilation Effectiveness**	1
Y			Credit 3.1 **Construction IAQ Management Plan**, During Construction	1
Y			Credit 3.2 **Construction IAQ Management Plan**, Before Occupancy	1
Y			Credit 4.1 **Low-Emitting Materials**, Adhesives & Sealants	1
Y			Credit 4.2 **Low-Emitting Materials**, Paints	1
Y			Credit 4.3 **Low-Emitting Materials**, Carpet	1
Y			Credit 4.4 **Low-Emitting Materials**, Composite Wood	1
Y			Credit 5 **Indoor Chemical & Pollutant Source Control**	1
Y			Credit 6.1 **Controllability of Systems**, Lighting	1
	?		Credit 6.2 **Controllability of Systems**, Thermal Comfort	
Y			Credit 7.1 **Thermal Comfort**, Design ASHRAE 55-2004	1
Y			Credit 7.2 **Thermal Comfort**, Verification / Occupancy	1
Y			Credit 8.1 **Daylight & Views**, Daylight 75% of Spaces	1
	?		Credit 8.2 **Daylight & Views**, Views for 90% of Spaces	

5	0	0	Innovation & Design Process	Possible Points 5
Y	?	N		
Y			Credit 1.1 **Innovation in Design**: Green Housekeeping Program (LEED EB - EQ Credit 10)	1
Y			Credit 1.2 **Innovation in Design**: 0% Reduction in non-regulated [process] water use (WE Credit 3)	1
Y			Credit 1.3 **Innovation in Design**: Exemplary Perf- Recycled Materials (MR Credit 4)	1
Y			Credit 1.4 **Innovation in Design**: Green Education Program	1
Y			Credit 2 **LEED Accredited Professional**	1

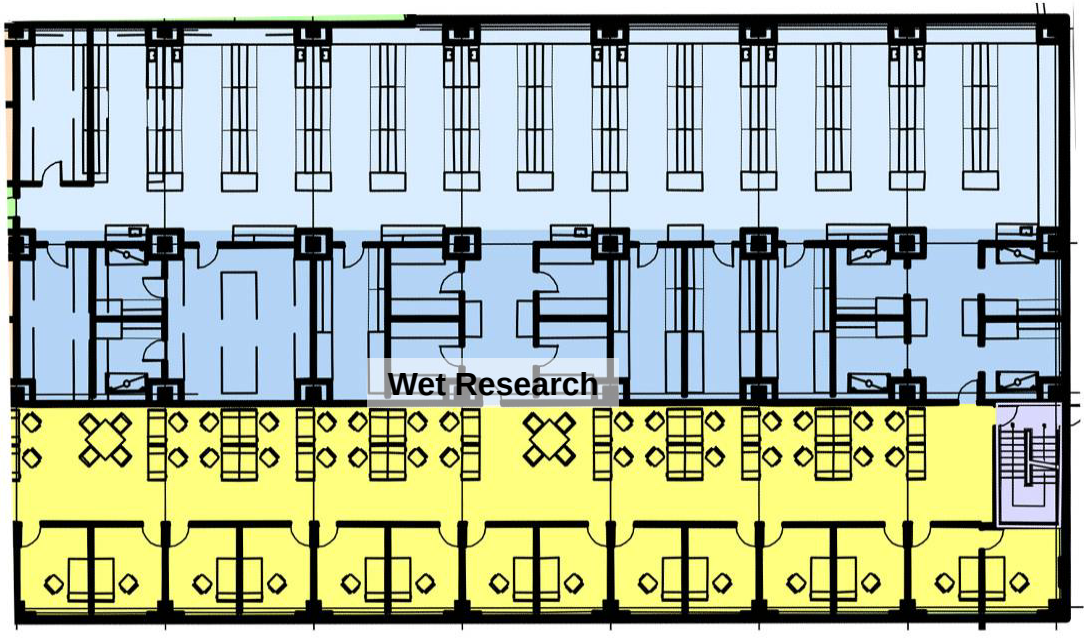
Scorecard showing how a project can achieve LEED Gold certification (48 pts)

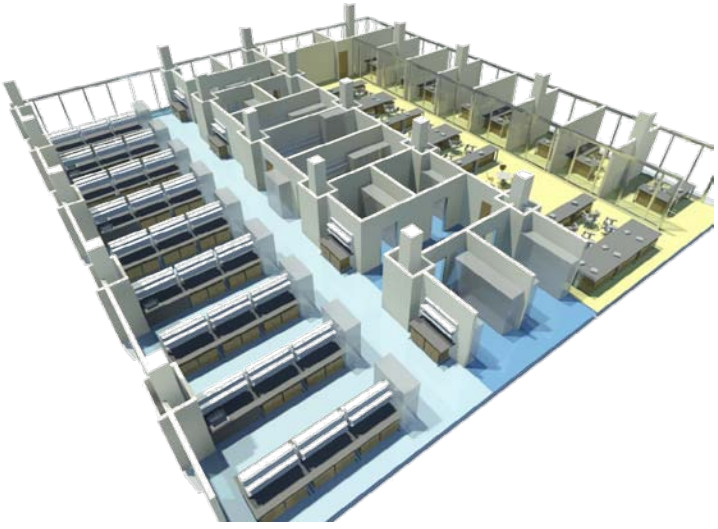
E. Research Models.

Building Effective Research Communities

Modern research communities must effectively support recruitment , connect research team members and be highly adaptable for the dramatic changes that will occur over the life of the research activity and the life of the building. Space must be provided for collaboration outside the lab. This collaboration space is most successful when it can combine access to food and refreshments and if it is scheduled for frequent public events inside and outside the COS community. Security and amenities must be developed that allow research team members to work extended hours without feeling isolated. Affordable housing for graduate students and research team members is a unique and pressing need for the COS community.

In an effort to develop consistent strategies for space allocation to support pure research, the following lab diagrams provide comparative wet lab layouts for approximately 1500 square feet of space per PI for wet research, support and office/ computational spaces. These diagrams are useful tools when testing existing lease space, or renovation space or when designing new research buildings. These diagrams are intended as space models for pure research outside the typical teaching lab environment.





WET LAB

LAB SUPPORT

OFFICE

CONFERENCE

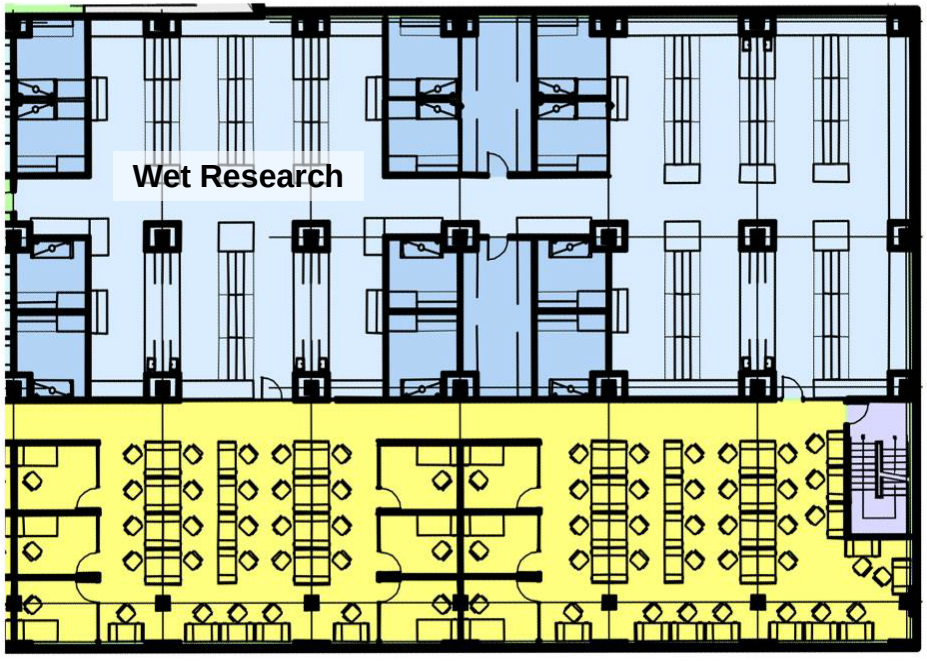
VERTICAL CIRCULATION

Key Points

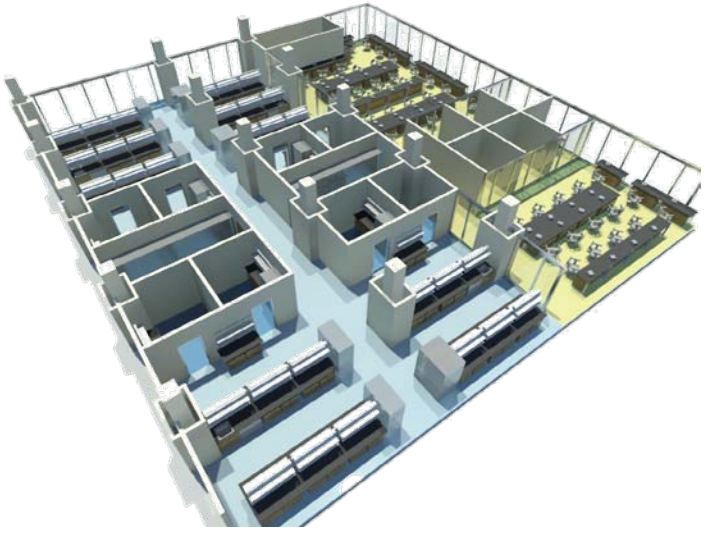
- Wet/ support/ dry spaces separated into discreet zones
- Collaborative space in dry research zone.
- Glass office walls.

Wet Research Layout #1

This wet research layout organizes the space with a **support lab zone down the middle** of the plan allowing open lab space on one side and closed/open office space down the other. This layout allows for optimum day lighting and direct views to the exterior for the open lab and provides a continuous open research zone. The office configuration allows for collaboration while filtering light through the closed offices through the use of glazing in the walls. This model and those on the following pages offer insight on how that same amount of square footage can be arranged in a variety of ways to promote different research collaboration models.



WET LAB
OFFICE
VERTICAL CIRCULATION
LAB SUPPORT
CONFERENCE

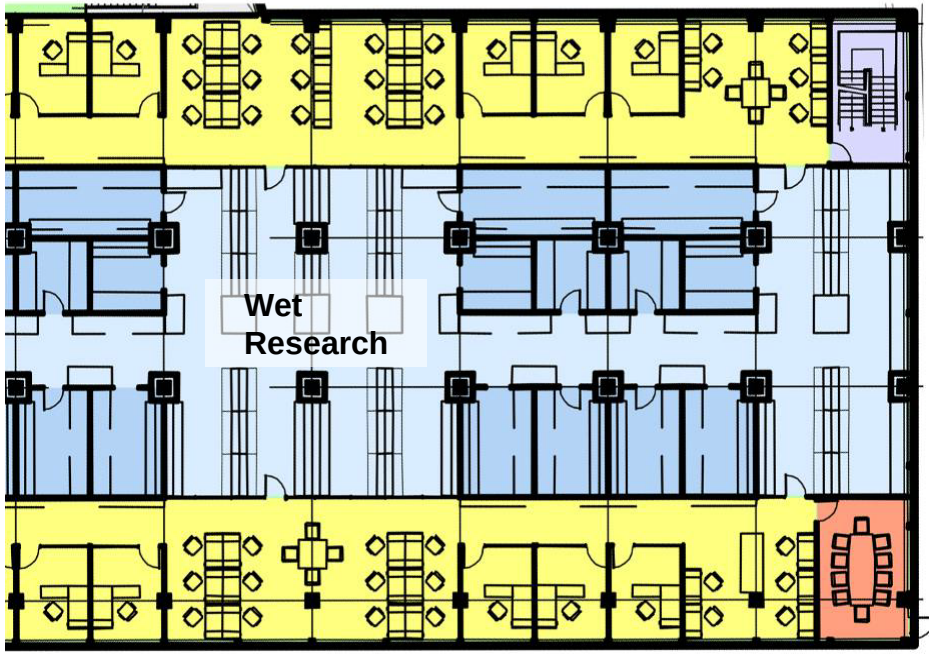


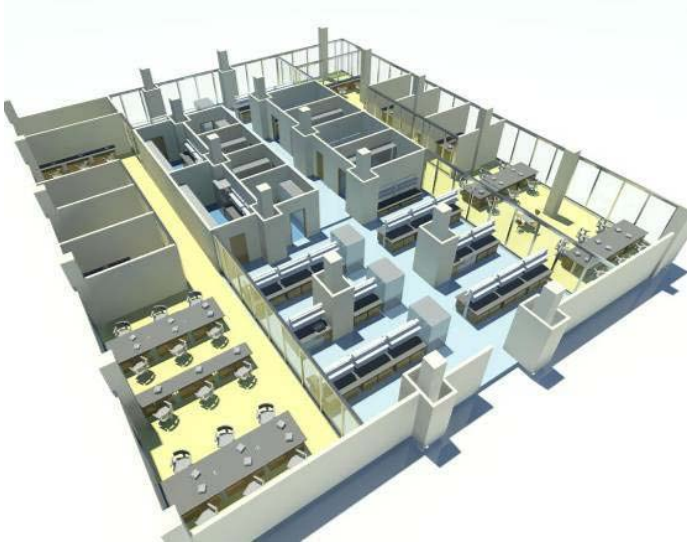
Key Points

- Transparency through research floors
- Collaborative space built into each dry and wet research zone.
- Lab equipment zones along lab suite corridors.
- Glass office walls.

Wet Research Layout #2

This wet research layout organizes the lab space with lab and support lab occupying the same zone on one side of the plan and offices on the other. This layout divides the open lab into smaller research groups with small groupings of support labs. The office zone is similar with a closed and open office/ dry computational zone. This layout matches the open zones of the labs and offices and allows for exterior view across the building and better dispersion of daylight throughout.





Key Points

- Collaborative zones in " suites"
- Transparency through research floors.
- Lab equipment zones along lab suite corridors.
- Glass office walls.

Wet Research Layout #3

This third wet research layout organizes the lab and lab support spaces as a central zone flanked by an office zone on each side. This layout also allows the support labs to divide the open lab into smaller open research spaces. Similar to Layout #2, the open office zones and the open lab zones match up to allow views and lighting across the building. This transparency is very important in that if provides natural light and views to a mostly interior lab space.

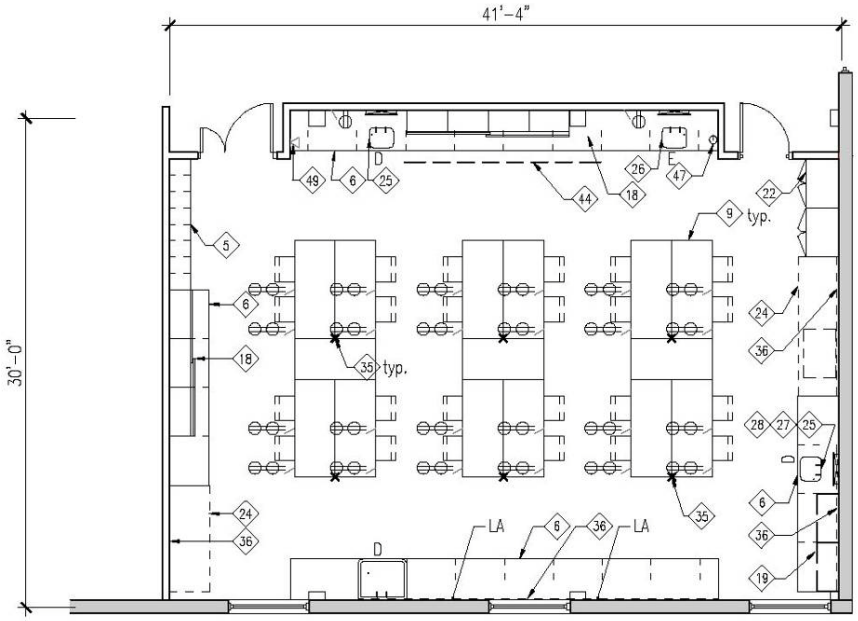
F. Detailed Teaching Lab Diagrams

Teaching Lab Guidelines

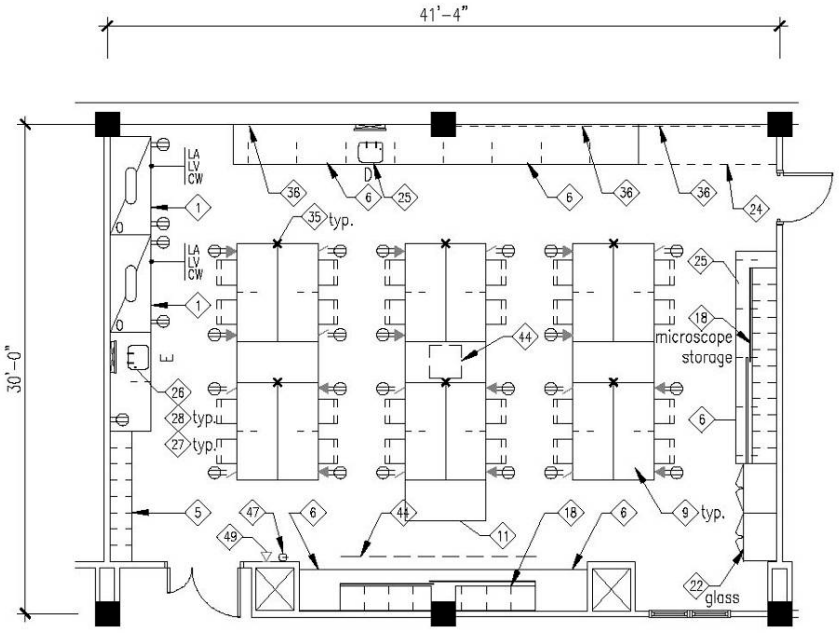
1.Teaching labs must be scheduled for 24 or more course credit hours per week to be justified under the current SCHEV utilization requirements.
2.Typical labs are arranged to allow for a variety of student teams from 2 to 8 depending on the course and the discipline.
3.If fixed fume hoods, sinks, and larger equipment and overhead storage can be located around the perimeter a more flexible lab center will allow for a wider range of pedagogies and sub-disciplines over the life of the building. This flexible center is furnished with sturdy, yet movable tables and carts to serve a wide variety of sitting and standing height write-up and bench work.
4.Presentation areas with sliding marker boards projector screens and A/V equipment should be located on an interior wall to allow for exterior glazing.
5.Glass to the corridor is desired to allow for light to penetrate into the building and to allow for views into the dynamic teaching lab environment. Interior glazing also contributes to a safer lab environment.
6.If lab casework is on a three foot module it will allow for easy changes and can be well served by an interchangeable inventory of casework.
7.An aisle minimum dimension of minimum of 5'-0" will meet based on American Disabilities Act (ADA) and represents good laboratory practice for safe circulation zones in the lab..
8.Locate fume hoods and bio safety cabinets away from doors for safety and to minimize the chance that turbulence is crated near the hood or cabinet.
9.Keep write up areas away from fume hoods. Separate the chemicals from the paper.
10.Basic fume hoods for organic chemistry are usually 6' wide general chemical fume hoods for allow for two students to work in the hood .
11.At least one 3'-6" wide door should be provided for each main lab. If a larger opening is required., a double leaf door will be used.
12.Each lab will be designed to have at least one position that is ADA compliant. This will affect the design of at least on fume hood (where applicable) and sink.
13.At least one sink in each lab should have a hand-held, sink mounted eyewash and body wash.
14.Labs that are 960 net square feet or greater will have two means of egress.
15.Any labs with vibration sensitive equipment (that would equal or exceed the vibration resistance needs of a 400X microscope should be located on the lowest floor where there is a concrete slab on grade, or utilize a vibration table if placed on an upper level.
16.Ideally labs are organized on a two directional grid to add flexibility to casework layouts

The following teaching lab diagrams provide diversity of lab types and configurations to allow conversations to support the programming and design of academic lab spaces. These diagrams are not intended to be standard models for adoption, but are valuable references for starting the design of a new lab space.

F. Detailed Lab Diagrams



General Biology - 1,240 sf



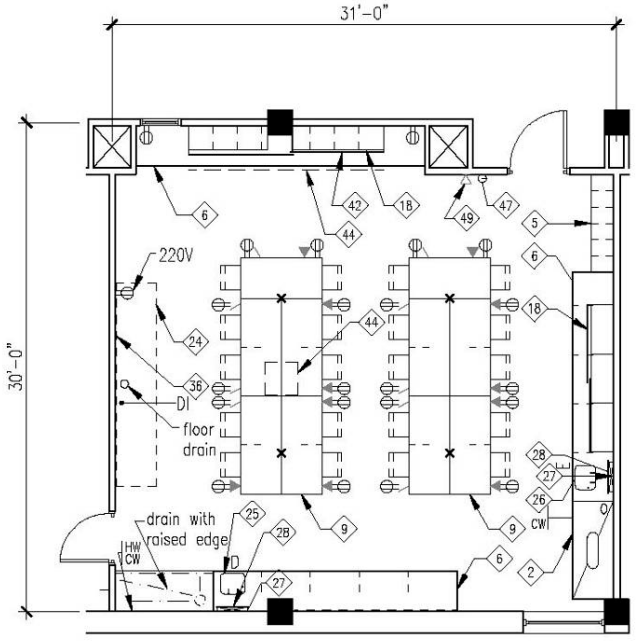
Biology (Majors) Principles 1 - 1,240 sf

Lab Furnishings Legend

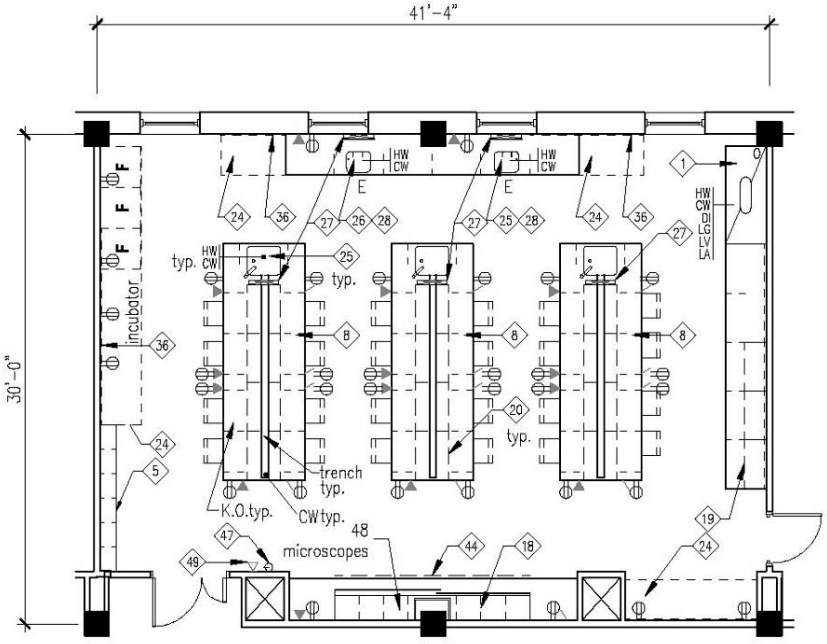
1. Chemical Fume Hood
2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
6. Lab Bench Standing Height (fixed)
7. Lab Bench Sitting Height (fixed)
8. Lab Table Standing Height (moveable)
9. Lab Table Sitting Height (moveable)
10. Adjust. Height Moveable Lab Tables
11. Moveable Demonstration Bench
12. Desk / Writing table
13. Balance Table
14. ADA Height Workstation
15. Movable Demonstration Bench
16. Mobile Base Cabinet (below)
17. Wall Cabinet Solid Doors
18. Wall Storage behind Marker/Black Boards
19. Adjustable Wall Shelves
20. Reagent Shelves Above Casework
21. Industrial Adjustable Shelving
22. Tall Storage Cabinet
23. Vented Storage Cabinet
24. Equipment Space
25. Laboratory Sink
26. ADA Sink
27. Utility or Pipe Drop Enclosure
28. Pegboard
29. Cupsink
30. Processing Sink
31. Cylinder Rack
32. Safety Shower
33. Eyewash
34. Overhead Service Carrier
35. Flexible Power/Data Drop
36. Electrical Raceway
37. Glassware Washer
38. Glassware Dryer
39. Autoclave
40. Wire Shelving
41. White Markerboard
42. Black Chalkboard
43. Tackboard
44. A/V Screen
45. Ceiling Data/Power for Pojector
46. File Cabinet
47. Fire Extinguisher
48. Black-Out Shades
49. Wall Mount Telephone
50. Rolling Cart (by owner)
51. Lattice Rod Assembly
52. Down Draft Exhaust
53. Gas Tank Rack

Detailed Lab Diagrams

PERKINS +WILL



Ecology / Plant Biology - 930 sf



Genetics MicroBiology - 1,240 sf

Lab Furnishings Legend

1. Chemical Fume Hood
2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
6. Lab Bench Standing Height (fixed)
7. Lab Bench Sitting Height (fixed)
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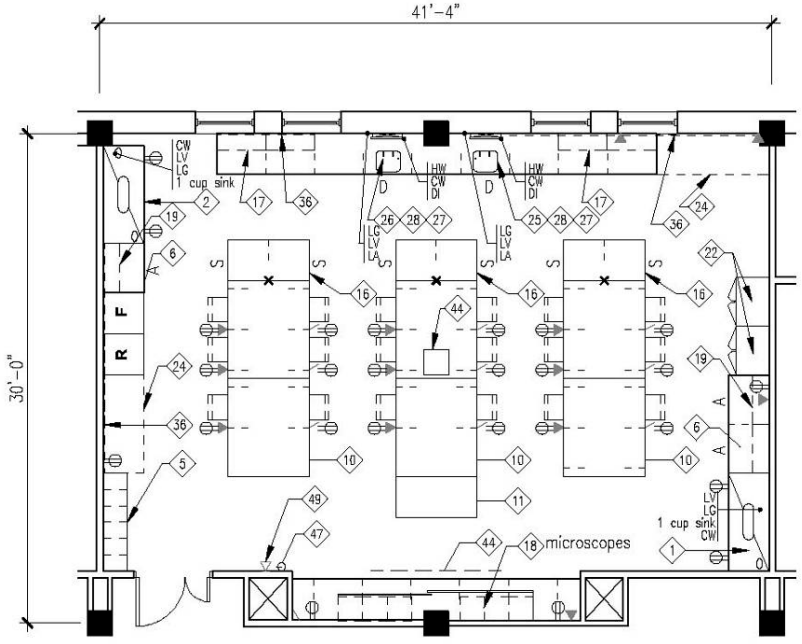
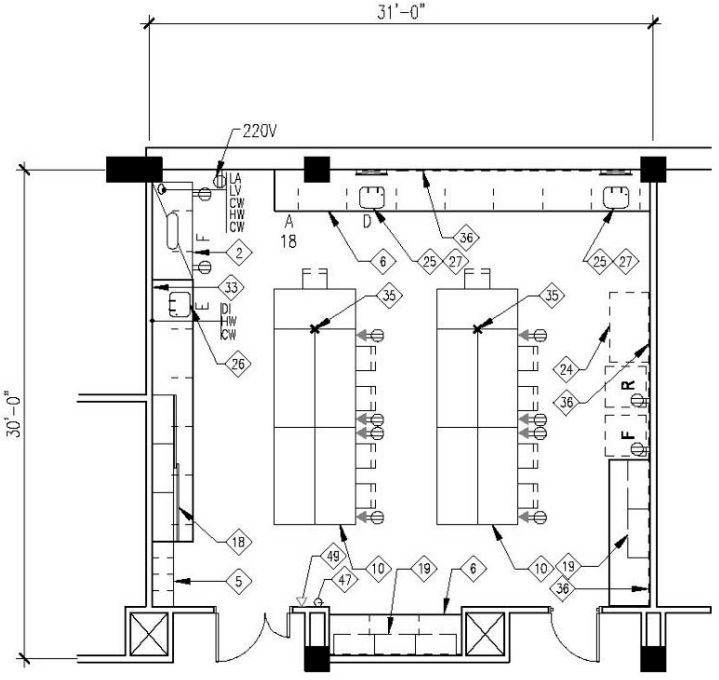
53. Gas Tank Rack

Detailed Lab Diagrams

PERKINS + WILL



Cell Biology - 1,240 sf



Animal Anatomy - 930 sf

Lab Furnishings Legend

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2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
6. Lab Bench Standing Height (fixed)
7. Lab Bench Sitting Height (fixed)
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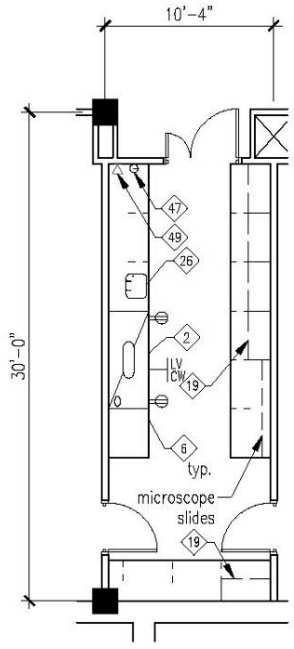
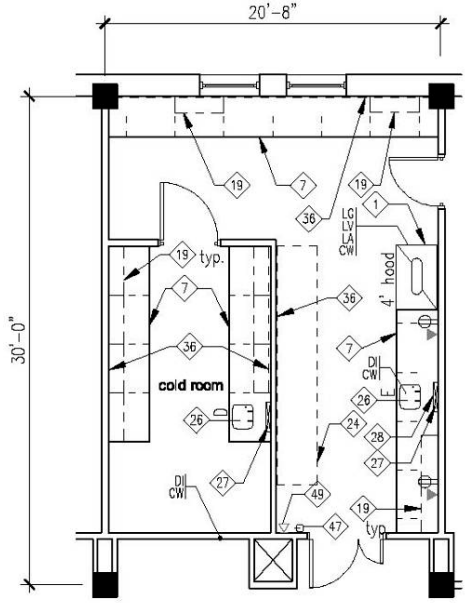


General Biology Prep - 310 sf



Cell & Molecular Bio. Prep - 620 sf

Lab Furnishings Legend

1. Chemical Fume Hood
2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
6. Lab Bench Standing Height (fixed)
7. Lab Bench Sitting Height (fixed)
8. Lab Table Standing Height (moveable)
9. Lab Table Sitting Height (moveable)
10. Adjust. Height Moveable Lab Tables
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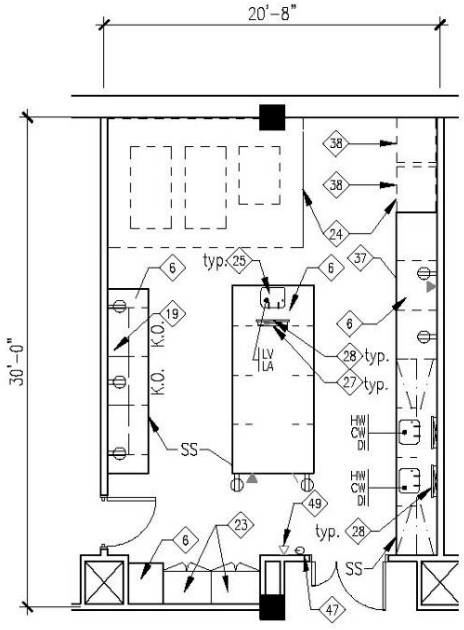
Detailed Lab Diagrams



Autoclave & Glasswash Biology - 620 sf

Lab Furnishings Legend

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2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
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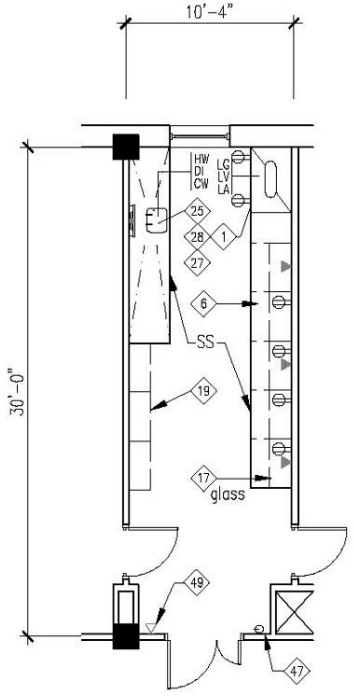
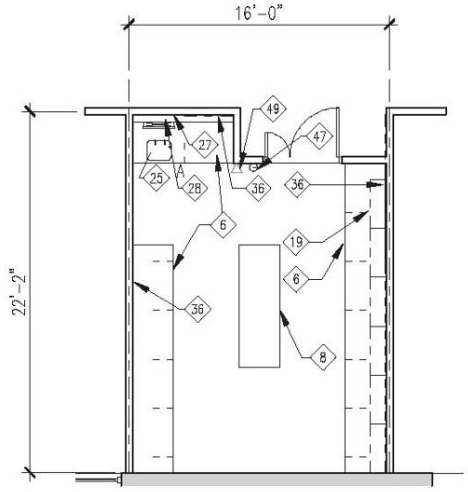
28. Pegboard
29. Cupsink
30. Processing Sink
31. Cylinder Rack
32. Safety Shower
33. Eyewash
34. Overhead Service Carrier
35. Flexible Power/Data Drop
36. Electrical Raceway
37. Glassware Washer
38. Glassware Dryer
39. Autoclave
40. Wire Shelving
41. White Markerboard
42. Black Chalkboard
43. Tackboard
44. A/V Screen
45. Ceiling Data/Power for Pojector
46. File Cabinet
47. Fire Extinguisher
48. Black-Out Shades
49. Wall Mount Telephone
50. Rolling Cart (by owner)
51. Lattice Rod Assembly
52. Down Draft Exhaust
53. Gas Tank Rack

Detailed Lab Diagrams

PERKINS + WILL



Media Prep - 310 sf



Animal Collection Room - 435 sf

Lab Furnishings Legend

1. Chemical Fume Hood
2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
6. Lab Bench Standing Height (fixed)
7. Lab Bench Sitting Height (fixed)
8. Lab Table Standing Height (moveable)
9. Lab Table Sitting Height (moveable)
10. Adjust. Height Moveable Lab Tables
11. Moveable Demonstration Bench
12. Desk / Writing table
13. Balance Table
14. ADA Height Workstation
15. Movable Demonstration Bench
16. Mobile Base Cabinet (below)
17. Wall Cabinet Solid Doors
18. Wall Storage behind Marker/Black Boards
19. Adjustable Wall Shelves
20. Reagent Shelves Above Casework
21. Industrial Adjustable Shelving
22. Tall Storage Cabinet
23. Vented Storage Cabinet
24. Equipment Space
25. Laboratory Sink
26. ADA Sink
27. Utility or Pipe Drop Enclosure
28. Pegboard
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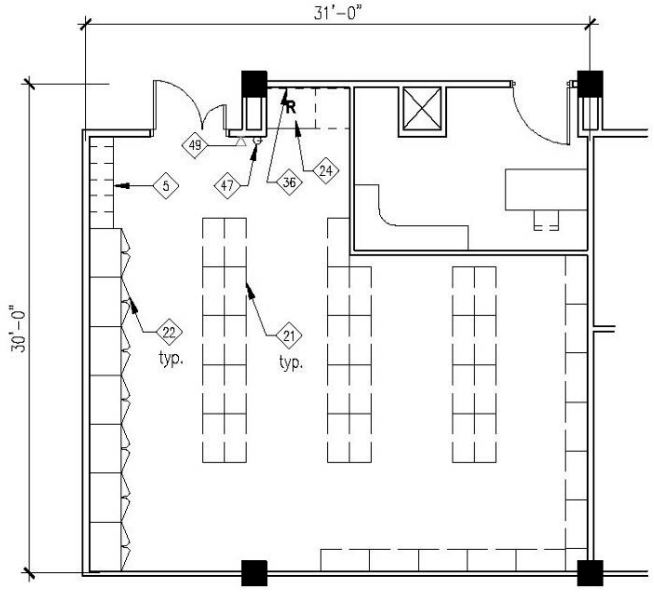
52. Down Draft Exhaust
53. Gas Tank Rack



Biology Stockroom - 930 sf

Lab Furnishings Legend

1. Chemical Fume Hood
2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
6. Lab Bench Standing Height (fixed)
7. Lab Bench Sitting Height (fixed)
8. Lab Table Standing Height (moveable)
9. Lab Table Sitting Height (moveable)
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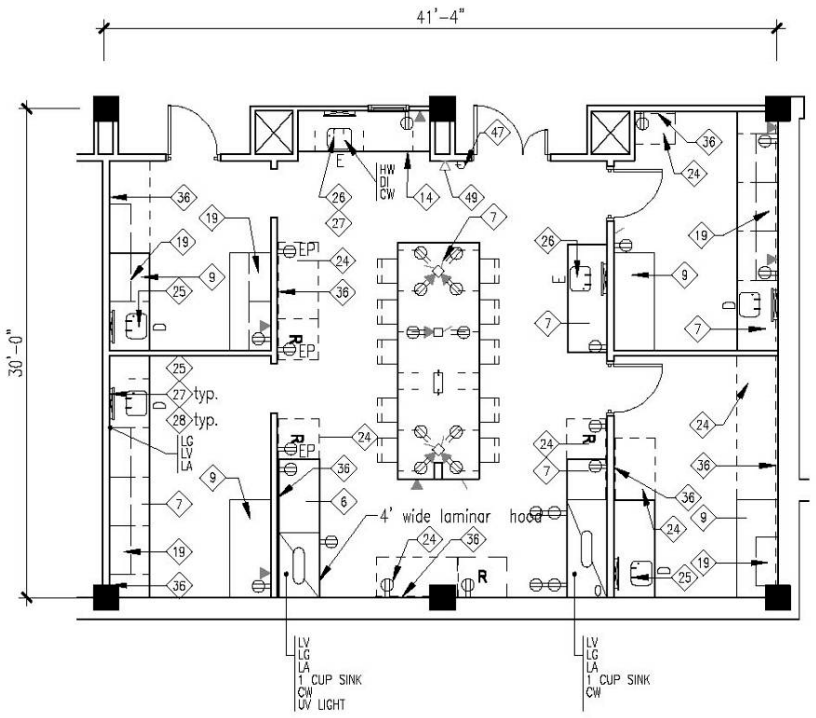
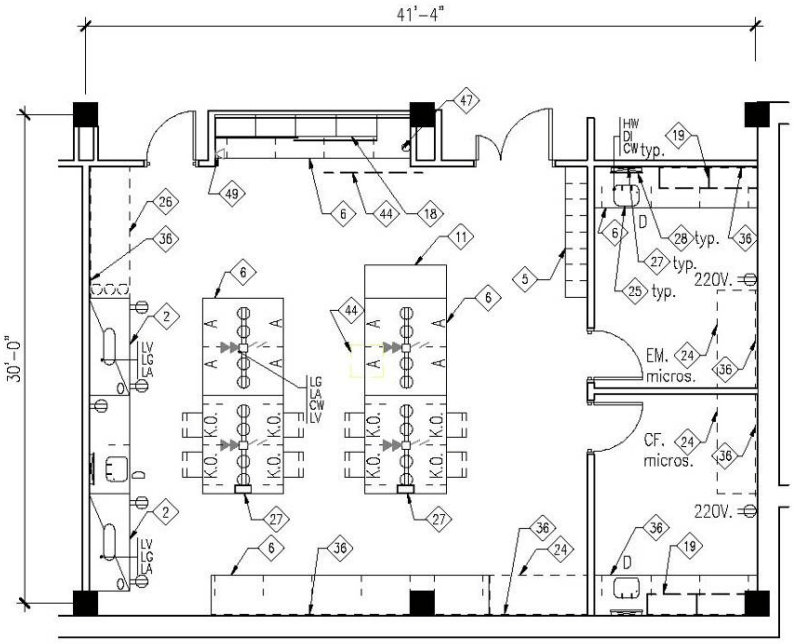
Detailed Lab Diagrams

PERKINS +WILL



Capstone Labs (Biology) - 1,240 sf



Research Capstone Labs - 1,240 sf

Lab Furnishings Legend

1. Chemical Fume Hood
2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
6. Lab Bench Standing Height (fixed)
7. Lab Bench Sitting Height (fixed)
8. Lab Table Standing Height (moveable)
9. Lab Table Sitting Height (moveable)
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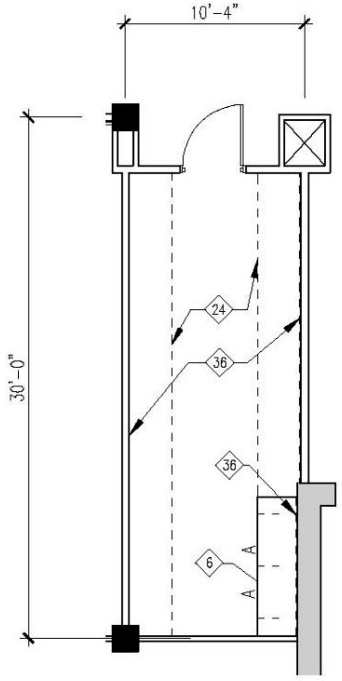
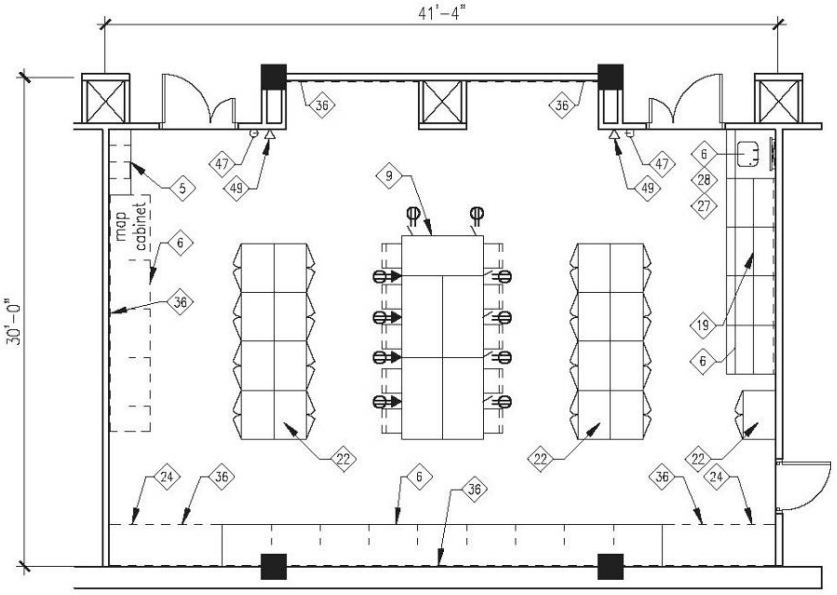
52. Down Draft Exhaust
53. Gas Tank Rack

Detailed Lab Diagrams



Bio. Equip. Room - 310 sf



Herbarium - 1,240 sf

Lab Furnishings Legend

1. Chemical Fume Hood
2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
6. Lab Bench Standing Height (fixed)
7. Lab Bench Sitting Height (fixed)
8. Lab Table Standing Height (moveable)
9. Lab Table Sitting Height (moveable)
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50. Rolling Cart (by owner)
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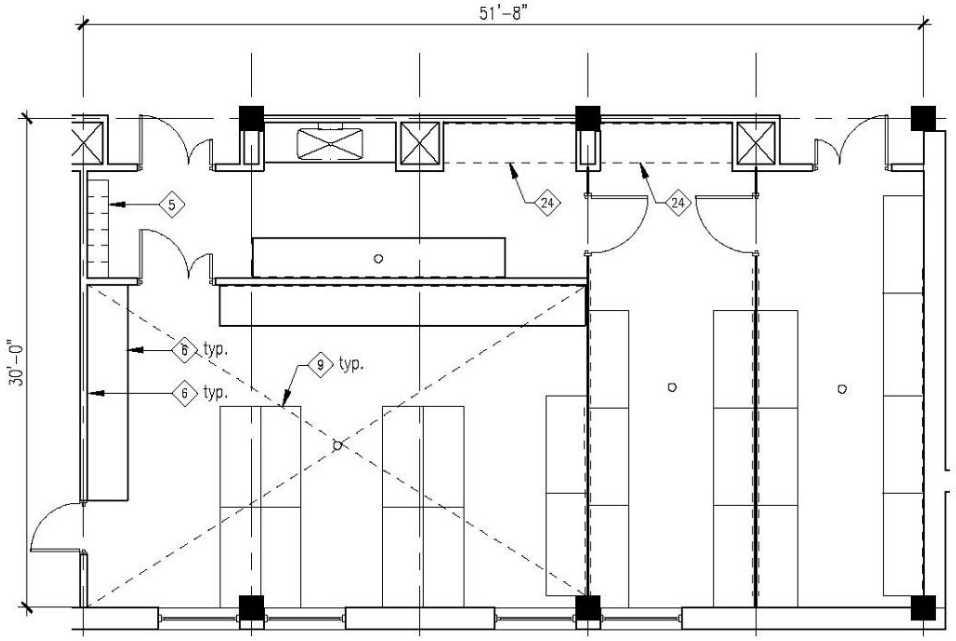
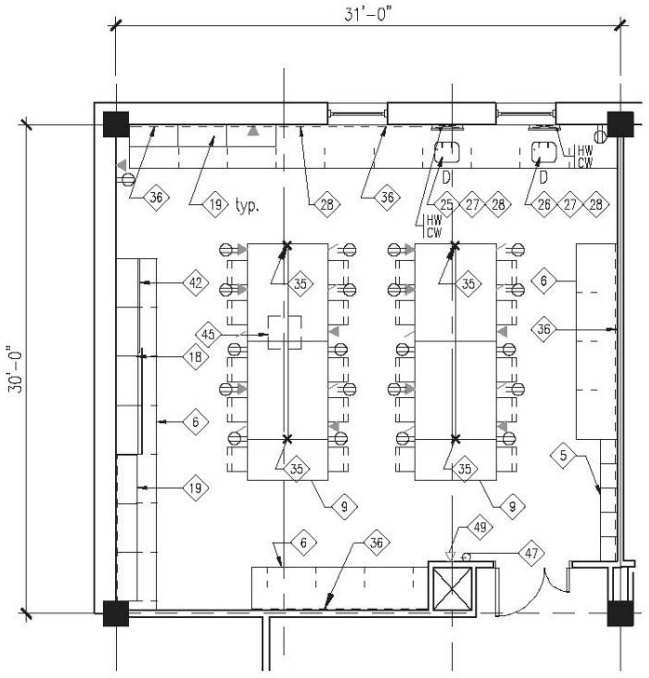
52. Down Draft Exhaust
53. Gas Tank Rack

Detailed Lab Diagrams

PERKINS + WILL



GreenHouse HeadHouse - 1,560 sf



Research (Biology) - 930 sf

Lab Furnishings Legend

1. Chemical Fume Hood
2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
6. Lab Bench Standing Height (fixed)
7. Lab Bench Sitting Height (fixed)
8. Lab Table Standing Height (moveable)
9. Lab Table Sitting Height (moveable)
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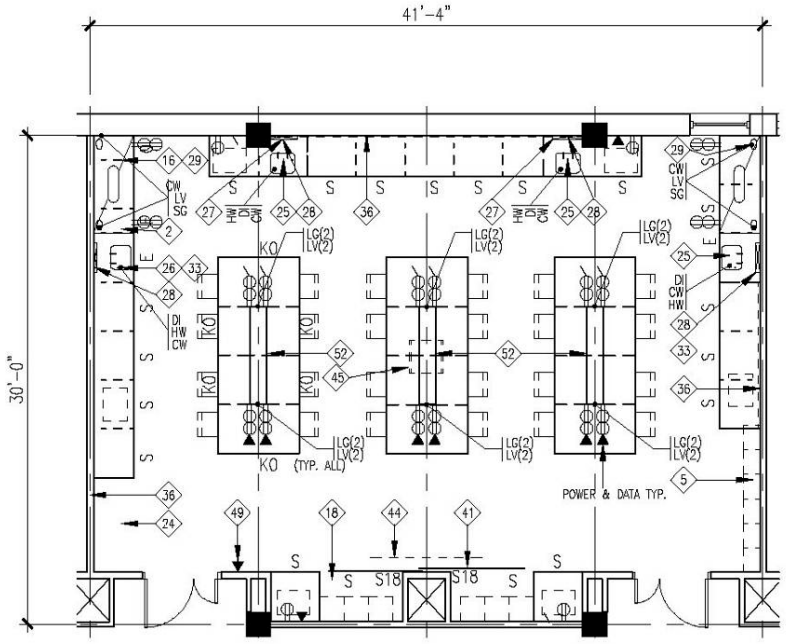
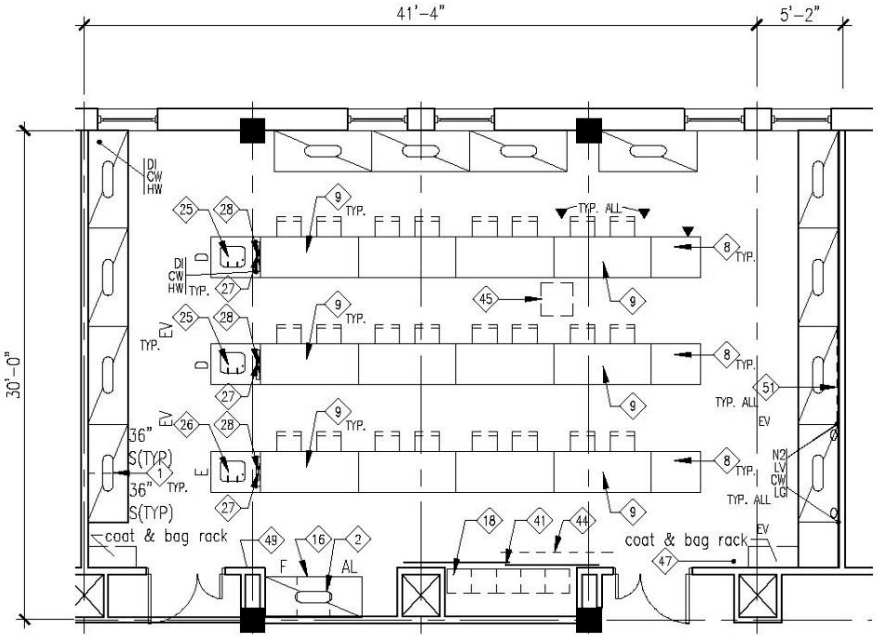
Detailed Lab Diagrams

PERKINS +WILL



General Chemistry Lab - 1,240 sf



Organic Chemistry - 1,490 sf

Lab Furnishings Legend

1. Chemical Fume Hood
2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
6. Lab Bench Standing Height (fixed)
7. Lab Bench Sitting Height (fixed)
8. Lab Table Standing Height (moveable)
9. Lab Table Sitting Height (moveable)
10. Adjust. Height Moveable Lab Tables
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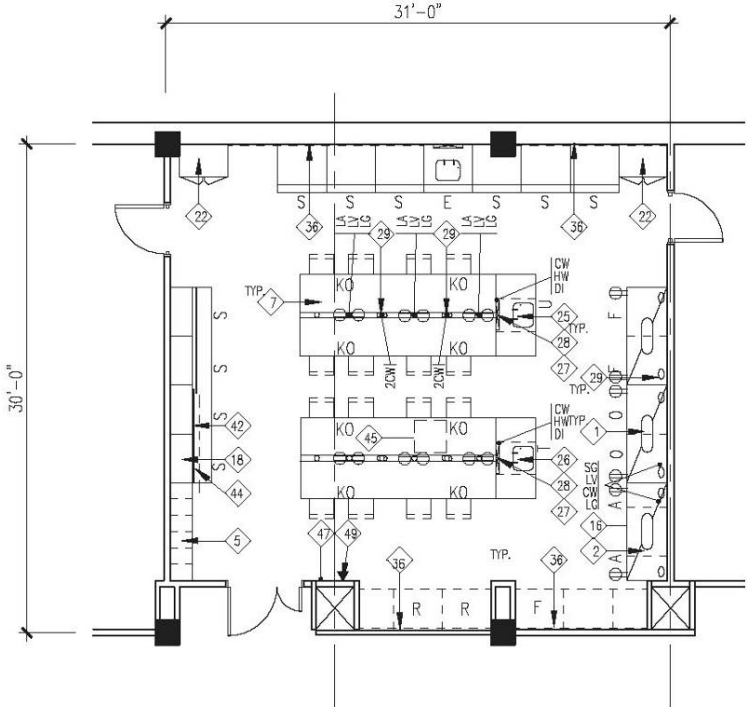
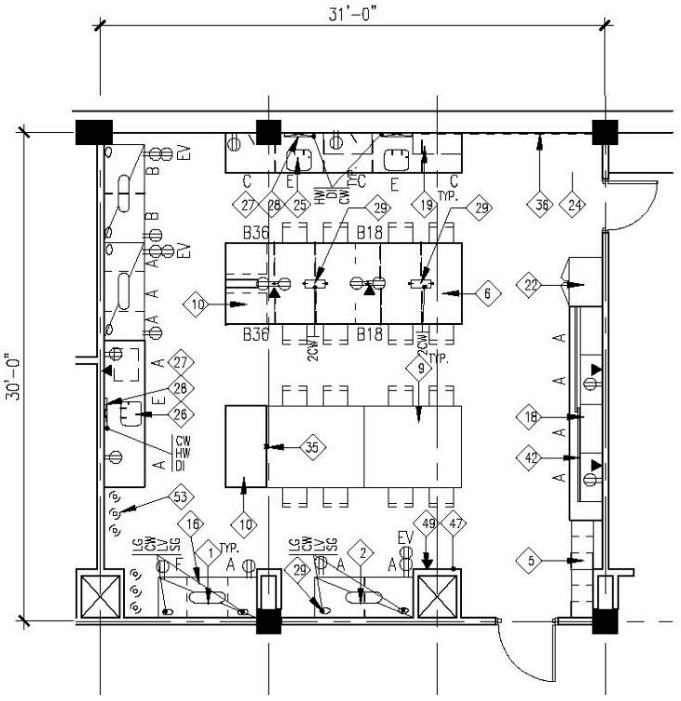
Detailed Lab Diagrams

PERKINS + WILL



Bio - Chemistry - 930 sf



Quant. / Phy. Chem. Inorganic - 930 sf

Lab Furnishings Legend

1. Chemical Fume Hood
2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
6. Lab Bench Standing Height (fixed)
7. Lab Bench Sitting Height (fixed)
8. Lab Table Standing Height (moveable)
9. Lab Table Sitting Height (moveable)
10. Adjust. Height Moveable Lab Tables
11. Moveable Demonstration Bench
12. Desk / Writing table
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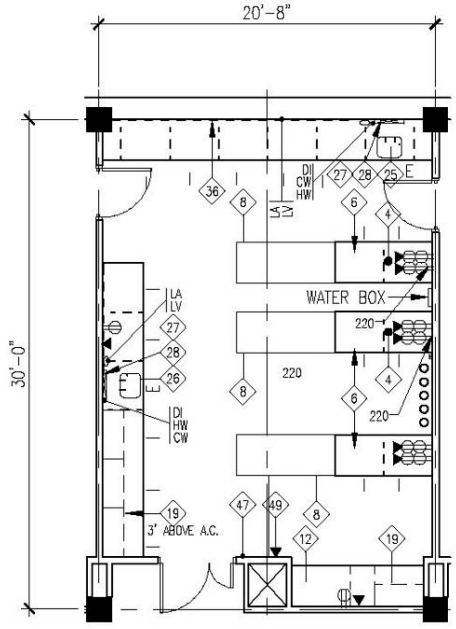
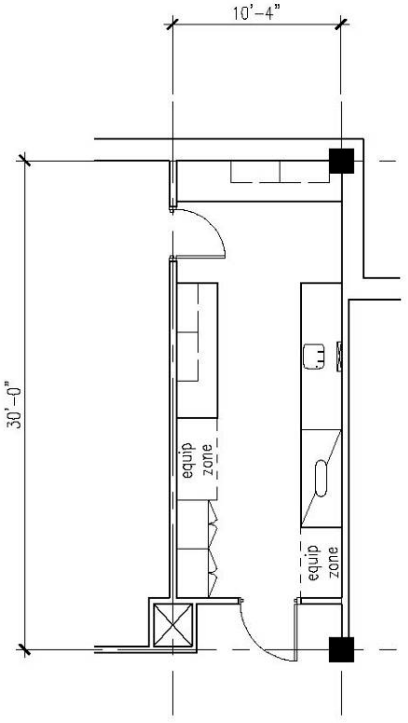
Detailed Lab Diagrams

PERKINS + WILL



Common Instrument Lab - 620 sf



Chemistry – Prep Storage - 310 sf

Lab Furnishings Legend

1. Chemical Fume Hood
2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
6. Lab Bench Standing Height (fixed)
7. Lab Bench Sitting Height (fixed)
8. Lab Table Standing Height (moveable)
9. Lab Table Sitting Height (moveable)
10. Adjust. Height Moveable Lab Tables
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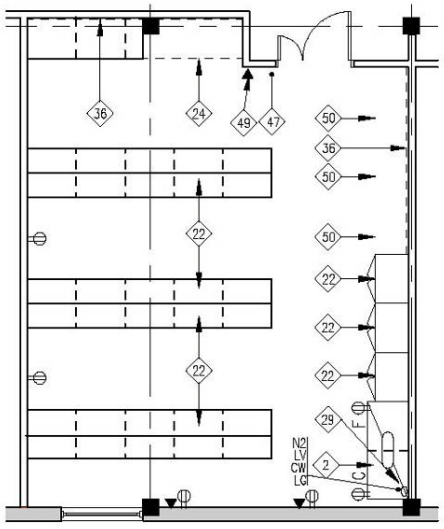
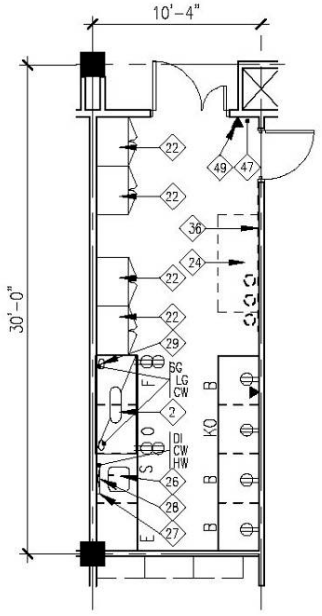


Chemical Store Room - 620 sf



Chemical Prep Area - 310 sf

Lab Furnishings Legend

1. Chemical Fume Hood
2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
6. Lab Bench Standing Height (fixed)
7. Lab Bench Sitting Height (fixed)
8. Lab Table Standing Height (moveable)
9. Lab Table Sitting Height (moveable)
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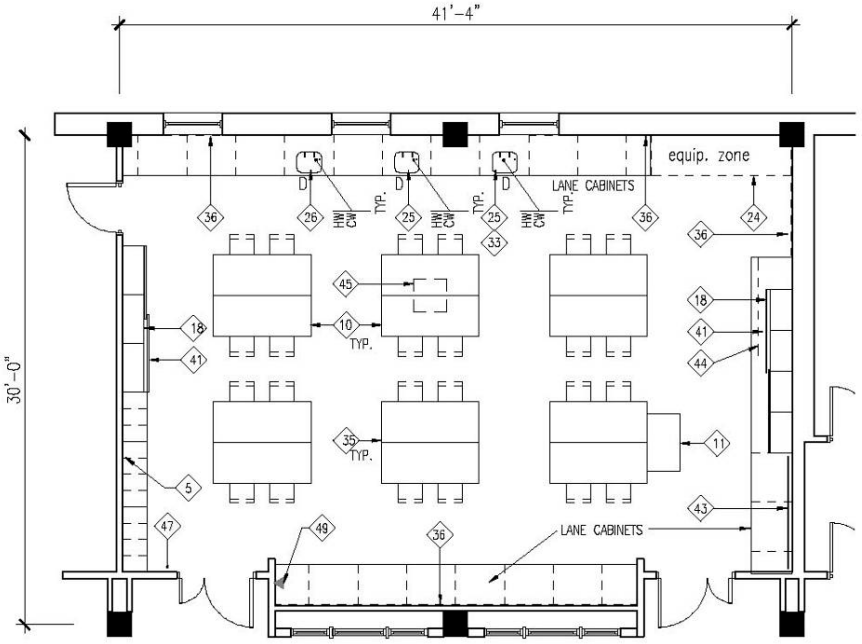
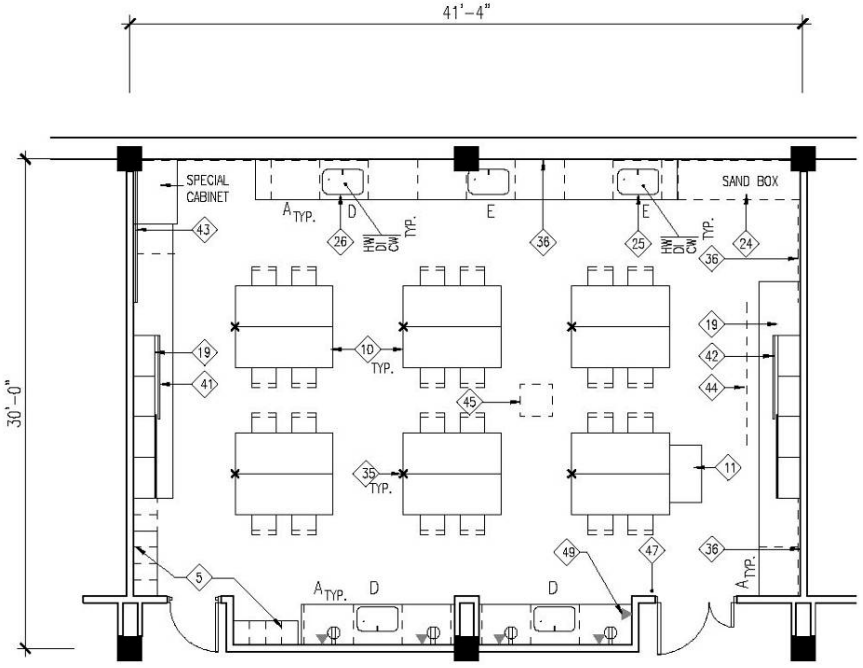
Detailed Lab Diagrams

PERKINS +WILL



Introduction to GeoScience - 1,240 sf



Rivers / Minerals / Ecology - 1,240 sf

Lab Furnishings Legend

1. Chemical Fume Hood
2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
6. Lab Bench Standing Height (fixed)
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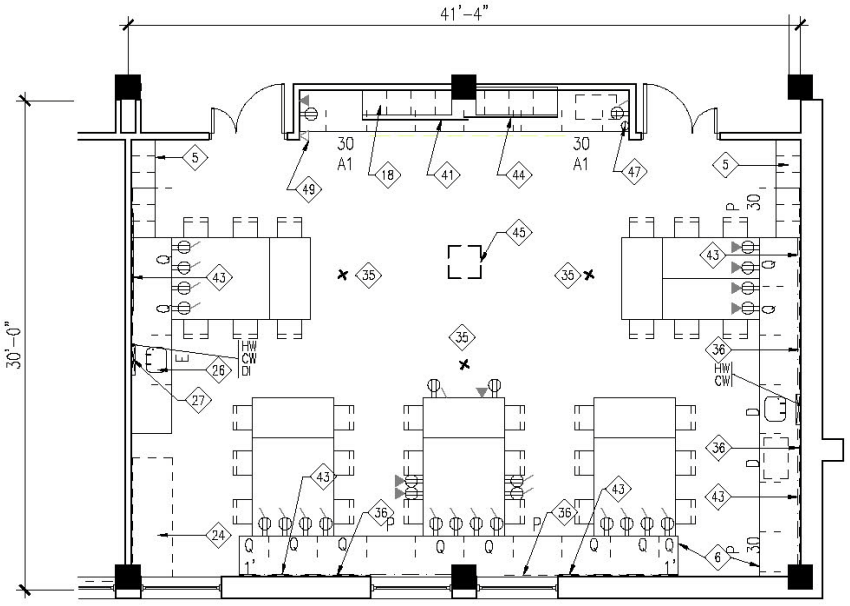
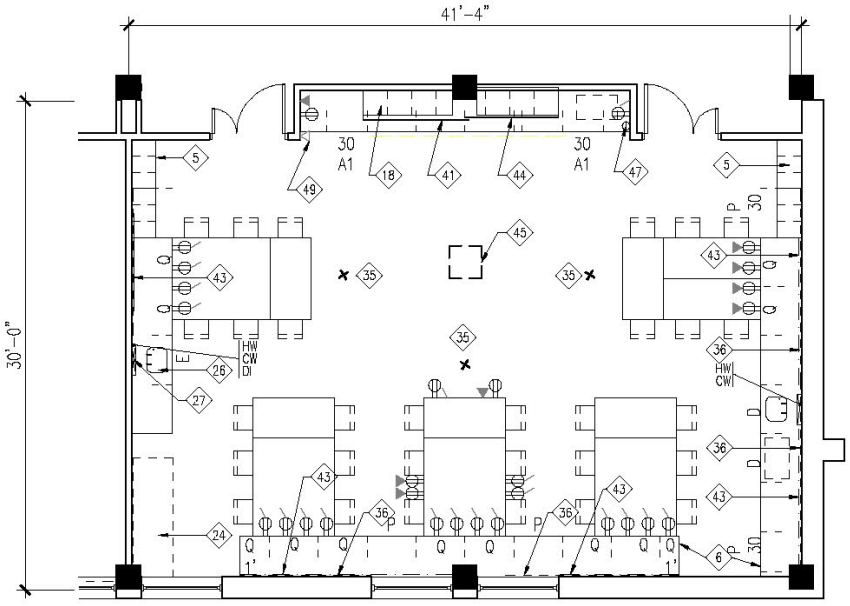
Detailed Lab Diagrams

PERKINS + WILL



General Physics - 1,240 sf



Gen./ Principles / Modern Physics - 1,240 sf

Lab Furnishings Legend

1. Chemical Fume Hood
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4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
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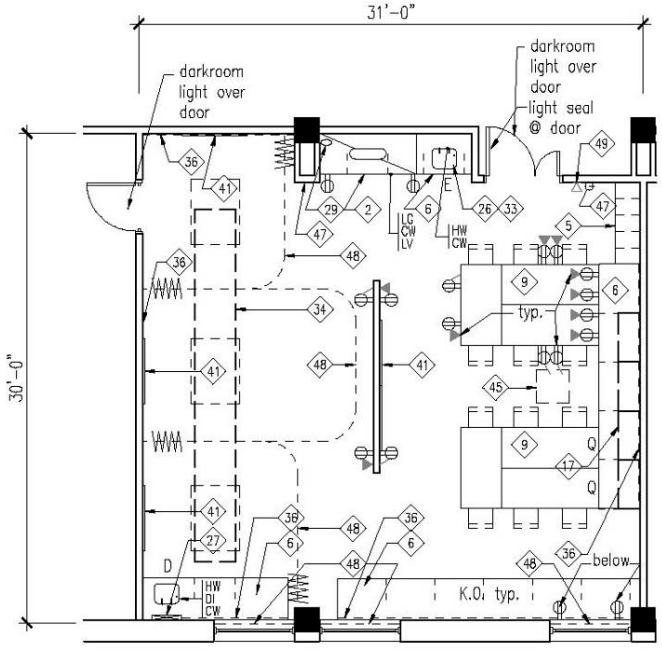
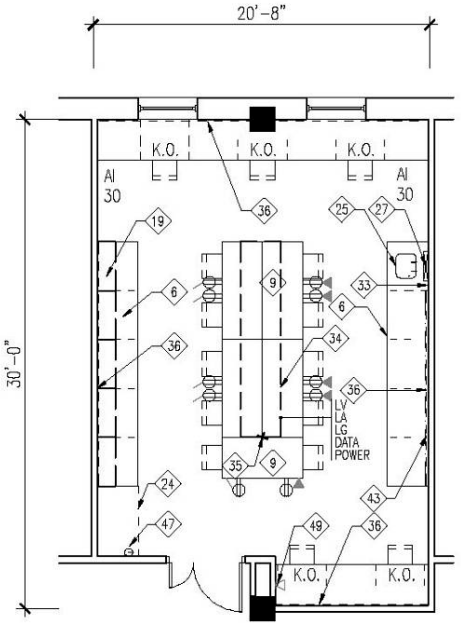
19. Adjustable Wall Shelves
20. Reagent Shelves Above Casework
21. Industrial Adjustable Shelving
22. Tall Storage Cabinet
23. Vented Storage Cabinet
24. Equipment Space
25. Laboratory Sink
26. ADA Sink
27. Utility or Pipe Drop Enclosure
28. Pegboard
29. Cupsink
30. Processing Sink
31. Cylinder Rack
32. Safety Shower
33. Eyewash
34. Overhead Service Carrier
35. Flexible Power/Data Drop
36. Electrical Raceway
37. Glassware Washer
38. Glassware Dryer
39. Autoclave
40. Wire Shelving
41. White Markerboard
42. Black Chalkboard
43. Tackboard
44. A/V Screen
45. Ceiling Data/Power for Pojector
46. File Cabinet
47. Fire Extinguisher
48. Black-Out Shades
49. Wall Mount Telephone
50. Rolling Cart (by owner)
51. Lattice Rod Assembly
52. Down Draft Exhaust
53. Gas Tank Rack

Detailed Lab Diagrams

PERKINS + WILL



Advanced Physics - 930 sf



Student/Faculty Research - 620 sf

Lab Furnishings Legend

1. Chemical Fume Hood
2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
6. Lab Bench Standing Height (fixed)
7. Lab Bench Sitting Height (fixed)
8. Lab Table Standing Height (moveable)
9. Lab Table Sitting Height (moveable)
10. Adjust. Height Moveable Lab Tables
11. Moveable Demonstration Bench
12. Desk / Writing table
13. Balance Table
14. ADA Height Workstation
15. Movable Demonstration Bench
16. Mobile Base Cabinet (below)
17. Wall Cabinet Solid Doors
18. Wall Storage behind Marker/Black Boards
19. Adjustable Wall Shelves
20. Reagent Shelves Above Casework
21. Industrial Adjustable Shelving
22. Tall Storage Cabinet
23. Vented Storage Cabinet
24. Equipment Space
25. Laboratory Sink
26. ADA Sink
27. Utility or Pipe Drop Enclosure
28. Pegboard
29. Cupsink
30. Processing Sink
31. Cylinder Rack
32. Safety Shower
33. Eyewash
34. Overhead Service Carrier
35. Flexible Power/Data Drop
36. Electrical Raceway
37. Glassware Washer
38. Glassware Dryer
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40. Wire Shelving
41. White Markerboard
42. Black Chalkboard
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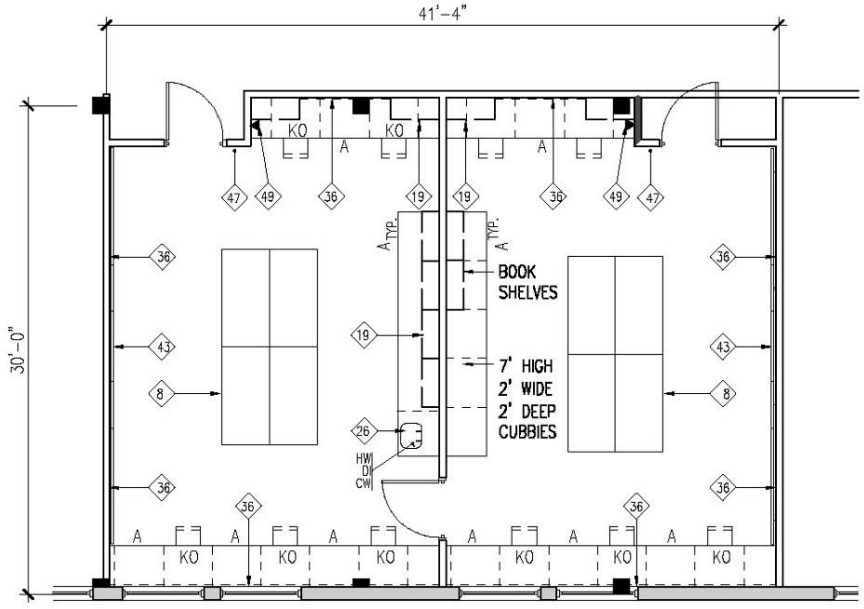
44. A/V Screen
45. Ceiling Data/Power for Pojector
46. File Cabinet
47. Fire Extinguisher
48. Black-Out Shades
49. Wall Mount Telephone
50. Rolling Cart (by owner)
51. Lattice Rod Assembly
52. Down Draft Exhaust
53. Gas Tank Rack



Physics Research - 1,240 sf

Lab Furnishings Legend

1. Chemical Fume Hood
2. ADA Chemical Fume Hood
3. Biological Safety Cabinet
4. Snorkel Exhaust
5. Cubbies for Coats / Backpacks
6. Lab Bench Standing Height (fixed)
7. Lab Bench Sitting Height (fixed)
8. Lab Table Standing Height (moveable)
9. Lab Table Sitting Height (moveable)
10. Adjust. Height Moveable Lab Tables
11. Moveable Demonstration Bench
12. Desk / Writing table
13. Balance Table
14. ADA Height Workstation
15. Movable Demonstration Bench
16. Mobile Base Cabinet (below)
17. Wall Cabinet Solid Doors
18. Wall Storage behind Marker/Black Boards
19. Adjustable Wall Shelves
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22. Tall Storage Cabinet
23. Vented Storage Cabinet
24. Equipment Space
25. Laboratory Sink
26. ADA Sink
27. Utility or Pipe Drop Enclosure
28. Pegboard
29. Cupsink
30. Processing Sink
31. Cylinder Rack
32. Safety Shower
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37. Glassware Washer
38. Glassware Dryer
39. Autoclave
40. Wire Shelving
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42. Black Chalkboard
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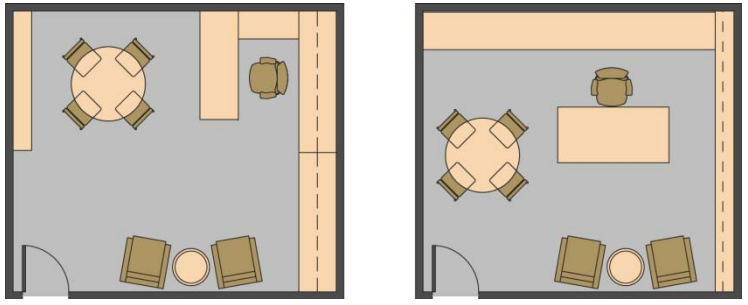
44. A/V Screen
45. Ceiling Data/Power for Pojector
46. File Cabinet
47. Fire Extinguisher
48. Black-Out Shades
49. Wall Mount Telephone
50. Rolling Cart (by owner)
51. Lattice Rod Assembly
52. Down Draft Exhaust
53. Gas Tank Rack

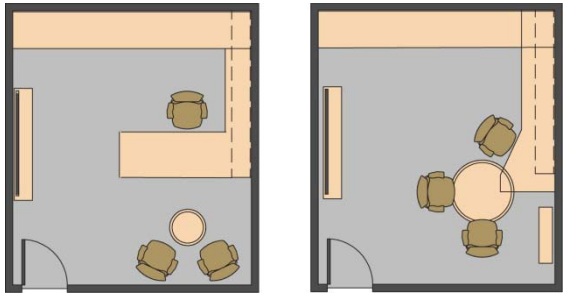
G. Office Diagrams

The following diagrams show workspace configurations that have been adopted by the University and represent desired models to be used by the College of Science.

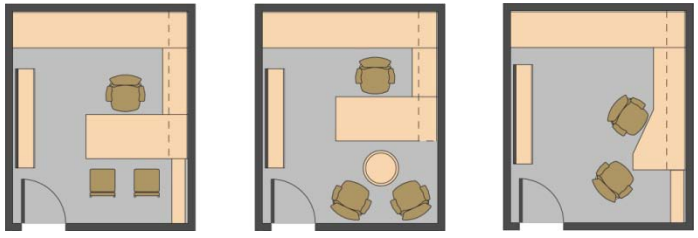
G. Office Diagrams



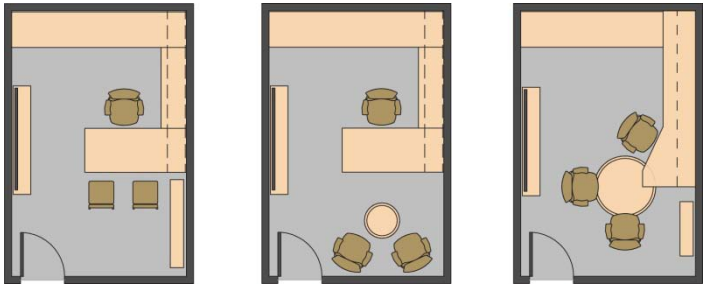
Dean's Office - 256 asf



Dept. Chair - 180 asf



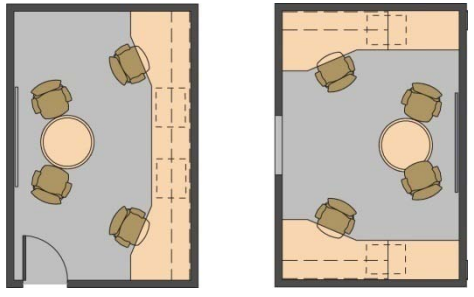
Single Occupancy -120 S.F.



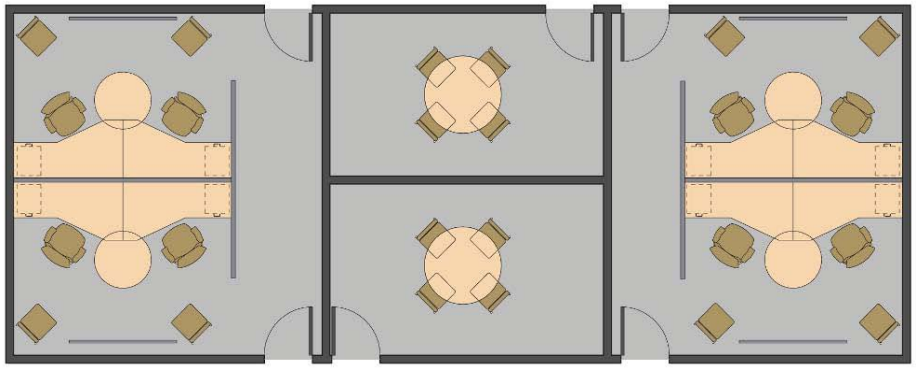
Single Occupancy -144 S.F.

Faculty offices

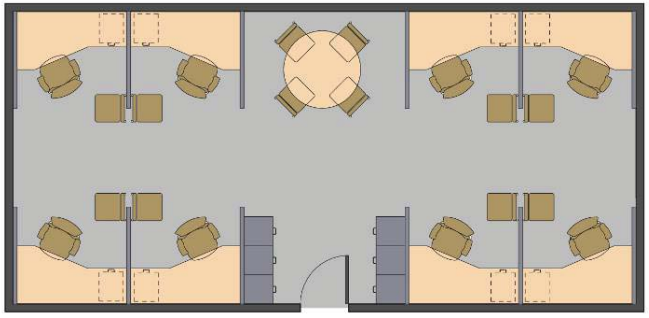
Faculty offices will be arranged to serve a variety of configurations and to enable collaboration. The use of shared computer screens and or projected images should be considered in all layouts. The typical faculty office of 144 square feet will often be provided with enough power and data for two workstations to enable heavy/ multiple computer users an to provide flexibility for shared use by two visiting or temporary faculty members.



Double Occupancy 144 s.f.



Shared Faculty Offices



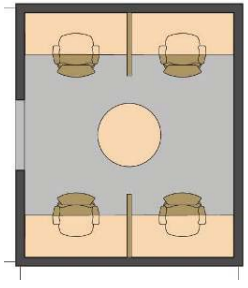
Graduate Teaching Assistant Offices

Collaboration Environments for part time faculty, GRA's and GTA's

Workspaces for key participants in the teaching and research efforts will be provided in all future projects. Their locations may be in central locations or distributed in proper proportions to the disciplines that are served. In the shared faculty offices above room is provided for meetings, for brainstorming or for small scheduled conferences.

Graduate teaching assistants may have workstations in clusters to collaborate with peers and to have meetings with students

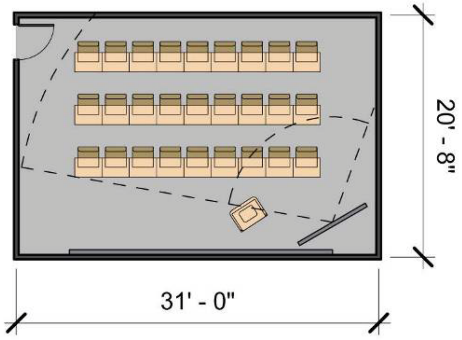
Graduate research assistants will have dedicated workstations and a shared conference table.



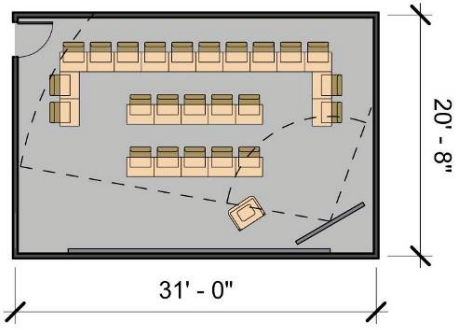
Graduate Research Assistant Offices

H. Classroom Diagrams

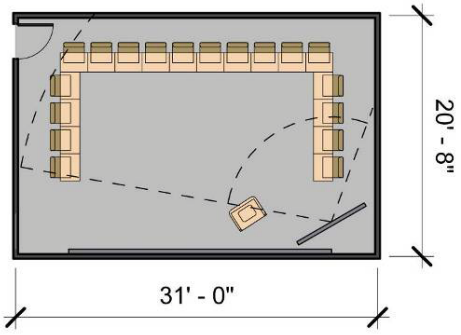
The following diagrams include classroom configurations for discussion during the planning and design of non- lab teaching spaces for the University and the College of Science. These space are not accepted standards but show a diversity of spaces and furniture arrangements to support a variety of learning styles. These diagrams are useful when evaluating the space needs for new or renovated classrooms.



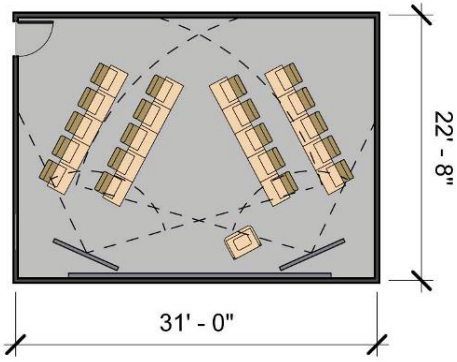
Classroom – 27 stud.



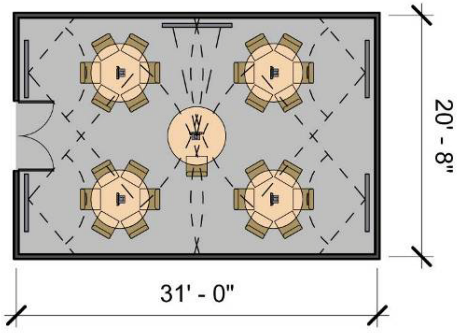
Classroom – 24 stud.



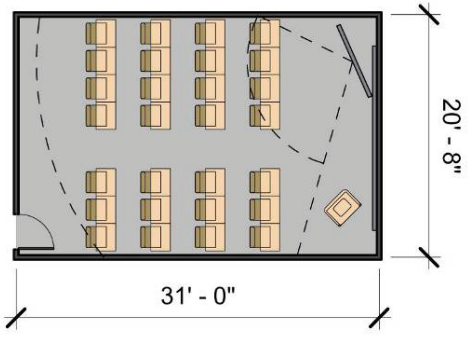
Seminar – 18 stud.



Debate – 24 stud.



Classroom – 24 stud.



Classroom – 28 stud.

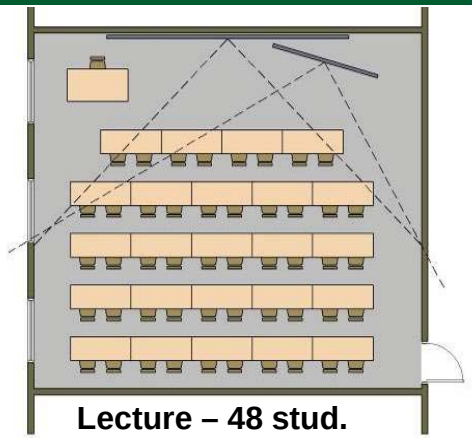
H. Classroom Diagrams

Flexible Classrooms – 620 s.f. Learning Environments

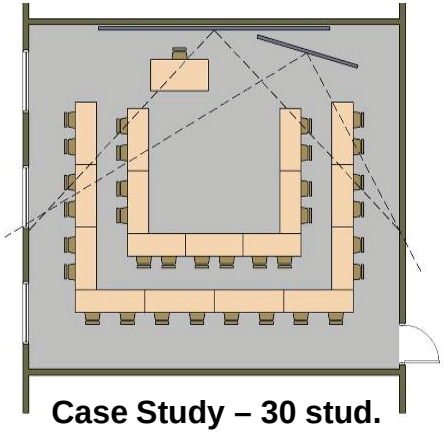
These classrooms occupy the same amount of space as a modest research lab or an upper level student project lab. Writing surfaces on the walls, movable furniture and a variety of digital image sources and web access make these viable for classrooms, research collaboration spaces, seminars and problem based learning models.

Classroom Diagrams

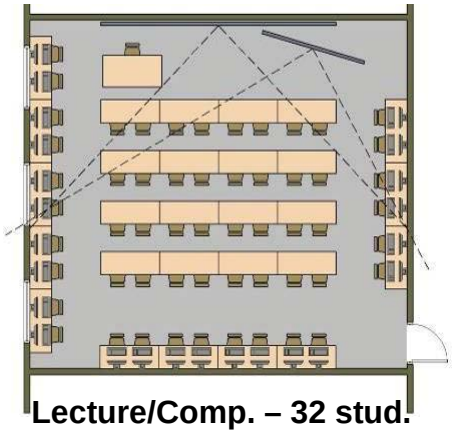
PERKINS + WILL



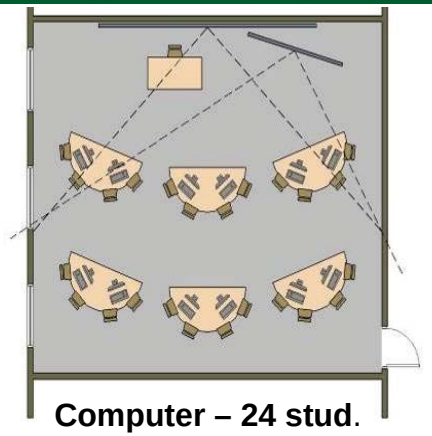
Lecture – 48 stud.



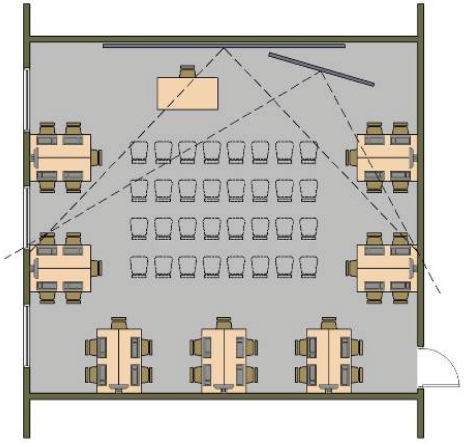
Case Study – 30 stud.



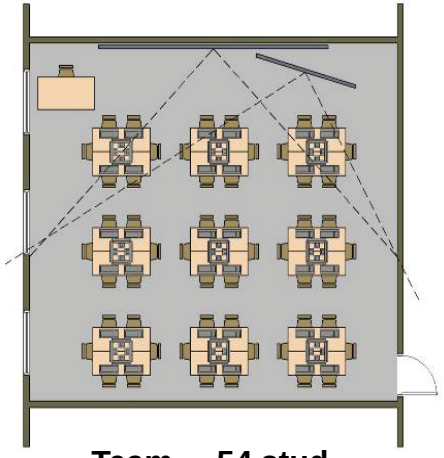
Lecture/Comp. – 32 stud.



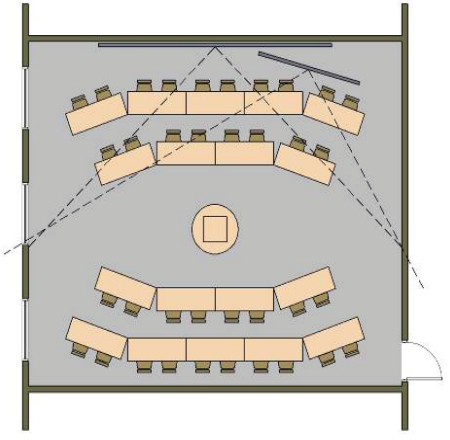
Computer – 24 stud.



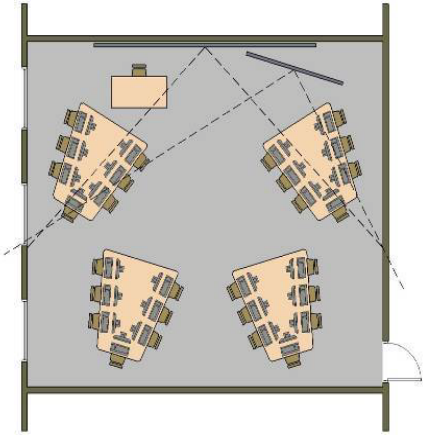
Lect./Team – 35 stud.



Team – 54 stud.



Debate – 36 stud.

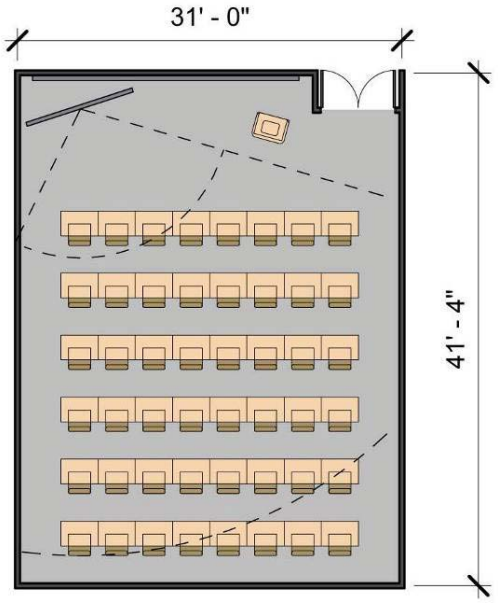


Computer – 28 stud.

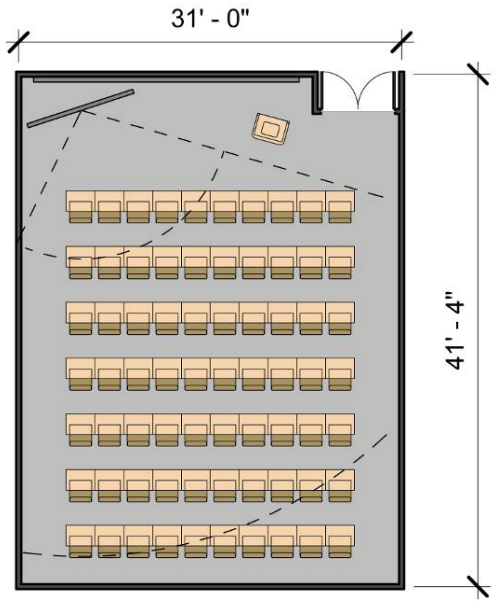
Flexible Classrooms – 930 s.f. Learning Environments

The classrooms building will be designed and equipped to support a wide range of teaching and learning styles. The above diagrams are meant to show the flexibility that a 930 sf space can accommodate. Problem base learning, case studies, debates, team projects and individual work can occur in these spaces. Multiple projector screens, movable writing surfaces, image capture, video collaboration and shared computing resources will be available. When a faculty member wants to reconfigure the room for a shared special event or for team or individual activities, it will only take a few minutes.

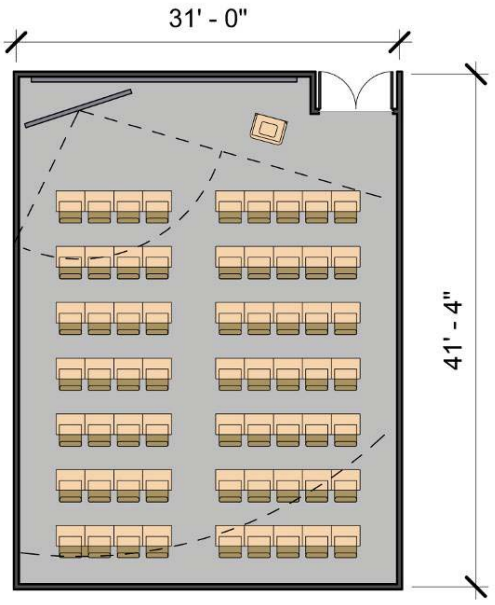
Classroom Diagrams



Classroom – 48 stud.



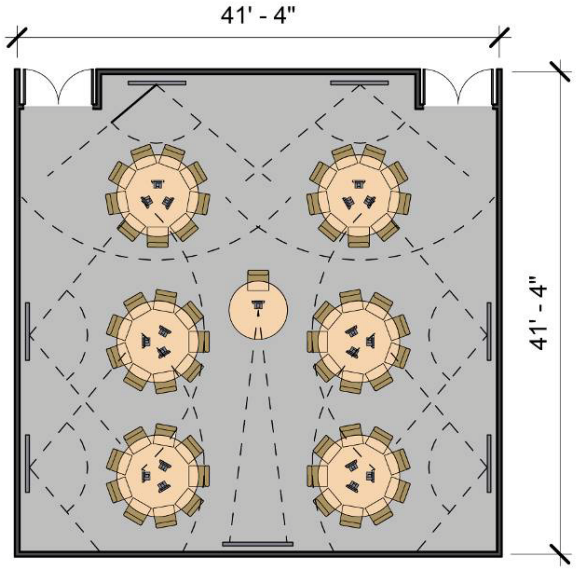
Classroom – 70 stud.



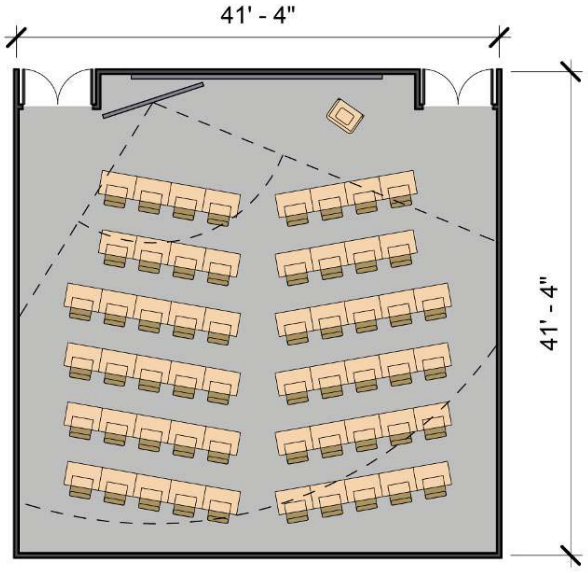
Classroom – 63 stud.

Flexible Classrooms –1240 s.f. Learning Environments

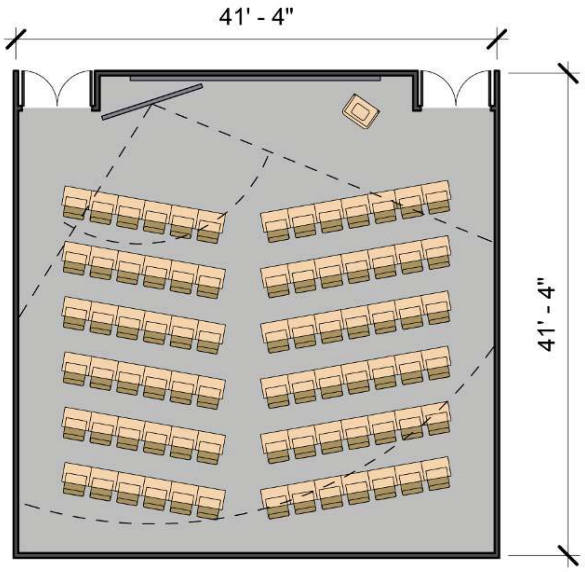
These classrooms are the same proportions as a typical teaching lab, which allows for greater flexibility over the life of the building. These diagrams are meant to show the rnage of students possible with a variety of standard seating configurations. Project based learning, scale up classroom styles and other innovative models can occur in this space if the floor is flat.



TEAL Scale-up – 54 stud.



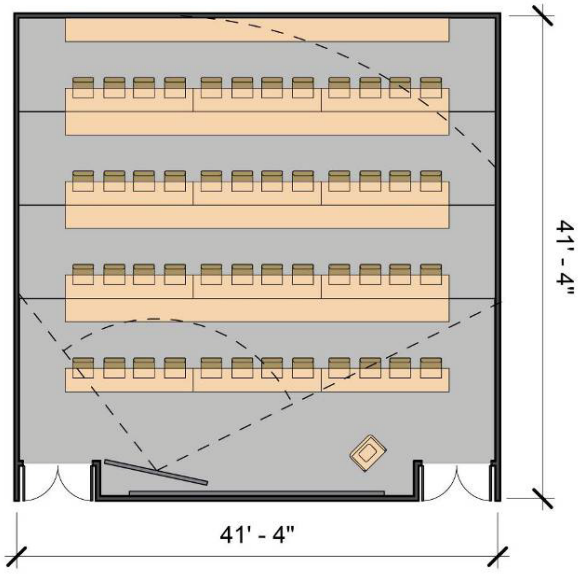
56 stud.



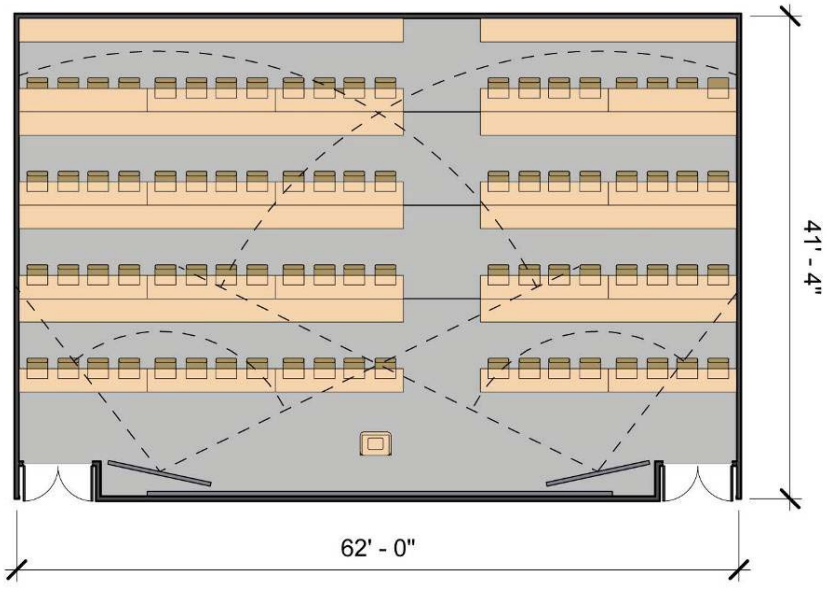
78 stud.

Flexible Classrooms – 1680 s.f. Learning Environments

A variety of classroom arrangements are possible in any room. This is the maximum recommended size before the floor must be sloped for proper view angles. All furniture should be movable to allow quick changes. The diagrams showing pedagogical diversity for the 1680 square foot environments earlier in the section would apply with this space as well.



Lab Lecture – 48 stud.



Lab Theatre – 72 stud.

Lab Lecture theater – 1700-2500 s.f. Learning Environments

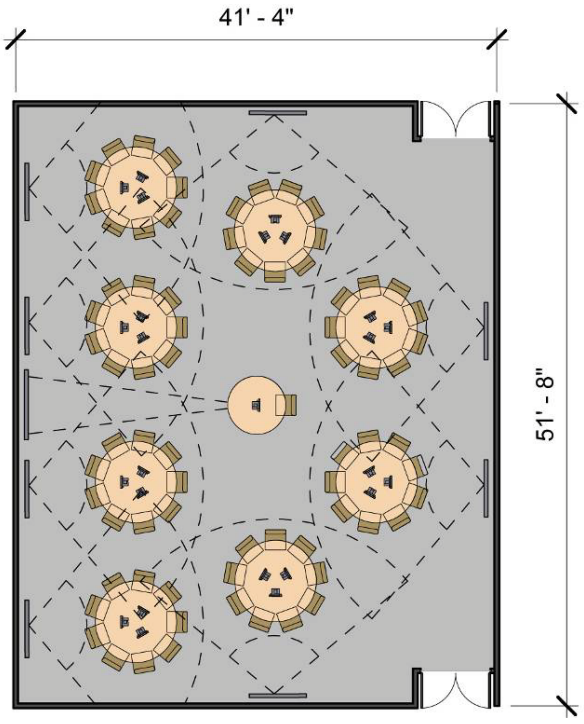
This model has been used successfully for engineering, ,general chemistry and organic chemistry. This model requires a two or three person teaching team. This works well for an institution that m ay be space short but have a good supply of qualified teaching assistants. However, this model has effectively served science education with only one faculty member.

In a chemistry lab, this would have down draft exhausts and water.

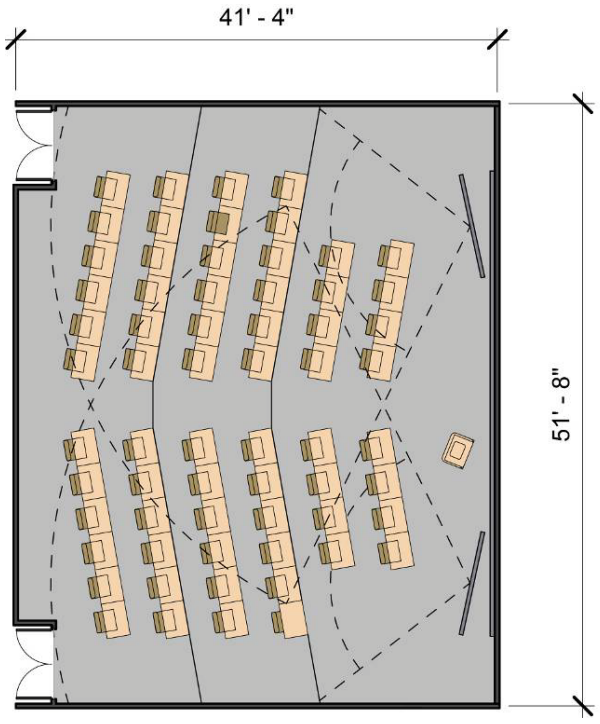
All lectures and labs occur in this model- there is usually not a separate space for lecture. Adjacent prep rooms would have all necessary equipment and supplies to support this space.

Classroom Diagrams

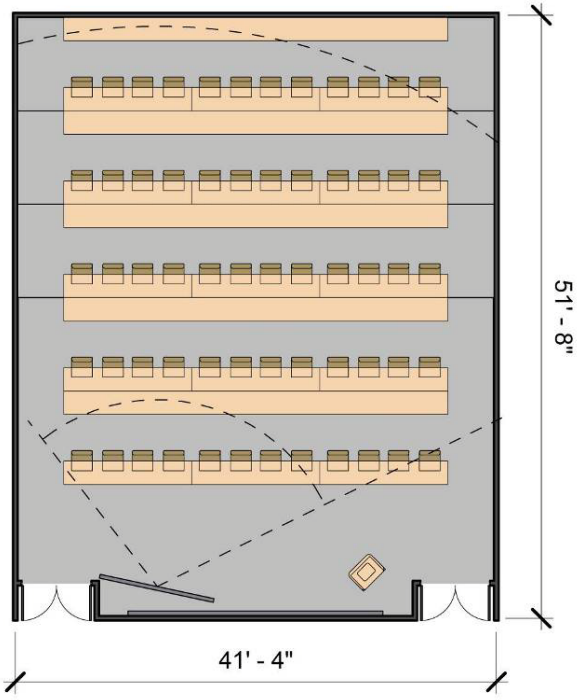
PERKINS +WILL



Scale Up – 72 stud.



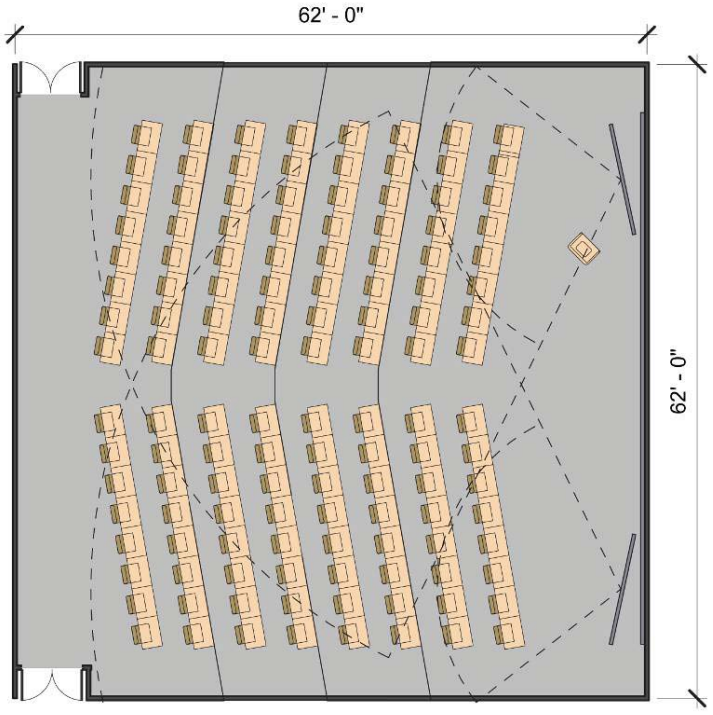
Team Lecture – 64 stud.



Lab Lecture – 60 stud.

Flexible Classrooms – 2140 s.f. Learning Environments

Scale –up classrooms, tiered team lecture and lab theater models are shown here for comparison. Only the Scale-up classroom is flat. Rooms of this size require ceiling heights greater than the typical floor to floor height would allow.



Lecture – 128 stud.

Lecture team model –3800 s.f.

This arrangement includes fixed tables on stepped tiers. Each table has two tiers and allow teams of students to share a table for project based learning or other team exercises. Tackable acoustical panels, and writing surfaces can occur on all walls.

I. Architectural Systems Narrative

These specifications are included to activate conversation between design teams and the University (COS and Mason Facilities staff), and will require project specific approval and adjustments.

General Design Criteria:
2004 Edition of the Virginia Construction & Professional Services Manual, Revision 1.
The Virginia Construction Code - 2006
Virginia Uniform Statewide Building Code - 2006
George Mason University Standards and Guidelines, Design Information Manual, and Laboratory Safety Manual
American with Disabilities Act (ADAAG) and Uniform Federal Accessibility Standard (UFSA 1988).

01 10 00 Summary
Will be project specific
01 23 00
Owner approved alternates will be provided in the amount of 5% of the Guaranteed Maximum Construction cost.

01 32.00
An internet accessible web camera will be required to provide real time and recorded views of the construction site from at least 2 viewpoints.

01 41 00 Testing Laboratory Services
Provide testing services required by currently approved version of the International Building Code and as necessary to meet LEED full commissioning and measurement and verification requirements. Additional testing and inspections to comply with the most current IBC will be included as a line item in the budget

01 74 00 Construction Waste Materials Management
Set the goal to recycle and/ or salvage a total of 75% by weight (minimum) of the construction, demolition, and land clearing debris. No soil will be removed from the site. All concrete formwork will be from fully recycled stock or be FSC certified.

01 81 00 Sustainable Design Requirements
In addition to requirements noted elsewhere, if the contractor has no LEED experience, he shall provide in-house or as a consultant, a LEED AP that has been responsible for the design implementation and documentation of all LEED construction purchasing and construction associated with documenting materials, construction materials recycling, construction waste management and commissioning. The LEED AP shall have documented experience on at least one LEED Silver certified project. If not already LEED certified, the Project manager and Project superintendent shall obtain LEED AP status 60 Days prior to the beginning of construction.

01 91 13
The owner will select a third party commissioning agent to provide full commissioning and measurement and verification specifications and site inspection services.

02 41 16 Demolition
Coordinate this section w/ 01 74 00 – demolition materials must be segregated and disposed of in accordance with that section.

02 00 00 Erosion and Sedimentation Control
Contractor must comply with LEED SS pre-requisite requirements –EPA and NPDES requirements and local and State codes .

02 00 00 Dewatering System
If necessary (see soil boring report) the dewatering system shall collect ground water and transfer it to the underground storm water/irrigation system for collection and distribution.

02 00 00 Excavating, Backfilling, and Compacting for Structures and Utilities
(all excavated soil will be reused on site.)

02 527 Concrete Curbs.
Specify Portland cement to be replaced with maximum acceptable percentage of fly ash (50% min./ or discuss with Mason Facilities).

02 63 50 Storm Water
Gravity drainage of roof water and surface water in the project site area shall be directed toward vegetated roof and or surface bio-retention/ filtration areas separated from the waste water treatment. The system will filter water and store it in underground cisterns for use as irrigation or to replenish gray water systems as approved by George Mason Facilities department. The basis of design shall meet local requirements with a target of holding a 1.2 inch storm event and an amount of water equal to the landscape needs of the site for 60 days.

02 71 10 Foundation Drainage Systems
As required- Miradrain or similar, gravel wrapped in filter fabric full height of underground walls, continuous drainage matt; continuous protection board: over waterproofing system. Continuous 150mm perforated PVC (confirm that a more sustainable product is not available) drain pipe at perimeter, tied to cistern for water harvesting. Shall be independent of dewatering system.

02 74 50 Asphaltic Concrete Paving
Consider reflective and /or porous paving systems wherever possible.

02 75 10 Cement Concrete Paving and Gutters
Color/texture variations shall be achieved using colored aggregate which shall be exposed by sandblasting as shown on the landscape site plan.
As approved by GMU facilities, Specify Portland cement to be replaced with maximum acceptable percentage of fly ash for intended use.

02 80 00 Site Amenities
Shall be manufactured from FSC certified wood, 100% post-consumer recycled plastic lumber, or approved recycled materials

02 81 30 Underground Irrigation
Specify high efficiency system complying with LEED SSc1. System to include micro-irrigation and moisture sensors. Landscape shall not require permanent potable water supply. but can be supplied with water for a short duration to become established.

02 82 50 Chain Link Fences and Gates
Provide galvanized steel fencing, including posts, fabric, gates, barbed wire, and miscellaneous accessories. during construction for safety and protection of materials and construction.

02 90 00 Planting
Planting shall be indigenous; incorporating xeriscaping principles in concert with site rainwater/bio-retention for managing storm water runoff on site. Mulch made from recycled materials will be incorporated where possible. All wood fiber or cellulose hydro mulch shall be 100% recovered content.

02 92 10 Lawns and Grasses
Includes; spreading topsoil, seeding, and/or erosion control mat with grasses over a prepared subgrade to keep site stabilized until final landscape is installed.

03 10 00 Concrete Formwork
Shall be reclaimed/recycled wood HDO plywood, to perform well for at least 10 re-uses. Formwork for columns shall be seamless fiberglass or similar to provide a Class “A“ finish exposed beams shall be a class “A” finish and underside of the slabs in the building will require a class “C” finish. All form wood shall be recycled or FSC certified.

03 20 00 Concrete Reinforcement; shall be 99% recycled

03 30 00 Cast in Place Concrete:
Fly ash and/or ground granulated blast –furnace slag will be used to replace at least 40% of the Portland cement in the mix as appropriate for each project. Recycled steel will be used for reinforcement. Concrete will be manufactured from materials within 100 miles of the site.

03 40 00 Pre-cast Concrete/Cast Stone stair treads and risers at terrace
Shall be manufactured from recycled materials within 200 miles of the project site

05 12 00 Structural Steel
Shall be recycled and use bolted connections as much as possible.
Maximize recycled content.

05 21 00 Steel Joists
Maximize recycled content.

05 31 00 Steel Roof Deck.
Maximize recycled content.

05 40 00 Cold Formed Framing
Shall be 6” 16 gauge studs @ 16” oc., at wall conditions without masonry with GMU facilities and BCOM approval.. Masonry walls and parapets at exterior wall conditions shall have 8” masonry backup.
Maximize recycled content.

05 50 00 Metal Fabrications
Utilitarian metal products including ladders, brackets and miscellaneous framing for masonry lintels and shelf angles. Provide galvanized coating.

05 51 00 Metal Stairs
Will be project specific

05 52 13 Railings
Interior rails shall be glass railing systems or other approved system. Exterior rails shall be shop finished, site assembled aluminum or stainless steel.

05 53 00 Steel Gratings (at vaults and areaways.)
Galvanized steel (or fiberglass) grating sections structured to withstand a load of 6.1kg/ms, or a concentrated load of 2000 lbf. Sections shall clear span 5.5 meters without noticeable deflection. Widths shall be 0.6 m wide minimum. Maximize recycled content.

06 10 00 Rough Carpentry
Preservative treated wood shall not use the CCA treatment process. All wood shall have the Forest stewardship Council Label. Provide 16 gauge 200 mm wide blocking straps to span between studs for structural support at all wall mounted glass, or millwork. Use of ammonium copper quat (ACQ) is acceptable treatment material.

06 20 00 Finish Carpentry
Counter surfaces shall be solid surface material with high recycled content. Consider concrete countertops with recycled glass aggregate. Cabinet door and drawer front substrate sshall be Straw board or formaldehyde free MDF.

- "no added urea-formaldehyde resin""
- Sealants or fillers shall comply with LEED Eqc4.1 (meet or exceed VOC limits of south Coast Air Quality Management District Rule #1168 and the Bay Area Air Quality Management District Reg. 8, Rule 51)

06 40 20 Interior Architectural Woodwork
From FSC sources or rapidly renewable materials harvested and manufactured within 100 miles of the site. Consider using materials from the site if existing trees must be removed to prepare for the new construction.

07 16 00 Bituminous Dampproofing
Trowel applied bituminous damproofing shall be used at all cmu back up - neatly transitioned into base, sill and shelf angle flashing. (or determine a more sustainable solution)

07 17 00 Waterproofing:

a. Bentonite or Grace Pro-cor waterproofing system shall be used at below grade retaining walls, elevator pits and utility pits...

07 19 00 Water Resistant Coatings
Masonry surfaces will be treated with a 10-year warranty, clear, penetrating water repellent coating.

07 20 00 Insulation and Sheathing

a. R-13 Glass fiber or mineral wool batt insulation with a high recycled content will be used at all exterior cold formed framing walls. Insulation vapor barriers shall occur at the outside of the insulation.Min. 20% recycled content glass fiber and min. 75% recycled content mineral wool.
b. R- 30 non-HCFC polyisocyanurate board insulation with a ½"mm heat resistant cover board will be used for roof insulation on a sloped deck.
c. K-13 type Spray-on insulating material with a vandal/impact resistant sealer coating will be used at the underside of the elevated slabs for thermal separation between exterior and interior R-value- R-20 minimum.
d. Exterior sheathing under stucco shall be ½" Dens-glas gold -plus with waterproof sealant at the joints.

07 27 00 Firestopping/ Safing
Provide neat aluminum tray/pan to match glazing system enclosing 2-hr safing insulation at all exposed slab conditions. Provide metal tray/pan enclosing 2-hr safing at all slab edge conditions not sealed by concrete.

07 72 00 Roof Accessories
To be determined

07 42 13 Metal Wall Panels and Trim
Will be project specific

Roof Option 1
07 52 16 SBS Heat Applied Modified Bitumen Roofing
3 ply, 20 year (no dollar limit warranty) system with a white- energy star rated applied coating over the granular topcoat. Counterflashing and sheet metal will be aluminum with white kynar finish. Base flashing should be flexible, SBS membrane with aluminum counter flashing and reglets. Provide expanded perlite cant strips with 12.5mm heat-resistant cover board at parapets.

a. Aluminum gutters and downspouts, and precast splashblocks will be provided at transitions between high and low roofs at the penthouse
b. Skid resistant, modified asphalt walkway panels shall be laid in hot asphalt to provide a walking surface from stairs to the entrance of the mechanical penthouse.

c. Roofing must also be high reflectivity (initial reflectance of at least .85 and three-year-aged reflectance of at least .80 when tested with ASTM 408, and emissivity of at least .9 when tested with ASTM 408)

07 81 00 Applied Fireproofing
Cementitious spray-on fireproofing shall be used at concealed interior structural steel that supports floors and/or roofs, and at penthouse steel framing. If steel is exposed to the interior environment, fireproofing must be low-voc per GreenSeal requirements for paints and coatings.

08 11 13 Metal Doors and Frames
(steel doors will be used if required for fire ratings over 45 min.)
Steel frames shall shall be 2" frames for rated wall conditions. Typical interior door frames shall be aluminum with clear anodized finish. Provide materials with highest possible recycled content.

08 14 16 Flush Wood Doors
White oak- rift cut, factory finished AWI TR-6, 5-ply particle board core with 125mm hardwood top, bottom, and midrail lock blocking at doors with exit devices. Hardwood mortise lock blocking shall be included in every door. Fiberboard used as door cores must have no added urea-formaldehyde resin, and not exceed ANSI A208.1-1993 emission standard of 0.20 ppm of formaldehyde. Typical door into office or labs/prep areas shall be ½ glass. All wood shall be FSC certified.

08 22 20 Fiberglass Reinforced Polyester Doors
To be used at all exterior service doors and or wet environments.

08 33 10 Overhead Coiling Doors
At loading dock- (similar to Overhead door solid aluminum slat 3-coat Kynar finish-) with manual operation.
Specify minimum of 25% recycled aluminum content.

08 41 13 Aluminum Entrances and Storefront (Aluminum system with a high-recycled aluminum content. Coating to be 3-coat Kynar- color to be determined)
Provide all metal panel infill, and trim as a part of the storefront system.

a. Spandrel Infill- Spandrel glass to match appearance of vision glass.
b. Type 1- Thermally broken 6" overall depth at typical single story spans. Minimum of 25% recycled aluminum content.

08 44 13 Glazed Aluminum Curtain wall
Will be project specific

c. Horizontal Projecting Sunscreen: Will be project specific

08 50 50 Operable Windows in Storefront and Curtain Wall System
(Will be project specific)

08 80 00 Exterior Glazing (basis of design – not an approved requirements.)

a. Glass type 1(Spandrel) –Insulated 1" clear glass spandrel with white ceramic frit opaque coating on surface number 4.
b. Glass Type 2 -1" insulating, clear, low-e, vision glass with low-e coating and dots on the #2 face. Dots shall be white. For non-dot frit base unit product performance shall be as follows- Visible Light transmittance 50%, Solar energy 24%, UV 7%; Reflectance Visible exterior-19%, visible-interior-21%, solar energy- 30%; U-value .29 Btu/(hr x sqft x degree F; Solar heat gain coefficient greater than .37)

b. Glass Type 2 -1" insulating, clear, low-e, vision glass with low-e coating and dots on the #2 face. Dots shall be white.
For non-dot frit base unit product performance shall be as follows- Visible Light transmittance 50%, Solar energy 24%, UV 7%; Reflectance Visible exterior-19%, visible-interior-21%, solar energy-30%; U-value .29 Btu/(hr x sqft x degree F; Solar heat gain coefficient greater than .37)

08 81 00 Interior Glazing
a. GL- 1: ¼"clear (at office clerestories)
b. GL- 4 ½" Clear laminated with custom patterned film at multi-height space balcoies.

09 26 00 Gypsum Board Assemblies-
a. Interior Walls – shall be 3-5/8" -20 gauge 16 inch o.c. spacing from floor to underside of concrete structure with 2 inch sound attenuation batts. 5/8 regular and firecode board will be used.
b. Shaftwall will be used at all elevator and mechanical shafts.
c. Special Trim: Corridors shall have Softforms SWR-050-HT Hanging track- mounted integral with the gwb at 7 feet above the finish floor, continuous between windows and doors. Provide one hanger hook for every 16 inches of lineal wall space.
d. Gypsum board must contain a minimum of 10% recycled gypsum. Facing paper shall be manufactured from recycled newsprint. -Joint compound shall be low VOC content.

09 31 00 Ceramic Tile
Will be used from floor to ceiling on the toilet wet walls and on all walls in the toilets/shower rooms. 2"x2" unglazed ceramic mosaic tiles will be used with 15% bright accent tiles. Dark epoxy grout will be used on the floor.

09 40 00 Terrazzo
Epoxy (3/8") thin set terrazzo with integral recycled glass and recycled aluminum aggregate at the first floor lobbies, and gallery space. Provide zinc control and divider joints, with tinted epoxy fill between control strips. Any sealers applied after installation shall be low VOC content.

09 51 00 Acoustic Ceiling Panels

4 foot by 4 foot highly absorptive type panels will be used in public gathering space ceilings, soffit and vertical walls above 8 feet A. F.F. Provide a minimum 25% recycled content in mineral fiber panels and suspension systems. (Decoustics Cilencio or similar)

09 51 10 Acoustic Panel Ceilings

Light reflectance of .84-.89. Provide a minimum 25% recycled content in mineral fiber panels and suspension systems. (Armstrong tiles meet this requirement)

09 53 10 Fabric Wrapped Acoustic Panels
One inch (25mm) high-impact resistant 30-34 k/sm medium density core with impact resistant scrim facer. NRC .85.Mounting- mechanical panel clips and wall clips with leveling clips at bottom of panels. Finished edges with tight butt joints, with aluminum trim at exposed edge panels. Decoustics "AP" or similar. With COM fabric. Provide at large conference room. Fiberboard cores must have no added urea-formaldehyde resin, and not exceed ANSI A208.1-1993 emission standard of 0.20 ppm of formaldehyde.

09 65 17 Linoleum Flooring: Consider welded sheet linoleum flooring for labs and prep rooms.

09 65 30 Resilient Wall Base and Accessories
Concrete stairs will receive rubber treads and risers with a raised dot pattern on the treads. Wall base will be 6" rubber, PVC free with molded corners.

09 68 10 Carpet Tile: Typical Corridors and Non-Lab Spaces
Carpet shall be one that is accepted in an operating recycling program which extracts component materials for reuse and/or reclaims inherent energy, and does not contribute significantly to land fill. Carpet system must meet the Carpet and Rug Institute Green Label Indoor Air quality Test Program Requirements. If an adhesive is required for installation, use low VOC carpet manufacturer recommended adhesive and install per manufacturer's recommended frame or perimeter adhesive pattern method. (Full field glue-down is not acceptable except for carpet with an integral dry film adhesive back.) If a seam sealer is required for installation, use carpet manufacturer recommended low VOC seam sealer or recommend heat welded seaming. Shaw or interface full recycled/recyclable products. (Similar to Interface Entropy)

09 92 00 Interior Painting
GWB Walls and Ceilings – No-VOC water based latex primers and paint– with 30% accent colors.

Hollow metal door and window frame coatings
Epoxy or alkyd with no-VOC content

10 10 00 Visual display boards
Sliding marker boards shall be provided at each lab and conference room – provide equivalent of 24 lineal feet 4 feet high for each lab or conference room.

10 15 50 Toilet compartments
Campus standard

10 20 00 Louvers will be Kynar coated, extruded aluminum, drainable –6" deep.

10 26 50 Corner guards
7 foot tall 2-1/2 inch flange clear acrylic, back painted to match the wall paint with double stick tape mounting.

10 44 10 Non-Illuminated Interior signs
Use water-based, low-voc adhesive for installation that comply with LEED Eqc4.

11 60 00 Laboratory Fume hoods: Similar to Fisher Hamilton Concept hoods- 6 feet wide with cold water, two duplex outlets, cup sink, lab air, vac, and gas typical. Fume hoods in chemistry labs will have 2 variacs in base cabinet below hood per hood. Light gray epoxy tops. Provide integral alarm/ sash position monitor.

12 35 53 Laboratory casework- Shall be similar to standard Fisher Hamilton flush wood (red oak or Maple) FSC certified. With light gray epoxy tops.

12 51 10 Horizontal louver blinds: 1 inch aluminum mini-blinds –outside jamb installation, full height of glazing. Finish- match Levelor #34 Brushed aluminum. Scope to be defined- typical exterior wall will not have blinds.

12 98 50 Foot grilles
Each of the entrances shall have vestibules that will have a recessed stainless drainable walk off mats.

14 24 00 Elevators
a. Elevator –consider energy efficient gearless traction elevator similar to

KONE Monospace.

10 Division 15 - see mechanical

11 Division 16 - see electrical

12 Division 17 Building commissioning- by Owner's Consultant.

J. MEP (Mechanical, Electrical, and Plumbing) Systems Narrative

These specifications are included to activate conversation between design teams and the University (COS and Mason Facilities staff), and will require project specific approval and adjustments.

General Design Criteria

A. Owner Criteria:

2004 Edition of the Virginia Construction & Professional Services Manual, Revision 1.
The Virginia Construction Code - 2006
Virginia Uniform Statewide Building Code - 2006
George Mason University Standards and Guidelines
George Mason University Design Information Manual
George Mason University Laboratory Safety Manual
International Mechanical Code, 2006
ASHRAE 62-2004, Ventilation for Acceptable Indoor Air Quality.
ASHRAE 15, Safety Code for Mechanical Refrigeration.
ASHRAE 90.1, 2003 edition.
American with Disabilities Act (ADAAG).
Uniform Federal Accessibility Standard (UFSA 1988).

B. Acoustical Criteria:

1. Acoustical performance of building systems is important in creating an environment conducive to learning. Low pressure drop sound attenuators should be used to reduce sound levels. Systems will be designed to meet the following noise criteria, which is more stringent than ASHRAE standards:

Area	NC Level
Offices	30
Lobbies and common areas	35
Conference rooms	30
Laboratories	35
Classrooms	30

II. HEATING, VENTILATING, AND AIR CONDITIONING

A. Design Criteria:

1. Indoor Design Conditions:

Area	Summer deg F db/%RH	Winter deg F db/%RH
Office / Support	78ºF / 50% (+/-5%)	70ºF/30% (+/-5%)
Classrooms / Lecture	78ºF / 50% (+/-5%)	70ºF/ 30% (+/-5%)
Special purpose rooms	78ºF / 50% (+/-5%)	70ºF/30% (+/-5%)
Equip. Rooms	78ºF / 50% (+/-5%)	70ºF/30% (+/-5%)
Laboratories **	78ºF / 50% (+/-5%)	70ºF/30-50% (+/-5%)

**Design Conditions may differ based on user requirements

2. Ventilation Criteria:

(a) Toilet rooms, showers and locker rooms, housekeeping closets, kitchens, laboratories, soiled areas, and will be designed to maintain inward directional airflow relative to adjacent building areas

(b) Outside air- ventilation quantities shall meet those required by the 2006 Virginia Construction Code and exceed those required by ASHRAE Standard 62 by at least 30%.

B. Heating:

1. The GMU Fairfax Campus operates a Central High Temperature Hot Water and Cooling Plant (CHCP) to supply campus buildings. New buildings shall be tied into this system wherever possible.

2. HTHW heat exchangers used to generate heating water shall be shell and tube type. Building Hot water will be distributed to heating coils in the air handling units, terminal units, unit heaters, and fan-coil units.

3. For buildings not on the Fairfax Campus, The hot water system will consist of boilers, primary and secondary hot water pumps, and piping as necessary.

4. Preferred boilers are cast iron sectional for small boilers and Scotch Marine for boilers over 50 BHP.

C. Cooling System:

1. The GMU Fairfax Campus operates a Central Cooling Plant (CHCP) to supply campus buildings. New buildings shall be tied into this system wherever possible. Buildings not on the Fairfax Campus shall be provided with independent building cooling plants.
2. Cooling will be provided by the chilled water system. Chilled water will be distributed to cooling coils in the air handling units, and fan-coil units. The chilled water system will consist of chillers, condenser water and chilled water pumps, piping, and cooling towers as necessary.
3. Piping shall be arranged in a primary secondary or variable primary piping arrangement. Distribution pumps shall utilize variable frequency drives for energy savings.
4. The building chiller or chillers will be high efficiency water-cooled centrifugal or rotary screw type. Refrigerant will be R-123, or R-134A.
5. Cooling Towers: the cooling towers will be induced-draft type and will be located on the roof or adjacent to the building. Towers will be oversized for fan energy savings with variable speed drives on the fans for additional energy savings and to reduce noise.

D. Air Conditioning Systems:

1. Air Handling Units:
   - (a) Air handling units will be semi custom single-zone draw-through, factory-fabricated, medium pressure type consisting of filters, cooling coils, heating coils, premium efficiency motors, fans solid double-wall casings, and spring vibration isolation. Air handling units will be provided with variable frequency drives. Air Handling Units serving the classrooms, offices and other public spaces will have airside economizer cycles to provide free cooling when the dry bulb temperature permits. Units will be located in basement or roof penthouse location as appropriate.
   - (b) Cooling coils: coils will be selected for air velocities not in excess of 400 fpm, and for a 14 deg. F chilled water temperature differential. Condensate from each coil will be piped to a condensate recovery system.
   - (c) Zoning:
     - (1) Laboratories and non-laboratory spaces will be served with separate systems to optimize available energy saving strategies.
   - (d) Filtration:
     - (1) Filtration will be provided with a minimum MERV rating of 14.
2. Ductwork:
   - (a) Ductwork will be galvanized steel, except as follows:
     - (1) Laboratory fume hood exhaust ductwork: stainless steel, with welded longitudinal seams and transverse joints. Longitudinal seams and transverse joints in non-welded ductwork will be sealed.
3. Terminal Units:
   - (a) Variable volume reheat terminal units will provided with hot water heating coils.
4. Air Distribution Devices:
   - (a) Laminar flow diffusers air will be used in the laboratories with fume hoods to minimize disruption to fume hood capture.

E. Exhaust Systems:

1. Exhaust systems will exhaust all toilet rooms, housekeeping closets, break rooms, copy rooms and laboratories. Strategies to capture waste energy from exhaust air stream will be used.
2. Toilet exhaust - toilet exhaust will be run through a total energy heat wheel to recover energy and pre-treat outside air for air handling units serving the office, classrooms and public spaces.
3. Laboratory Exhaust Systems:
   (a) The laboratory exhaust system provides opportunities for significant energy savings. If all laboratory air is exhausted then fume hood and general exhausts will be in a manifolded exhaust system served by multiple exhaust fans, these fans will be the constant volume type and will discharge through high velocity vertical discharge nozzles or stacks. The exhaust flow into the system will vary as fume hood sash positions and space airflow setpoints change. A constant negative static pressure and constant total exhaust airflow will be maintained in the plenums by modulating fresh air bypass dampers into the system the plenum sides. Variable discharge air quantity from the stacks should be considered as long as recirculation of exhaust air can be avoided. Consideration should be given to returning air from certain laboratory spaces either when unoccupied or when the space use does not require the use of once though air. Where laboratory air cannot be returned and must be exhausted, heat should be recovered through a heat recovery system.
   (b) Exhaust systems will be designed for 100 fpm face velocity at each fume hood. A laboratory airflow control system will vary the amount of air exhausted as a function of sash position to keep a constant face velocity. Consideration should be given to shutting off air flow completely when not in use and when not used for chemical storage.

F. Automatic Temperature Control Systems:

1. A direct digital control system, including a PC-based operator station, will be provided to control air handling units, fans, coils, terminal units, chiller plant, boiler plant, laboratory airflow controls, and fan-coil units.
2. All controls will be compatible and tie into the Campus standard Building Management System.

G. Laboratory Airflow Control Systems:

1. A Laboratory Airflow Control System will be used to control the airflow, pressure, temperature and make up air into each lab. A supply air valve with reheat coil, and a general room exhaust valve will modulate as required to maintain room temperature and a minimum room air change rate. Room air change rate will be reset with "occupied/unoccupied" control setpoints. When the room is "unoccupied", the minimum air change rate will be reduced and space temperature tolerances will be relaxed. Supply and exhaust terminal units will be controlled by airflow measurement devices to maintain a constant negative pressure in each laboratory. An independent room pressure alarm will monitor differential pressure between each laboratory and its adjacent corridor. Any system malfunction that causes a laboratory to become neutral or positive to the corridor will activate the alarm.

H. HVAC Testing, Adjusting, and Balancing:

1. Systems will be tested, adjusted, and balanced to achieve proper operation, design flow, temperature and pressure differentials, and pressure drop through piping, ductwork, equipment, and components.

I. Sustainable Design Features and Opportunities:

1. A goal for projects should be 50% reduction in energy usage from the ASHRAE 62 baseline building is desired. Innovative, sustainable design strategies will be required to achieve the goal, while providing a system that is appropriate for the campus and maintenance staff.

2. Sustainable Features of the HVAC system for consideration include:
   (a) Premium efficiency type motors.
   (b) High efficiency chillers, where not connected to Campus Plant.
   (c) Equipment and distribution systems selected for low air pressure drop.
   (d) Oversized cooling tower with variable speed drive fan.
   (e) Variable volume air handling systems with variable speed fans.
   (f) Reset of building temperature setpoints and or tolerances.
   (g) Reset pressure setpoints for air and water systems via discriminator control.
   (h) Energy recovery wheel for toilet exhaust to pre-treat ventilation air for air handling units serving non-laboratory spaces.
   (i) Variable flow hot and chilled water system with variable speed pumps.
   (j) Automatic switches in operable glazing to deactivate mechanical cooling and heating systems in areas with open windows.
   (k) Provide separate air handling systems for laboratories and non laboratory areas.
   (l) Reduce required air change rates in individual laboratories as appropriate based on an analysis of the risk associated with that space and the chemicals being used in it rather than on historical practice, which lacks scientific basis.
   (m) Return general exhaust air from laboratories as appropriate based on an analysis of the risk associated with that space, the occupancy, and the desire of the Owner to use spaces designed as laboratories for non laboratory spaces to maximize use of the space. A full return system and also a full exhaust system may be required for some spaces.
   (n) Design fume hoods to shut off completely when not and use and where not used for chemical storage.
   (o) Recovery of coiling coil condensate for reuse as cooling tower make up.
   (p) High filtration of incoming air.
   (q) Increased quantity of ventilation air without increasing the heating and cooling loads on the building.
   (r) Independent control of temperature in private offices.
   (s) Where applicable, use sensors to monitor CO2 levels to modulate ventilation air to provide for energy savings through demand control ventilation techniques.

3. Provide monitoring system for tracking and display of building energy use, water, etc. This system is to also be used as an educational opportunity.

PLUMBING

A. Plumbing Fixtures:

1. Water closets: Vitreous china, wall hung, siphon jet types, with non-hold open sensor flush valves. Fixtures shall be dual flush type and use no more than 1.6 gallons per flush.
2. Urinals: wall hung waterless type - material to be determined.
3. Lavatories: Vitreous china, wall hung or counter top units. The faucets in public toilet rooms will be electronically controlled and will limit the flow to .5 gpm. Faucets in laboratory areas will be electronically controlled and will limit the flow to 1.0 gallons per minute.
4. Mop receptors in janitor's closets: Floor mounted, 24" x 24" molded stone, rim guard with hose end type of faucet with a vacuum breaker.
5. Floor drains and funnel drains will be provided in the mechanical rooms and toilet room.
6. Water cooler type will be electric, self-contained, wall hung type with non-CFC refrigerant.

C. Drainage Systems:

1. Sanitary Drainage System:

(a) Sanitary drain, waste, and vent systems will extend from building fixtures and equipment requiring service to the civil sanitary system.

2. Rainwater Drainage System:

(a) Rainwater primary drainage systems will extend from the roof and gutter drains to the civil storm system outside the building. Where possible it should be routed to a cistern for use as irrigation a non potable water system for toilet flushing if analysis indicates it is practical.

3. Piping:

(a) Sanitary and rainwater drainage and vent piping will be hubless cast iron pipe and fittings with heavy duty compression type couplings or elastomeric compression joints.

D. Domestic Water Systems:

1. Water Supply:

(a) The water supply will be provided from municipal water service. The water service will be provided with dual backflow prevention devices in accordance with local code. Pressure reducing valves will be provided, as required, to control excessive water pressure.

2. Water Distribution:

(a) A central water pressure booster system will be provided to serve the upper floors of the buildings if required.

3. Domestic Hot Water:

(a) The domestic hot water service will be extended from water heaters to the plumbing fixtures. Water heaters will be located in basement mechanical room. Water hammer arresters will be provided for shock suppression.

(b) Water heaters generally should be heated with HTW or MTW when central heating systems are available. Where Campus HTW is not available, water heaters will be gas-fired, copper-finned tube type with vertical hot water storage tanks. Heater systems will include necessary tank circulating pumps, automatic controls for each supply heater, and expansion tank.

(c) A hot water circulating pump will be provided to limit temperature loss throughout the system to 10°F maximum.

(d) The domestic hot water will be heated to 140°F. A master thermostatic mixing valve will be installed at the water heater to reduce the hot water temperature to the building to 109°F 120°F.

4. Piping:

(a) Domestic water piping within the building will be type L hard copper with wrought copper sweat type fittings, and joints using lead-free solder.

E. Fuel Gas Systems:

1. Gas Service and Distribution Systems:

(a) The fuel gas system will provide natural gas at 7" wg from the gas meter outside the building to the water heaters, lab benches in the biology labs and HVAC units.

2. Piping:

(a) Underground gas piping will be yellow polyethylene with thermal fusion joints schedule 40 mill-wrapped black steel with welding or threaded fittings. Piping above grade will be schedule 40 black steel pipe with welding or threaded fittings as required.

F. Laboratory Systems:

1. Laboratory systems will consist of laboratory compressed air, laboratory vacuum, and piping.

(a) Laboratory Compressed Air Systems:

(1) The laboratory compressed air system will be prewired and pre-piped skid mounted units, located in the basement mechanical room units. Compressed air systems will include compressed air receivers, air-cooled after-coolers, refrigerated air dryers and pre-and post-filters to provide clean air.

(b) Laboratory Vacuum System:

(1) The laboratory vacuum system will be prewired and pre-piped skid mounted units, located in the basement mechanical room.

(c) Piping:

(1) Piping for laboratory gas systems will be type L hard copper tubing, precleaned for oxygen service with wrought copper fittings. Joints will be brazed with 14% silver brazing alloy and continuously purged with nitrogen during brazing operations.

2. Pure Water Systems:

(a) RO water system (if required) will extend from water treatment equipment throughout the building with a pure water return line back to the water treatment equipment. Local polishing units supplied by the Owner will be located at each outlet.

3. Laboratory Drainage Systems:
   (a) It is the design intent that no chemical waste will be disposed of into the building systems but will be contained locally and will be removed diluted or removed before entering the waste stream .
   (b) A central neutralization/dilution system will be provided to monitor and control pH control of laboratory wastes in case of accidental spill or violation of waste disposal protocol. The system will be designed for direct-burial vault/pit installation. The intent is that this waste could be suitable for discharge into a man made wetland for treatment on site. Waste disposal protocols will be critical. Early discussion with the Authority Having Jurisdiction over this approach will be required.
   (c) Chemical waste and vent piping will be fire-retardant polypropylene with mechanical or heat-fused joints.
4. Sustainable Design Features and opportunities:
   (a) Goals for the project may include zero water leaving the site and a LEED Platinum Certification established. Innovative and sustainable design strategies should be employed to achieve these goals, while providing a system that is appropriate for the campus and maintenance staff.
   (b) Sustainable Features of the plumbing system for inclusion or consideration include:
      (1) Low flow toilets, faucets and showers.
      (2) Dual flush valves on toilets.
      (3) Waterless urinals.
      (4) Treatment of sanitary waste on site in the man made wetland.
      (5) Protocols to prohibit the disposal of chemicals in the laboratory waste system so that the remaining waste stream could be treated on site in the man made wetland.
      (6) Recovery of storm water for irrigation use.
      (7) Possible inclusion of a non potable water system for toilet flushing if analysis indicates appropriate.

IV. ELECTRICAL

A. General:

1. Codes and Standards:

2004 Edition of the Virginia Construction & Professional Services Manual, Revision 1.

The Virginia Construction Code - 2006
Virginia Uniform Statewide Building Code - 2006
George Mason University Standards and Guidelines
George Mason University Design Information Manual
George Mason University Laboratory Safety Manual
NFPA 70-2005, National Electrical Code NFPA 110-2005, Emergency and Standby Power Systems

B. Electrical Distribution System:

1. Electrical service for the building will originate from a pad-mount service transformer located outside the building. Service to the building will be 480Y/277 V, 3-phase, 4-wire, wye connected, grounded neutral. In general, loads will be served as follows:
   Fluorescent and HID lighting 277 V; motors 0.5 hp and larger 480 V, 3-phase; incandescent lighting, receptacles, and motors 0.33 hp and smaller 120 V.
2. Service equipment will consist of a 480 Y/277 V, switchboard. Switchboard bussing will be copper, and will be braced for the available fault current. The service switchboard will be provided with an electronic power monitoring on both main and sub-feeders. The monitor will be a microprocessor-based device with capability for connection to a remote host web based computer via the internet.
3. Branch circuit panelboards will be provided on each floor to serve the lighting and receptacles on the same floor. Dedicated panelboards will be provided for each laboratory or laboratory suite. Protective devices in panelboards will be bolt-on type circuit breakers. Buswork will be copper.
4. Lighting and receptacle panelboards will have a minimum 10% spare circuit breakers plus 20% spaces for future circuit breakers.
5. Wiring will be insulated conductors installed in raceways. Conductors will be copper with type THWN/THHN or XHHW insulation. Conductors for power wiring will be a minimum of #12 AWG and a maximum of 600 kCM.
6. Minimum raceway size will be 0.5" for power and 1" for communications systems.
7. Transient voltage surge suppressor (TVSS) devices will be installed at the main switchboard, telephone service entrance, fire alarm control panel, and other selected equipment.

8. Wall switches and duplex receptacles will be specification grade. Receptacles will be installed a maximum of 50' on center in corridors. A duplex outlet for electronic equipment power and a duplex outlet for normal power will be provided for each workstation. The electrical systems, circuits, and equipment will be grounded and bonded in accordance with NFPA 70-2005. The maximum resistance of electrical systems to ground will be 5 ohms. A green identified grounding conductor will be installed in raceways with the phase conductors.
9. The emergency power supply system will include a standby rated engine-generator set, with control panel, automatic transfer switch systems, remote annunciator panel, and accessories to automatically supply power during a utility power failure. The system will assume the emergency power load within 10 seconds after a utility power loss. Engine-generator set will be 480Y/277 V, 3-phase, 4-wire, natural gas fueled engine with unit-mounted radiator and weatherproof sound attenuated enclosure will be provided. Engine-generator set will be located outside the building adjacent to the pad-mount transformer, within sight of the building. Automatic transfer switches will include a switched neutral, pre-transfer signal load control, electronic power monitor. Emergency and standby power supply system loads will consist of egress and exit lighting, fire detection and alarm systems, engine-generator set auxiliaries, fire protection systems, lighting and receptacles at generator and in main electrical rooms, telecommunication systems, sump pumps, lighting and receptacles in telecommunications and electrical closets, security and building access controls, lab refrigerators, lab freezers, and lab growth chambers.
10. Photovoltaic Systems: A PV system may be considered for demonstration purposes and would provide many benefits. A fixed system would include DC to AC inverters; monitoring panels, transfer switch, and related accessories. Given potential for these systems, and the certainty of improving technology, a roof mounted PV system may be considered on the portion of the roof that is not used as a green roof.

C. Lighting:
   1. Generally, interior lighting will be fluorescent type. Downlights will be compact fluorescent. LED stencil face aluminum or recessed edge-lit type exit signs will be used. Luminaires will be commercial grade. Fluorescent luminaires will be provided with T5 or Super T8 lamps with electronic type ballasts. Illumination levels will be evaluated during pre- design.
   2. All spaces will be provided with controls for automatic lighting shutoff in accordance with ASHRAE 90.1 and will consist primarily of occupancy sensors in combination with time-of-day and photoelectric controls. Daylighting control systems will be provided for building perimeter spaces to dim electric lighting systems in response to daylight. Control systems will consist of photo sensors, electronic dimming ballasts, and daylighting controllers.

D. Telecommunication:
   1. Telecommunication systems and CATV will be provided in accordance with George Mason University Network Communications Building Standards.

E. Sustainable Design:
   Sustainable design is an important aspect of the project. The following features will be included or considered:
   (a) Energy efficient lighting design.
   (b) Active daylighting and control.
   (c) Photovoltaic systems.

V. FIRE PROTECTION

A. General:
   1. Design Criteria:
      (a) Water requirements, water densities, head spacing, etc. will comply with NFPA 13 for ordinary hazard classification. The existing site water main will be the source of fire protection water.
      (b) The building will be protected throughout by a combined system of Class I standpipes and automatic sprinklers.
      (c) Systems will comply with the requirements of Factory Mutual.

B. Sprinkler System:
   1. Piping will be sized by hydraulic calculations. Mechanical rooms, locker rooms, and storage areas will be classified

ordinary hazard Group 1. Other areas will be classified light hazard. Hydraulic design criteria will be in accordance with NFPA 13-2007, Paragraph 5-2.3 as follows:

(a) Sprinkler spacing will not exceed 225 ft2 in light hazard areas and 130 ft2 in ordinary hazard areas. Heads will be quick response type.

C. Standpipe System:

1. Wet standpipes will be located within heated stairwells. Additional standpipes, if required, will be provided so that all portions of all floors are within reach of a 75' hose. Hose thread pattern will match the local fire department pattern.

D. Sprinkler Heads:

1. Sprinklers will be commercial, standard quick response, UL listed type. Sprinklers in areas having ceilings will be semi-recessed pendent or sidewall design with a polished chrome finish. and white ceiling cup. Concealed type sprinklers with white cover plates will be used in the main lobby, elevator lobbies, toilets, and public areas. Sprinklers in grid ceilings will be aligned and located in the center within 3" of the center of square tiles or of the half tile for rectangular tiles.

E. Piping:

1. Aboveground piping will be black steel with threaded, grooved, or welded fittings. Piping 2" and smaller will be schedule 40 and pipe 2.5" and larger will be schedule 10. No plain-end fittings, strap-on branch outlets, or couplings employing set screws will be used. Pump suction piping and piping subject to alternate wetting and drying will be galvanized. Underground piping will be cement-lined ductile iron with mechanical joints. Underground piping will be anchored with concrete thrust blocks and tie rods.

F. Water Supply:

1. Water supply will be fed from connection to the campus mains. A UL listed, AWWA approved double-check backflow preventer will be installed to isolate the fire protection systems from the plumbing systems.

G. Fire Pump:

1. To be determined based on building configuration and local flow test.

H. Monitoring:

1. The fire protection system will be monitored by the building fire alarm system. Monitor points will include trouble and alarm conditions for pump status, water flow switches, and valve monitor switches and air pressure switches.

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