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ELLENZWEIG

University of Maine

Program and Site Selection Report
Engineering Education and Design Center
College of Engineering

April 25, 2018

Table of Contents

INTRODUCTION

In December of 2017, the University of Maine engaged the design team of WBRC Architects Engineers and Ellenzweig to initiate the design process for the new Engineering Education and Design Center (EEDC) on the Orono campus. The overall design process for this project will include the following phases ultimately leading to the construction of the project: Predesign, Schematic Design, Design Development, Construction Documents and Bidding. This report shall serve as the recordation of the initial phase, Predesign, which consists of three foci: Visioning, Programming and Site Selection.

The ensuing chapters provide an overview of the process as well as detailed data related to programming, site selection and the anticipated next steps as the project heads into the Schematic Design phase. Finally, an appendix provides a compilation of the meeting minute recordation of the individual programming sessions, site analysis and estimating assumptions.

University of Maine Building Committee:

Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
David Dvorak	DV	Professor, Mechanical Engineering Technology & Interim Chair, Mechanical Engineering
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Stewart Harvey	SH	Executive Director, Facilities Management
Dana Humphrey	DH	Dean, College of Engineering
Eric Landis	EL	Professor, Civil Engineering
Will Manion	WM	Associate Professor, Construction Engineering Technology
Carolyn McDonough	CM	Director, Capital Planning and Project Management
Peter Schilling	PS	Innovation in Teaching and Learning
Andy Sheaff	AS	SysAdmin and Lecturer, Electrical and Computer Engineering
Arthur Bottie	AB	Project Manager, Capital Planning and Project Management

Design Team:

Ellenzweig

Jim Blount	JB	Lab Planning Architect
Carolyn Day	CED	Lab Architect and Project Coordinator
Michael Lauber	ML	Programmer
Eric Mitchell	EM	Designer
Dominick Roveto	DR	Campus Planning Architect

WBRC Architects Engineers

Ray Bolduc	RB	Principal in Charge
Paul Brody	PB	Landscape Engineer
Kris Kowal	KK	Project Manager
Paul Monyok	PM	Civil Engineer
Jen Richard	JR	Interior Designer

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PROGRAMMING

Overview

This section of the report describes the process utilized to develop the space program for the Engineering Education and Design Center (EEDC) project, and contains the final recommended space program. The space program contains a list of all of the spaces that are to be included in the project, with a suggested area allocation for each space. The program also contains suggested layout diagrams of all important spaces, plus adjacency diagrams indication desired relationships among the various spaces. All of those components are contained in this report.

Project Goals

A successful programming process starts with thoughtful goal-setting. For the EEDC, the College of Engineering and the University did establish very clear goals, and provided a number of specific programmatic recommendations which greatly aided the programming process. As stated in the project description prepared by the College, the goal of the EEDC is to "become the heart of the undergraduate engineering education at the University of Maine." Also, that "the focal point of the EEDC will be a hands-on, team based laboratories for…design projects where students from multiple engineering disciplines will be brought together to collaborate."

Specific space program elements to be included in the EEDC, also as stated in the College's project description, are:

- Primary entrance with Welcome Center.
- Undergraduate Design Laboratory with open, multidisciplinary labs for use by students in designing and building senior capstone projects.
- Specialized laboratories adjoining the Undergraduate Design Laboratory for electronics, advanced machining, 3D printing, and other supporting functions.
- Multiple types of classrooms including lecture halls, flexible classrooms that accommodate collaborative learning engineering demonstration classrooms and "smart" distance learning classrooms".
- Faculty, staff and graduate student offices.
- Undergraduate, graduate and research laboratories to support bioengineering.
- Undergraduate teaching laboratories to support mechanical engineering.
- Flexible student workspaces for collaboration on group projects and homework assignments (group sizes from 2 to 10).
- Snack bar in close proximity to student workspaces.

All of these spaces have been included in the final recommended space program.

Overview

Some of the key features of the project include:

Student Project Lab

This group of spaces will be a world-class student project suite, with a central workshop area and an array of adjacent spaces to support student project activity. These support spaces include: metal shop, wood shop, composites lab, vehicle bay, rapid prototyping room, testing room, Bioengineering project lab, electronics lab, student project storage, material storage and tool crib. This suite will be the centerpiece of the project, and will be highly visible on the main entry floor of the building.

Commons

The Building Commons acts as the social hub of the building, and will provide an overall orientation for to the building. It is intended to be a place where students, faculty, and staff can get together for informal conversations and group work; food service will be provided. This will be a flexible space, and can host a variety of functions including poster sessions, parties, celebrations, etc.

Welcome Center

The Welcome Center will serve as a meeting place for campus-wide tours, including tours associated with the admissions process. In this way the new EEDC will serve as the gateway to the Orono campus, and will symbolize the energy and expanding opportunities present at College of Engineering as well as the University of Maine as a whole.

Teaching Labs

The EEDC will include teaching labs for Mechanical Engineering and Bioengineering; the labs will be robust and flexible learning spaces that can adapt and change over time. They will all be provided all necessary laboratory infrastructure, including high-definition audio-visual systems to support the hands-on pedagogy.

Research Labs

The research labs for Biomedical Engineering have been programmed to provide a variety of research environments to support different research activities, including labs for Chemistry and Biosafety Level 2 activities. A “Flex lab” has been included to support a variety of wet and dry activities. The research suite also includes shared support spaces to provide isolated research environments for tissue culture, chemistry and imaging, as well as space for instrumentation, equipment and specialty research activities ranging from inert atmosphere chambers to alternate light source research.

Overview

Machine Tool Lab

The machine tool lab is the primary shop space for the College, it is also the main work area for the Mechanical Engineering Technology Department. It will contain a variety of shop equipment, including computer-driven equipment, and a related applied research area.

Qualities of the Project

In addition to the specific programmatic requirements, there were a number of qualitative attributes that were set as goals for the project. These include:

- Transparency – the EEDC should provide visibility into all of its exciting spaces to students and visitors who move through the building; the building design should also provide visibility to important spaces from the exterior, to passers-by on campus.
- Student-friendly – the EEDC should provide an array of spaces that allow students to occupy the building at all times of the day and evening; through its design it should convey the sense that it welcomes students to engage in the various spaces and activities contained within.
- Highly flexible – all of the spaces in the building should be designed to provide maximum flexibility, so that the building can change over its life to adapt to new technologies and pedagogies
- Convey excitement – the design of the building itself should convey a sense the energy and excitement embodied in the student and faculty activities housed within.
- A proud addition to the campus – the building should represent the best traditions of the Orono campus, in terms of campus fit and pedestrian friendly environments, as well as represent an optimistic future for Engineering and the campus as a whole.

Programming Process

The space programming process occupied approximately four months. The project team met for the first time in early January, and this report, dated April 2018, marks the end of programming. The narrative below describes the steps undertaken in this process.

Building Committee

The EEDC programming process was led by a Building Committee whose members provided overall leadership and decision-making for the process; Committee membership is noted in the Introduction to this report. This was a very effective group, ensuring that the process was timely and well-organized, and that the final program was consistent with project budget targets.

Building Tours

The process commenced with tours of relevant projects. The tour group included the Dean and faculty and staff from the College of Engineering, and representatives of Ellenzweig Architects and WBRC Architects and engineers. The projects toured were the following:

- University of Wisconsin-Madison - Engineering Center
- University of Wisconsin – Maker Space
- University of Wisconsin – Discovery center
- Marquette University - Engineering Building
- Rowan University - School of Engineering
- University of Pennsylvania - Skirkanich Hall (Bioengineering)
- Boston University - Center for Integrated Life Science & Engineering
- Boston University - Engineering Product Innovation Center
- Massachusetts Institute of Technology – Mechanical Engineering / Beaver Works Maker Space
- UMass Amherst - John W. Olver Building

Tour Summaries

Tours proved extremely useful in providing examples of the types of spaces that were to be included in the EEDC. There were also a number of “lessons learned” in the course of these tours – things that the building occupants would have done differently. As a whole, the tours provided a very useful foundation to begin the programming process.

Programming Process

University of Wisconsin-Madison - Engineering Centers

The Engineering Centers building was occupied in January of 2003. The building program is a co-location of student labs on lower levels and research on upper levels. It is the focal point for engineering on campus. Project labs are on display and both poster sessions and career fairs happen in this building.

First Floor Plan

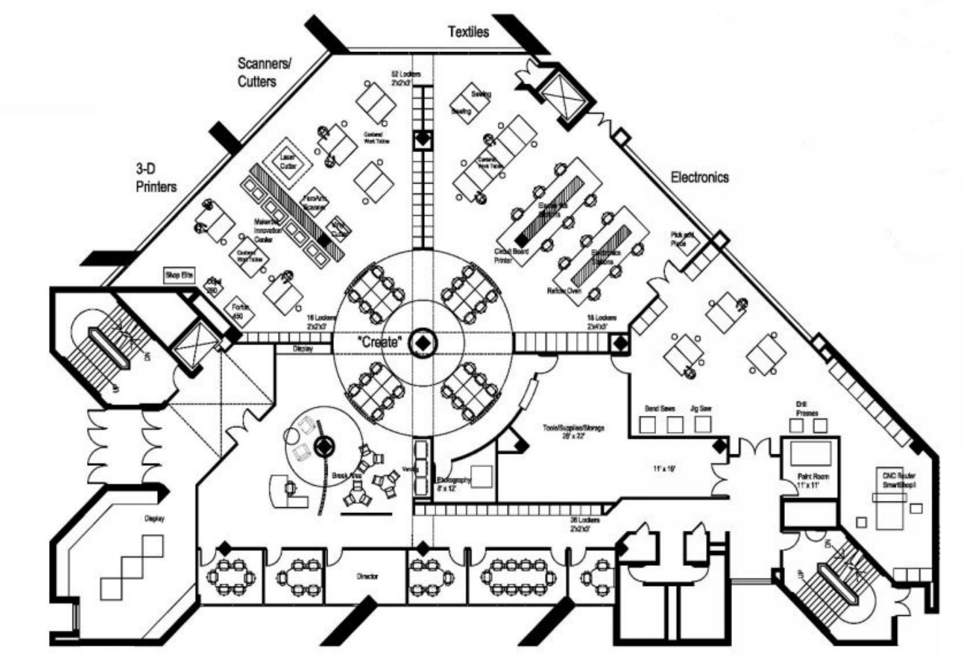
View of commons, with Project Lab to right

View down onto studet project lab

Programming Process

University of Wisconsin-Madison – Grainger Engineering Design and Innovation Lab

UW's Design Lab is located in a renovated portion of the old library building. It is a maker space arranged in a "spoke and hub" layout, allowing for centralized work area surrounded by specific technologies. Each area is separated by project storage lockers. All students on campus are welcome to use the space.



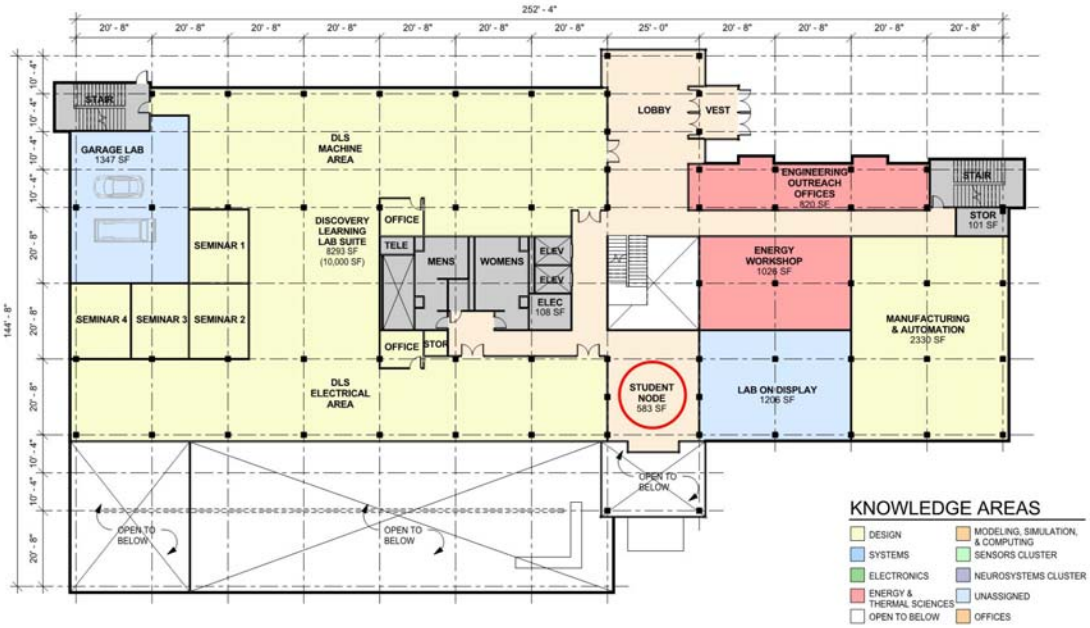
Plan of Innovation Lab

Working "Hub" with view towards rapid prototyping areas

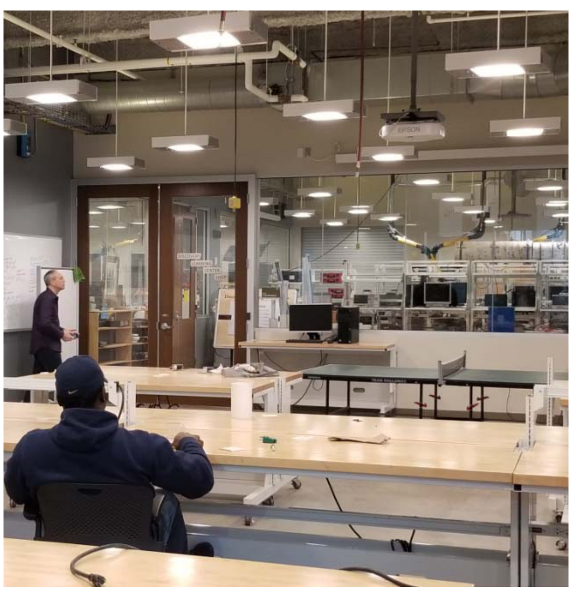
Programming Process

Marquette University – Engineering Hall

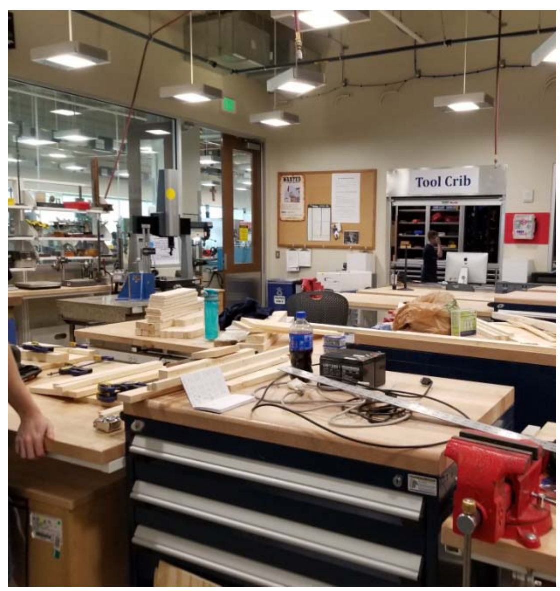
Engineering Hall at Marquette, designed by Opus Architects, opened in 2011. The building showcases undergraduate labs and workspaces around a central circulation stair. It also houses research labs and faculty offices. The building itself is a teaching tool, using sensor technology and building automation along with exposed building elements, such as the use of different steel connections for each floor of the stair.



Entry level plan. Note the "Discovery Learning Lab" student project space in yellow to the left



View of Learning Lab



View of wood shop and tool crib in learning lab

Programming Process

Rowan University – Engineering Hall

Engineering Hall opened in 2017. It serves as a gateway to campus and is connected to the original engineering building by a 3rd floor bridge. The program for this building is similar to the UM EEDC, including mechanical and biomedical teaching labs and biomedical research labs. The building also houses a commons and includes formal and informal student study space.

Commons

Typical floor plan

Formal and informal study areas

Programming Process

University of Pennsylvania – Skirkanich Hall / Penn Engineering (Bioengineering)

Skirkanich Hall, designed by Tod Williams Billie Tsien Architects, was completed in 2006. It houses research laboratories for the School of Engineering and Applied Sciences. It is located on a small site, connecting two other buildings, with a tall atrium at the center. The group also visited some other spaces in adjacent buildings as part of the tour.

Biomedical Engineering Student Lab

Active Learning Classroom

Programming Process

Boston University – Kilachand Center for Integrated Life Science & Engineering and Engineering Product Innovation Center (EPIC)

BU's Engineering Product Innovation Center is their maker space for the College of Engineering. It is 15,000 square feet of shop, assembly space, and specialized workshops with a focus on manufacturing. The Center for Integrated Life Science and Engineering, designed by Payette, is a new research lab for scientists, engineers, and physicians.

Engineering Product Innovation Center machine shop

Research lab in Kilachand Center with view towards write-up area

Programming Process

Massachusetts Institute of Technology – Mechanical Engineering and Beaver Works

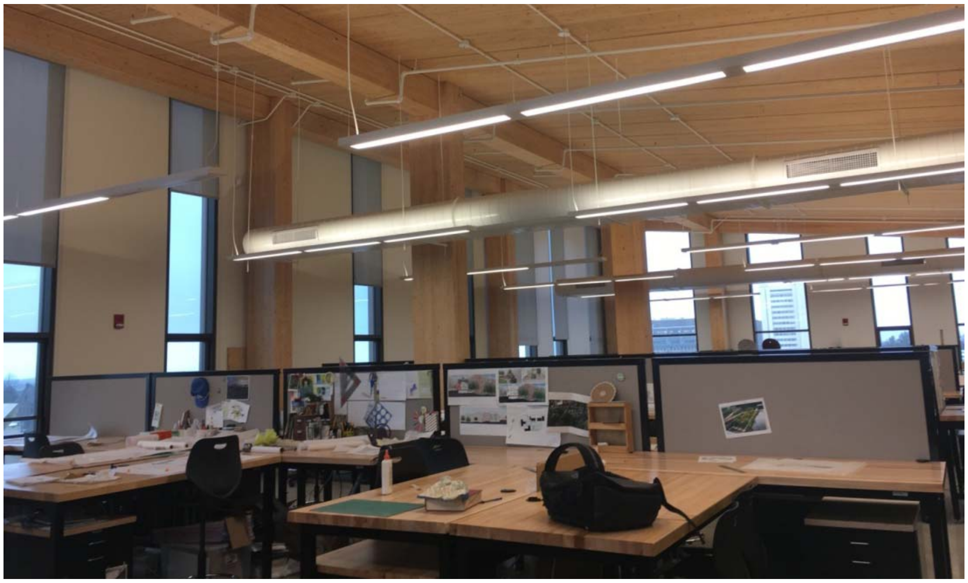
MIT's Beaver Works, opened in 2013, is a collaboration between the School of Engineering and Lincoln Laboratory. They conduct research, workshops, and classes for the College using prototyping and hands-on techniques.

Collaborative workspace at Beaver Works

Programming Process

University of Massachusetts Amhearst – John Olver Design Building

The Olver Design Building is the largest cross laminated timber (CLT) academic building in the US. It was designed by Leers Weinzapfel to bring Landscape Architecture, Architecture, and Building Technology under one roof and opened in 2017. The team chose to visit this building due to interest in exploring mass timber as a structural system for the EEDC.



Design Studio

Commons – showing wood/steel truss system

Programming Process

Visioning

The programming process commenced on campus with an open visioning session. The visioning session was intended to serve as an open forum to gather input on project goals from all interested parties across campus. The visioning session occupied a full morning, lunch, and a closing afternoon session; the planning team acted as moderator. The day's events were extremely well-attended.

The session was organized into three parts: 1) an initial open forum intended to solicit input from all parties on goals for the project related to any subject; 2) a series of break-out sessions organized around specific topics, such as the student project lab, teaching labs, research labs, sustainability, etc.; 3) a closing session with the entire group where each focus group reported out on their discussions, and some final general discussion. The visioning session overall proved to be very useful as a way to introduce the programming process in general as well as to establish some important programmatic goals for the project that were eventually incorporated into the project program. These goals pertained to issues such as organization of the research labs, components of the student project lab suite and campus design considerations.

User meetings

The heart of the programming process is comprised of user meetings. User meetings were organized around specific space types, identified below:

- Biomedical Engineering Teaching
- Mechanical Engineering Teaching
- Biomedical Engineering Research
- Student Project Lab suite
- Student Space (grad and undergrad)
- Administration and Faculty Office Space
- Classrooms and other learning spaces
- Outreach
- Mechanical Engineering Technology/Machine Tool Lab

These user groups contained faculty and staff with knowledge of and interest in each topic; the Student Space group also included current engineering students. Members of the Building Committee also attended each user group meeting; this proved very useful in terms of maintaining the overall mission and priorities of the project.

Programming Process

The planning team met with each user group three times over a two-month period. The sessions were preceded by an introductory memo sent to the participants which provided some background and expected outcomes of the programming process. In general, the first meeting served as an open-ended discussion of the various needs of the functions involved, and a discussion of possible options to address these needs. This allowed the planning team to develop an initial space program and prepare some layout diagrams for review. The planning team developed 2-D and 3-D diagrams of all of the principal program spaces, which allowed the participants to visualize and help advance the various layouts. The second meeting generally involved a review of the preliminary space list and layout diagrams, with suggestions for appropriate changes. At the third meeting, the planning team reviewed with the group the revised space list and layout diagrams. After the third meeting there was general consensus about the proposed program and the associated layout diagrams

Program adjustments to meet the Budget

After the second round of meetings, the planning team was able to construct an overall space program based in the user input. This program was then translated into an associated building size. This initial building area was considerably larger than what could be supported by the available funding, so some program reductions proved necessary. The Building committee led this process, and helped guide the program revisions to bring the project back on budget. The resulting program maintained all of the original goals for the project, while eliminating unessential spaces.

Program Modifications – Machine Tool Lab

The site selection process, documented in Chapter 2 of this report, was conducted simultaneously with the programming process. The final recommendation of the site selection process, accepted by the University, was to locate the new EEDC project on the current site of the Machine Tool Lab Building (MTL). This determination meant that the existing building would be demolished, and the associated spaces relocated elsewhere. It was agreed that the primary spaces in that building would be included in the EEDC, and those spaces have been incorporated into the final space program – these are listed in item 2.4 in the space program document. The addition of these spaces added approximately 4500 net square feet to the building, or approximately 8,000 gross square feet. Because of this additional area, the project budget was increased accordingly

Space Program

Space Program. Layout Diagrams, Adjacency Diagrams

The final recommended space program is included on the following pages. Following that list are 2-D and 3-D diagrams for a number of the spaces and a stacking diagram for the building, showing a potential allocation of space by floor, assuming a three-story building.

The final recommended program, documented on the following pages, includes approximately 62,000 net square feet. This translates into approximately 112,800 gross square feet, using an efficiency ratio of 55%. This efficiency ratio captures the need for significant non-program areas in the project, including various building mechanical spaces, restrooms, stairways, elevators, ducts shafts, corridors, and exterior and interior wall thicknesses. The final area of the building will be determined by the actual floor plan layout, although the net square feet of all of the program spaces in the building program will be maintained and implemented in the final building plans.

Program Summary

Space #	Space Name	Area / Space	Count	Total Area	Notes
Summary					
1.0	**Student Project Suite**			**11,050**	
2.0	**Teaching Labs**			**11,805**	
3.0	**Research Labs**			**9,345**	
4.0	**Offices**			**10,790**	
5.0	**Social and Student Spaces**			**6,704**	
6.0	**Classrooms and Support**			**8,600**	
7.0	**Outreach**			**2,200**	
8.0	**Building Support**			**1,580**	
Total SF				**62,074**	
Gross SF At 55% Efficiency				**112,862**	

Space Program

Space #	Space Name	Area / Space	Count	Total Area	Notes
1.0	**Student Project Suite**				
1.1	Assembly/Workshop Space	5,300	1	5,300	
1.2	Electronics Assembly	400	1	400	
1.3	Design Collaboration Area				Use classroom
1.4	Plotter Area				Incorporated into 1.13
1.5	Team Meeting Rooms				See 5.3
1.6	Wood and Sanding Shop	400	1	400	
1.7	Metal Shop	800	1	800	
1.8	Auto/Vehicle Space - 2 Bays	800	1	800	
1.9	BME Lab Project Space	650	1	650	
1.10	Composites Lab	900	1	900	
1.11	Tool Crib & Parts Inventory	300	1	300	
1.12	Testing Equipment	300	1	300	
1.13	Rapid Prototyping	700	1	700	Includes printing and plotting
1.14	Recycling Area				Eliminated
1.15	Display Area				Incorporated into 1.1
1.16	Material Storage	300	1	300	Metal, Wood
1.17	Paint Area				Incorporated into 1.8
1.18	Welding Area				Incorporated into 1.7
1.19	Student project storage	200	1	200	
1.20	Drone Area				Eliminated
Total Student Project Suite				**11,050**	
2.0	**Teaching Labs**				
2.1	Mechanical Engineering Teaching Lab (32 student)	1,900	2	3,800	
2.1.1	Storage	300	1	300	
2.2	Biomedical Engineering Teaching Lab (32 student)	1,800	1	1,800	
2.2.1	Tissue Culture	500	1	500	
2.2.2	Microscopy	350	1	350	
2.2.3	Prep Room/Storage	250	1	250	
2.2.4	Electronics/Instrumentation	250	1	250	
2.3	Shared Flex Lab				Removed from program
2.4	Tool Lab				
2.4.1	Tool Room	3,500	1	3,500	
2.4.2	Project Storage	80	1	80	
2.4.3	Tool Crib	400	1	400	
2.4.4	Applied Research	400	1	400	
2.4.5	Tech Support	175	1	175	
Total Teaching Labs				**11,805**	

Space Program

Space #	Space Name	Area / Space	Count	Total Area	Notes
3.0	**Research Labs**				
3.1	Biomedical Engineering				
3.1.1	BSL-2 Research Labs	600	3	1,800	
3.1.2	Chemistry Main Research Labs	600	3	1,800	
3.1.3	Flex Main Research Labs	600	3	1,800	
3.1.4	Computational Main Research Labs	575	1	575	
3.2	Research Support				
3.2.1	Tissue Culture	150	1	150	
3.2.2	Chemistry	150	1	150	
3.2.3	Imaging	150	1	150	
3.2.4	Instrument	150	1	150	
3.2.5	Equipment	150	1	150	
3.2.6	Specialty	150	1	150	
3.3	Core Labs				
3.3.1	Tissue Culture	200	2	400	One Mammalian & one Bacteria
3.3.2	Imaging	585	1	585	
3.3.3	Computational Modeling	600	1	600	
3.3.4	Chemistry	495	1	495	
3.3.5	Biomechanical	390	1	390	
3.4	Equipment Corridor				Eliminated
Total Research Labs				**9,345**	
4.0	**Offices**				
4.1	Mechanical Engineering				
4.1.1	Faculty Offices	120	29	3,480	
4.1.2	Administrative Offices	100	3	300	
4.1.3	Grad Student Area	30	80	2,400	
4.1.4	Department Chair Office	140	1	140	
4.2	Biomedical Engineering				
4.2.1	Faculty Offices	120	11	1,320	
4.2.2	Administrative Offices	100	2	200	
4.2.3	Grad Student Area	30	40	1,200	
4.2.4	Department Chair Office	140	1	140	
4.3	Shared Administrative Support				
4.3.1	Copy/Admin Storage	120	2	240	
4.3.2	Conference				
4.3.2.1	Conference - 15p	450	2	900	
4.3.2.2	Conference - 35				Use classroom 6.5
4.3.3	Faculty Lounge	350	1	350	
4.4	MET Faculty Office	120	1	120	
Total Offices				**10,790**	

Space Program

Space #	Space Name	Area / Space	Count	Total Area	Notes
5.0	**Social and Student Spaces**				
5.1	Building Commons	3,000	1	3,000	
5.2	Break-Out Areas	100	8	800	
5.3	Team Meeting/Study				
5.3.1	Large	200	2	400	
5.3.2	Small	125	12	1,500	
5.4	Student Club Space				
5.4.1	Storage				
5.4.1.1	Small	12	12	144	
5.4.1.2	Medium	40	4	160	
5.4.2	Meeting Room	350	1	350	
5.5	Informal Student Lounge	350	1	350	
5.6	Quiet Study				Eliminated
Total Social and Student Spaces				**6,704**	
6.0	**Classrooms and Support**				
6.1	Auditorium for 200				Eliminated
6.2	Classroom for 100	3000	1	3,000	
6.3	Classroom for 60-70				Eliminated
6.4	Classroom for 50-60	1650	2	3,300	1 w/ stor. cabinets
6.5	Classroom for 30-40	1050	1	1,050	With upgraded finishes
6.6	Seminar Room for 20	600	1	600	
6.7	Tech Support Offices	100	2	200	
6.8	CAD CAM Break-Out Room	450	1	450	Adjacent to Tool Lab
Total Classrooms and Support				**8,600**	
7.0	**Outreach**				
7.1	Welcoming/Outreach Lobby	1600	1	1,600	Accommodation for 100
7.2	Outreach Offices	100	2	200	
7.3	Additional Restrooms	200	2	400	
Total Outreach				**2,200**	
8.0	**Building Support**				
8.1	Receiving/Holding	300	1	300	
8.2	Jan Closets	100	3	300	
8.3	Building Storage	200	1	200	
8.4	Single-occupancy restroom	80	1	80	
8.5	Parents room	80	1	80	
8.6	Contemplation Room	120	1	120	
8.4	Tel-Data Closets	100	3	300	
8.5	Recycling	100	1	100	
8.6	Hazardous Waste Storage	100	1	100	
Total Building Support				**1,580**	

Diagram of Key Spaces

On the following pages we have included layout diagrams for the following spaces:

- Student Project Lab Suite
- Mechanical Engineering Wet and Dry Teaching Labs
- Biomedical Engineering Teaching Lab Suite
- Biomedical Engineering Research
- Machine Tool Lab – adjacency diagram
- Building Commons
- Outreach and Welcome Center
- Office and Conference rooms
- Student Club and Lounge Space
- 40, 60, and 100 person classrooms
- Administrative Suite – adjacency diagram
- Building Stacking Diagram

These diagrams are not necessarily meant to represent a final design approach to these spaces, but only to validate the area allocation for each space. Additional design studies for all spaces will be conducted in the actual design phases of the project.

Diagram of Key Spaces

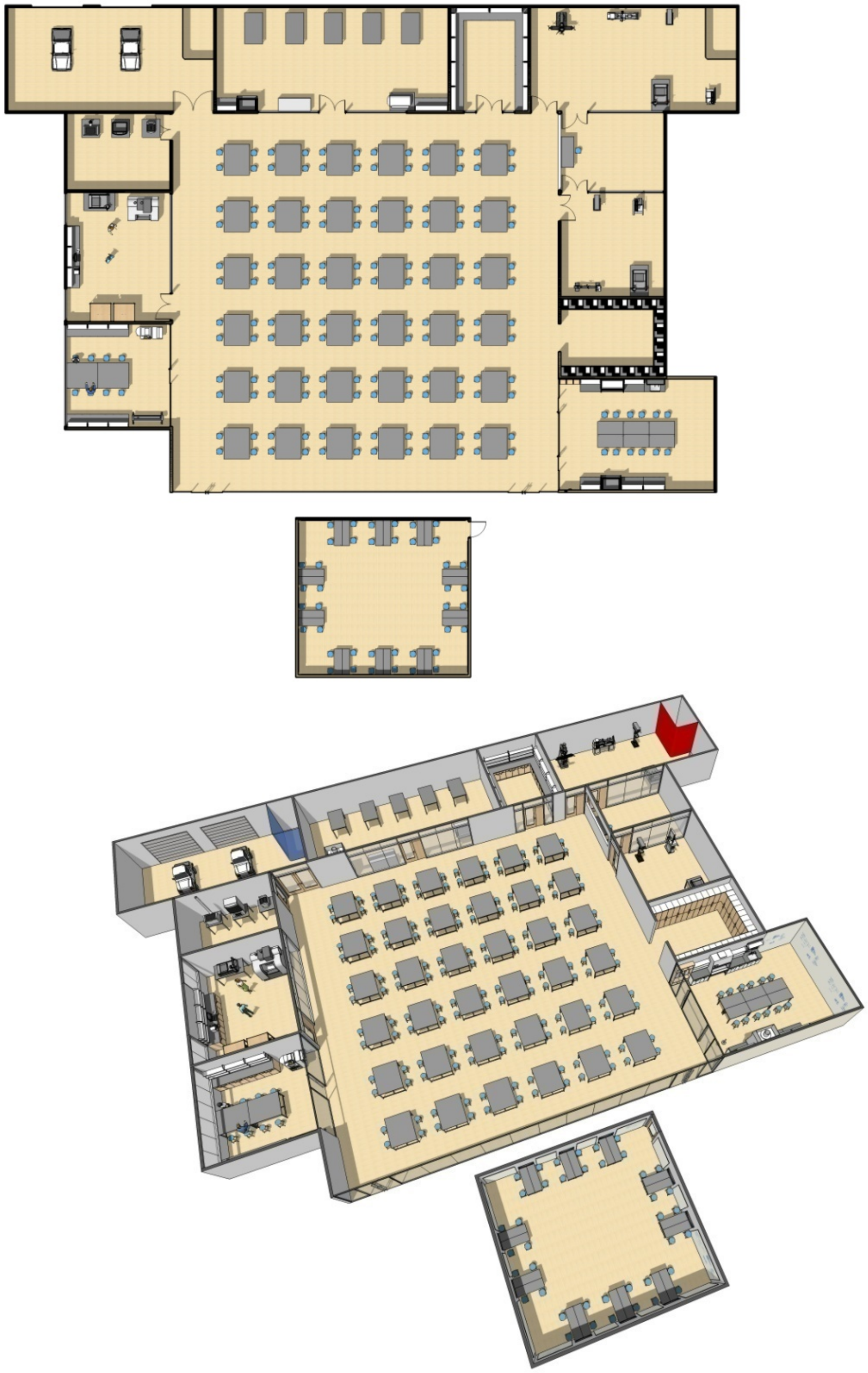


Diagram of Key Spaces

Project Lab Suite

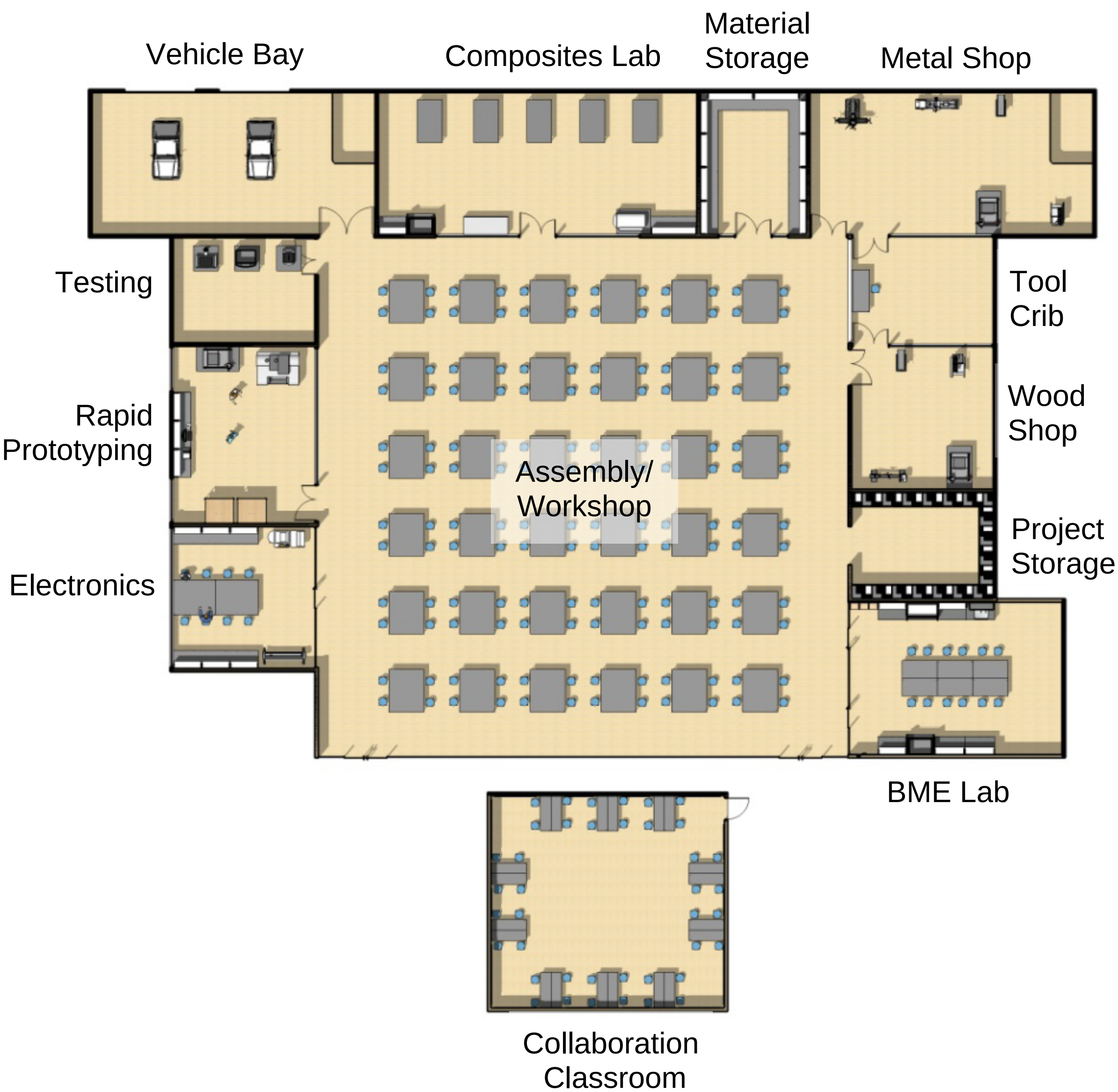


Diagram of Key Spaces

Mechanical Engineering-“Wet” Teaching Lab

Diagram of Key Spaces

Mechanical Engineering-“Dry” Teaching Lab

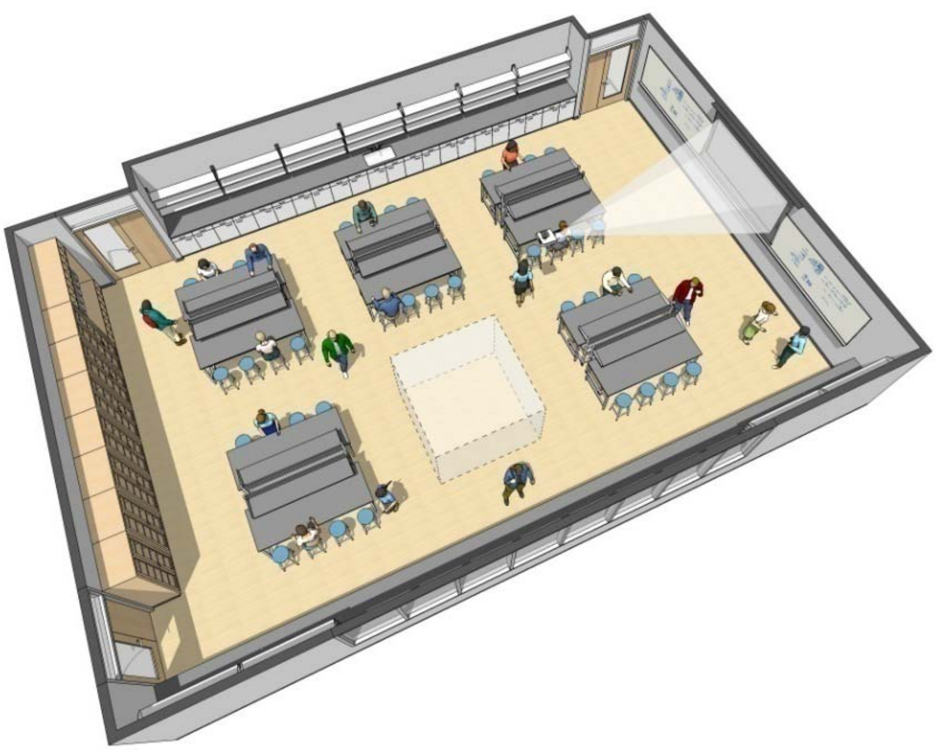


Diagram of Key Spaces

Bioengineering Teaching Lab Suite

Diagram of Key Spaces

Biomedical Engineering Open Chemistry – Research Lab

Cellular BSL-2 - Research Lab

Diagram of Key Spaces

Biomedical Engineering Open Research "Flex Lab"

Research "Flex" Lab with Optical Table

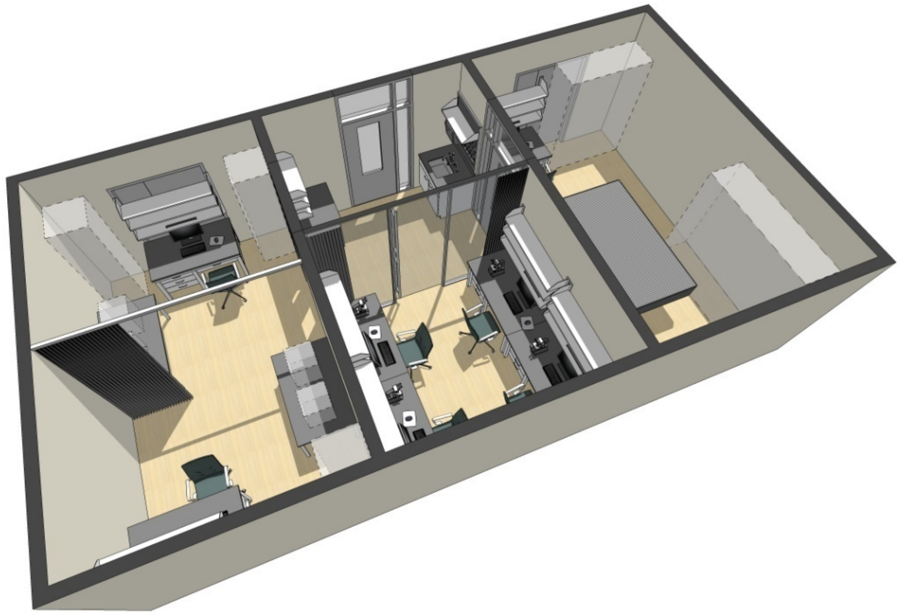
Diagram of Key Spaces

Tissue Culture Core Lab

Chemistry Core Lab

Diagram of Key Spaces

Imaging Core Lab



Biomedical Core Lab

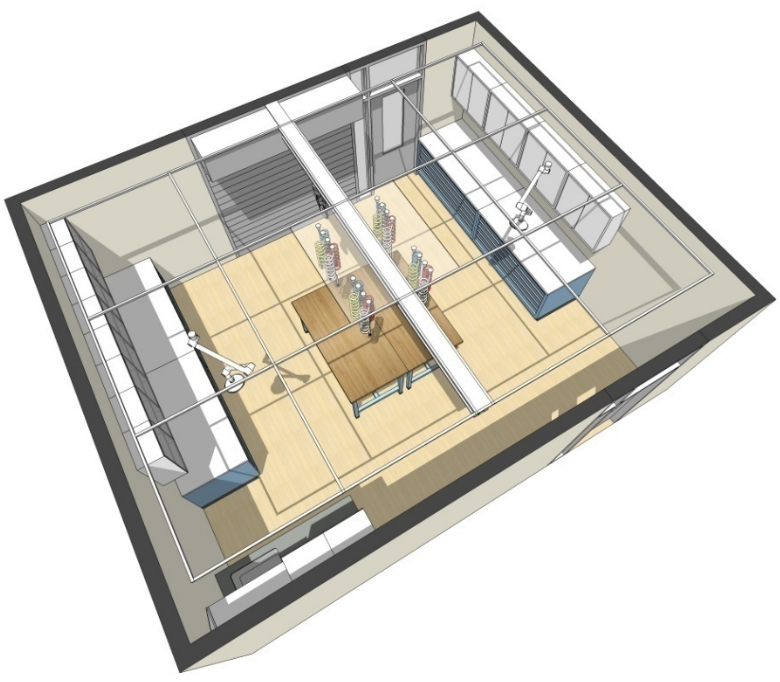


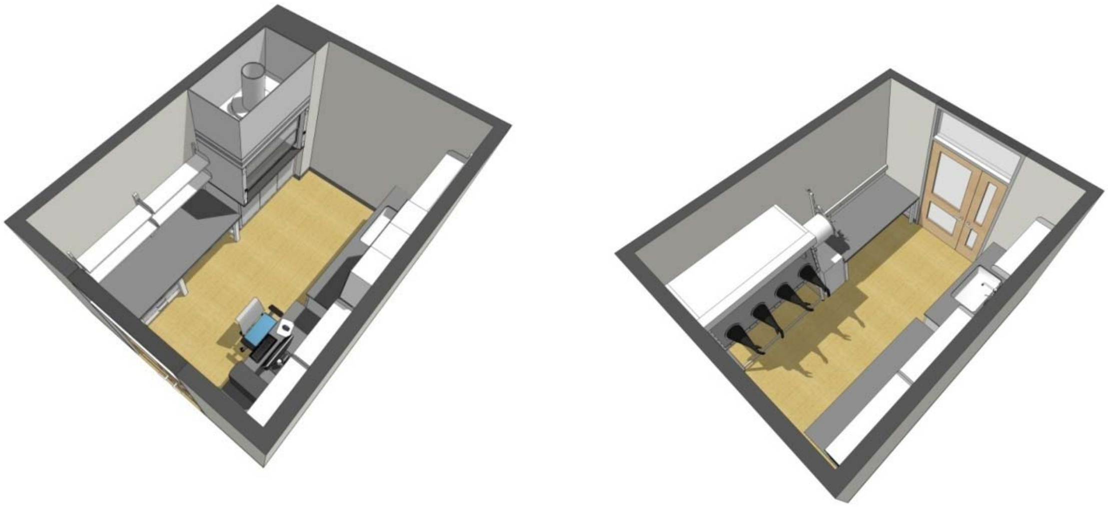
Diagram of Key Spaces

Computational Research Lab

Computational Modeling Core Lab

Diagram of Key Spaces

Chemistry Research Support



Specialty Research Support

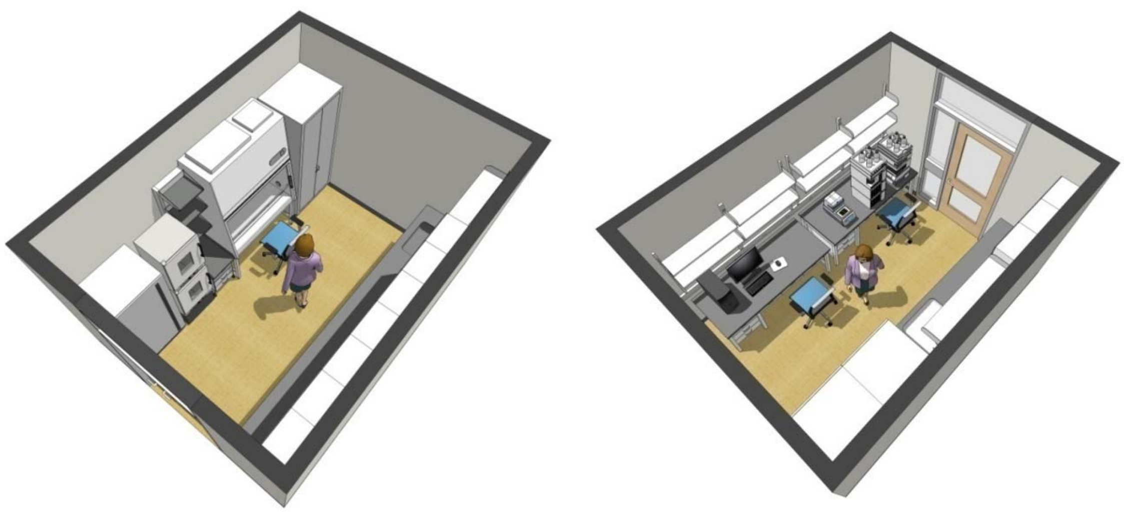


Diagram of Key Spaces

Machine Tool Lab

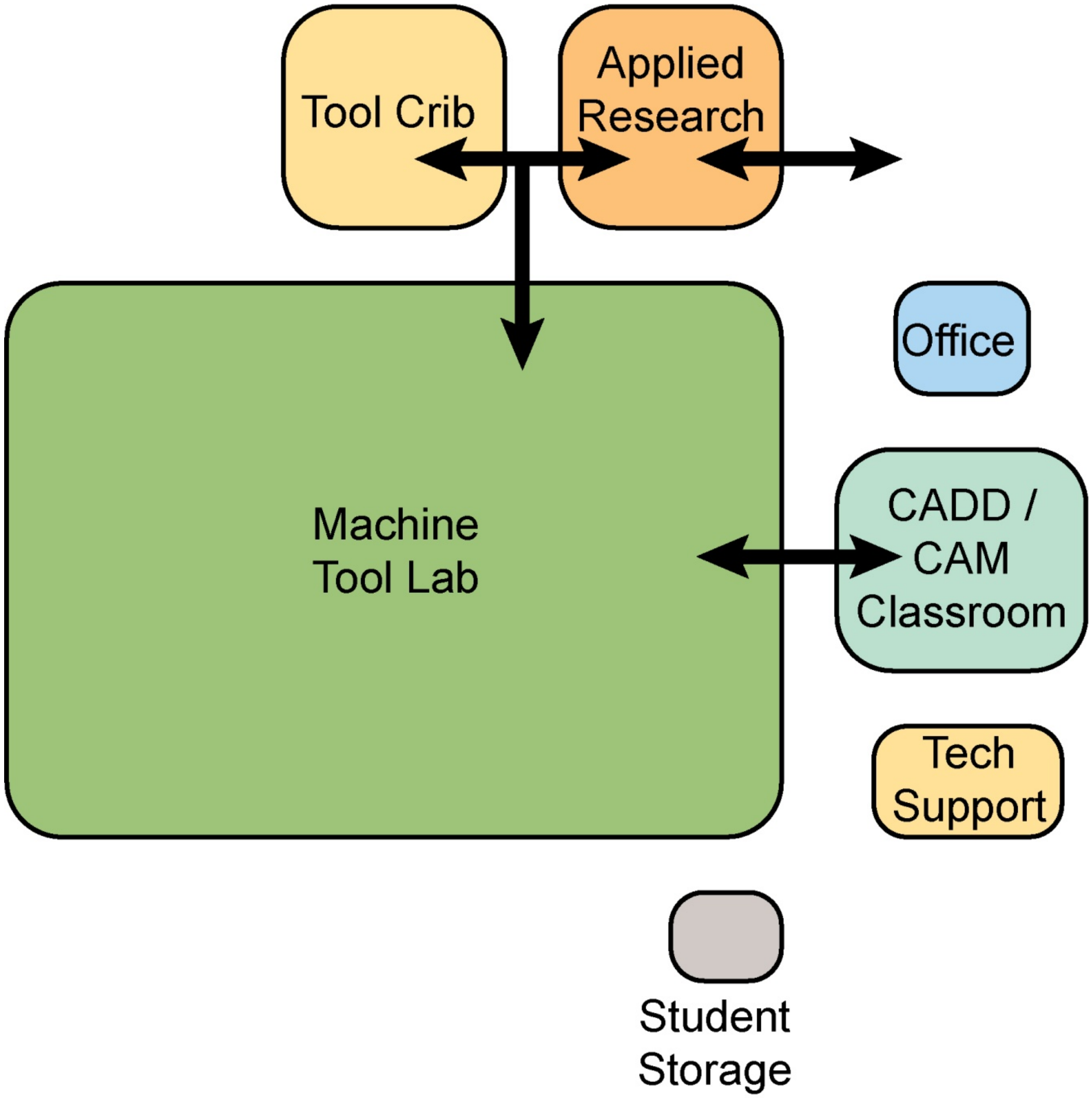
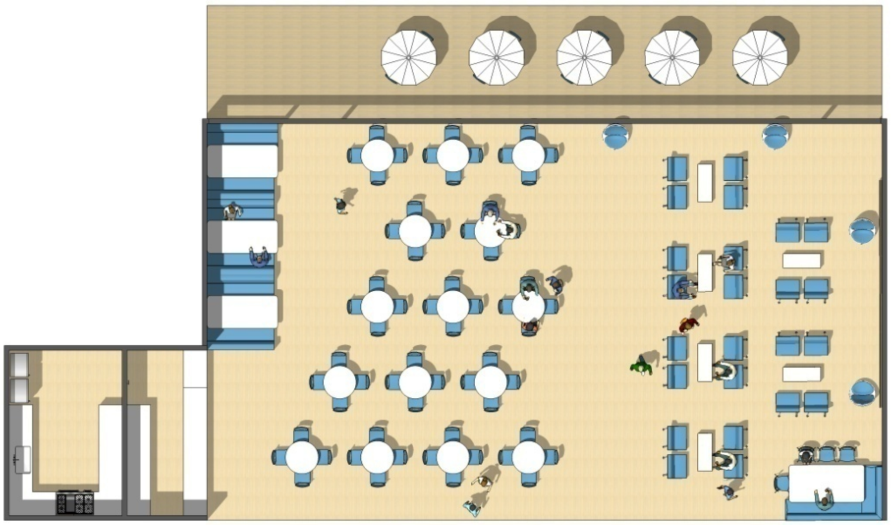


Diagram of Key Spaces

Commons



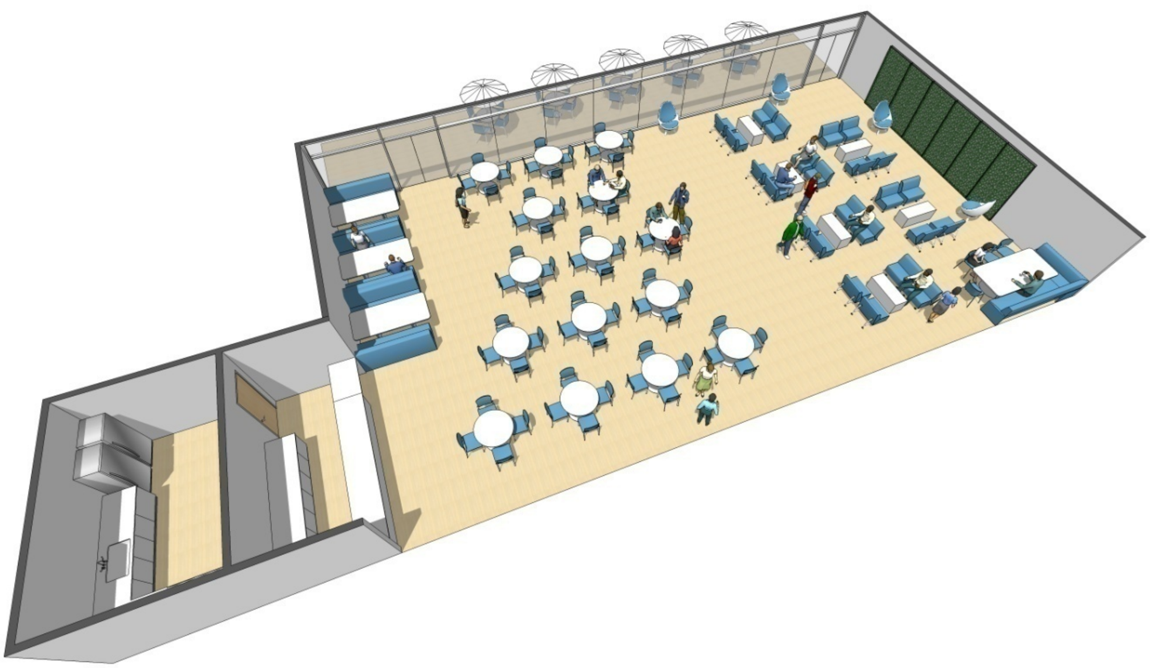
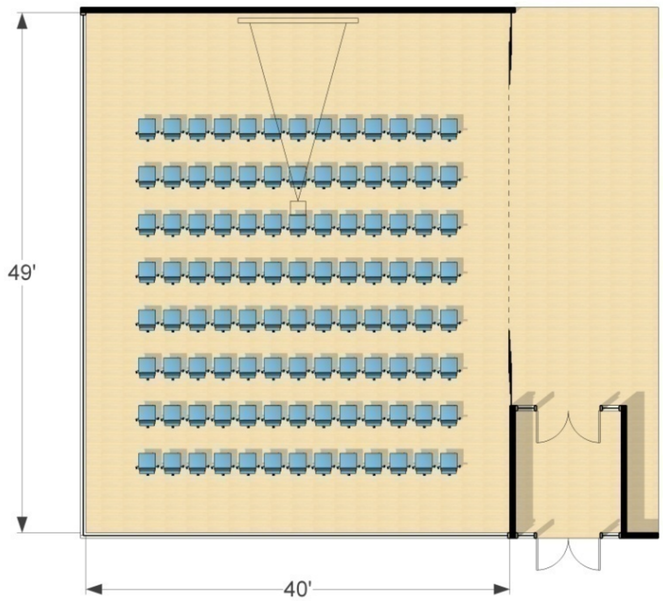


Diagram of Key Spaces

Outreach/Welcome Center



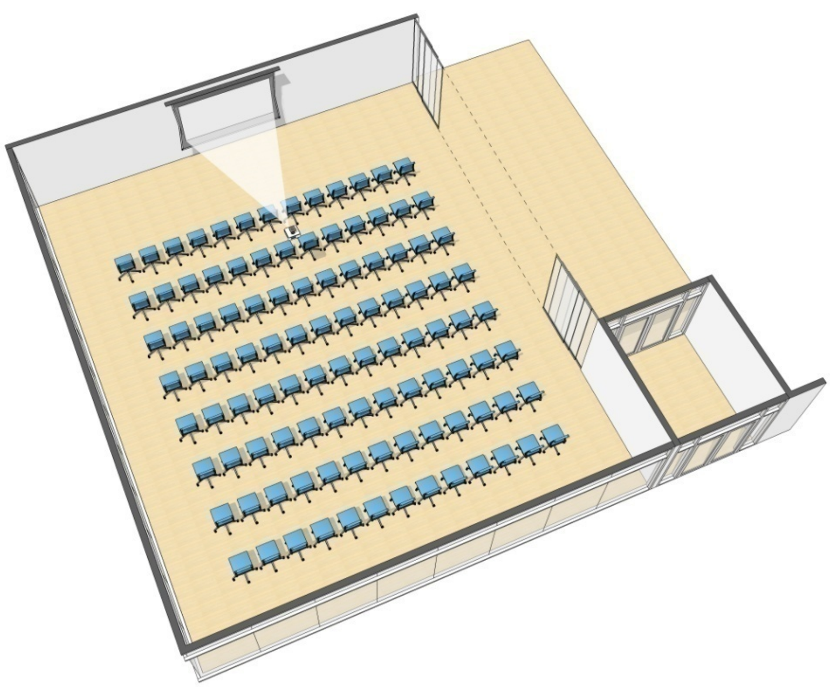
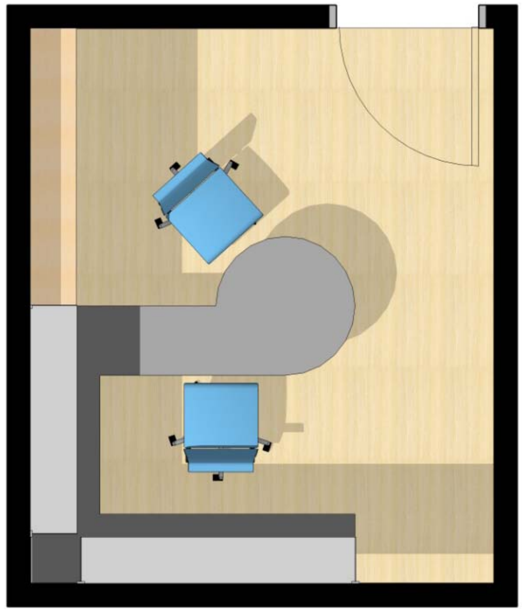


Diagram of Key Spaces

Office



Conference

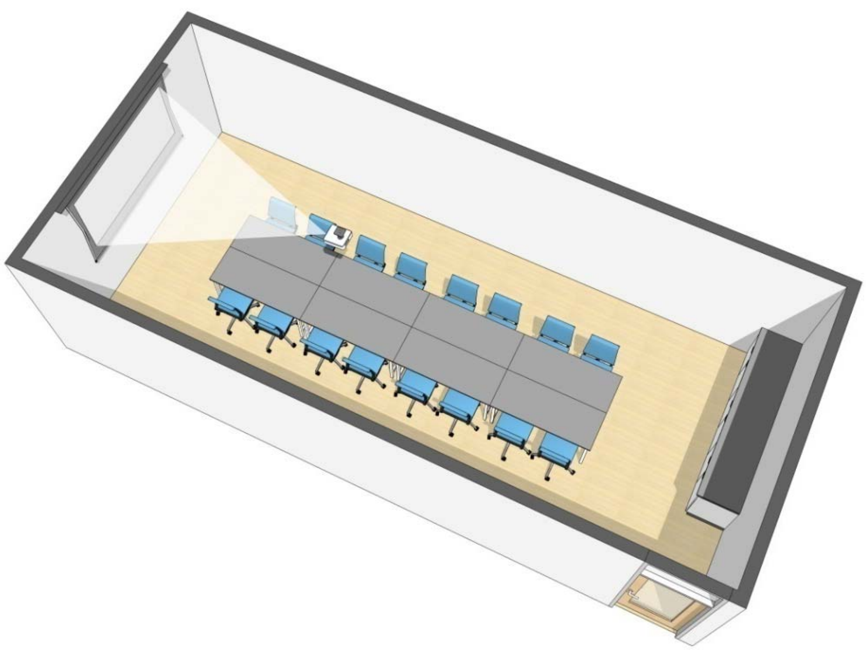
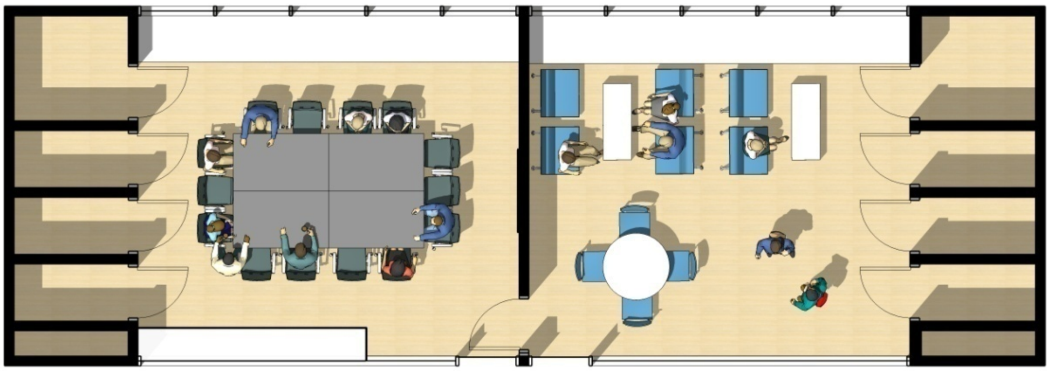


Diagram of Key Spaces

Student Club and Lounge



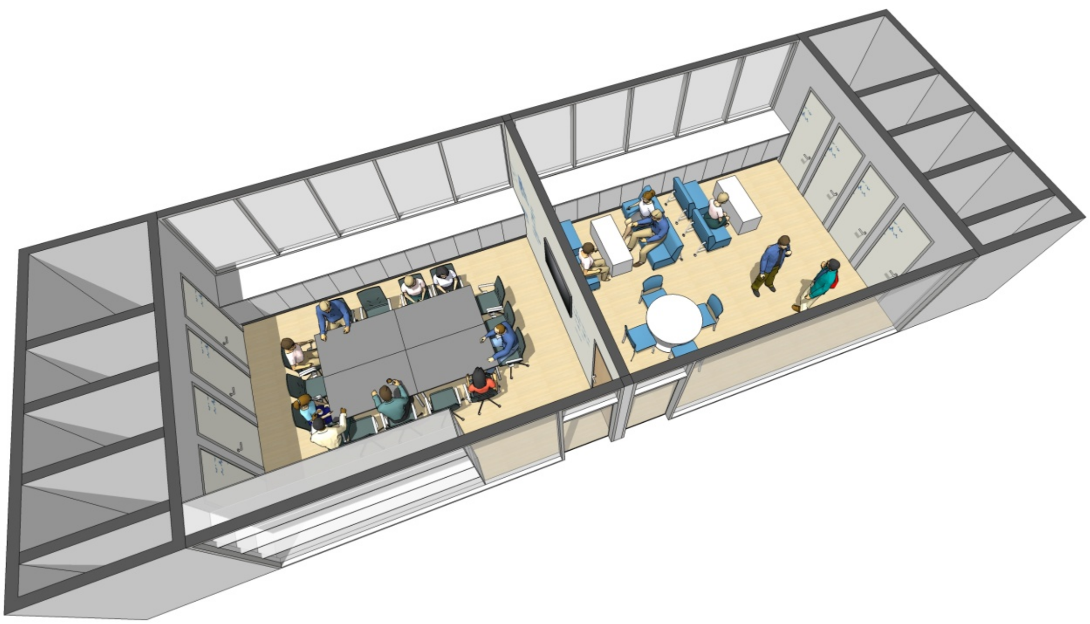
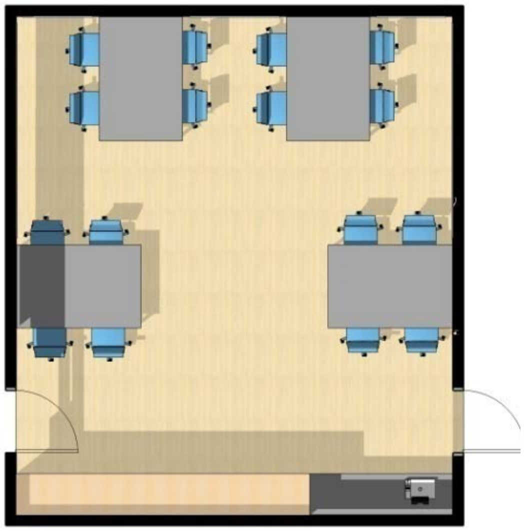


Diagram of Key Spaces

CADD / CAM Classroom



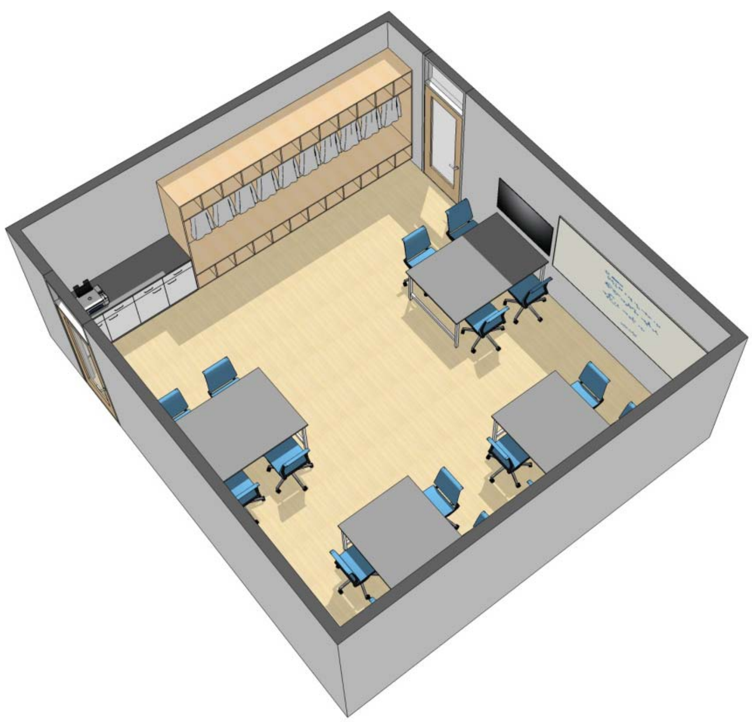
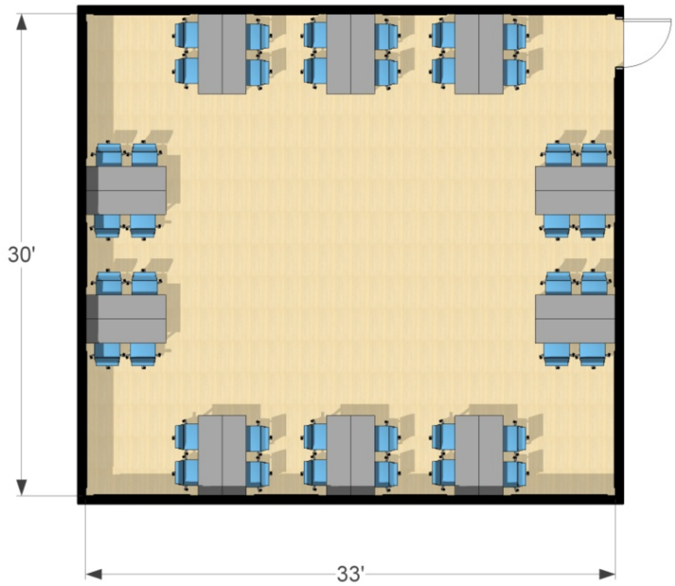


Diagram of Key Spaces

40 Person Classroom



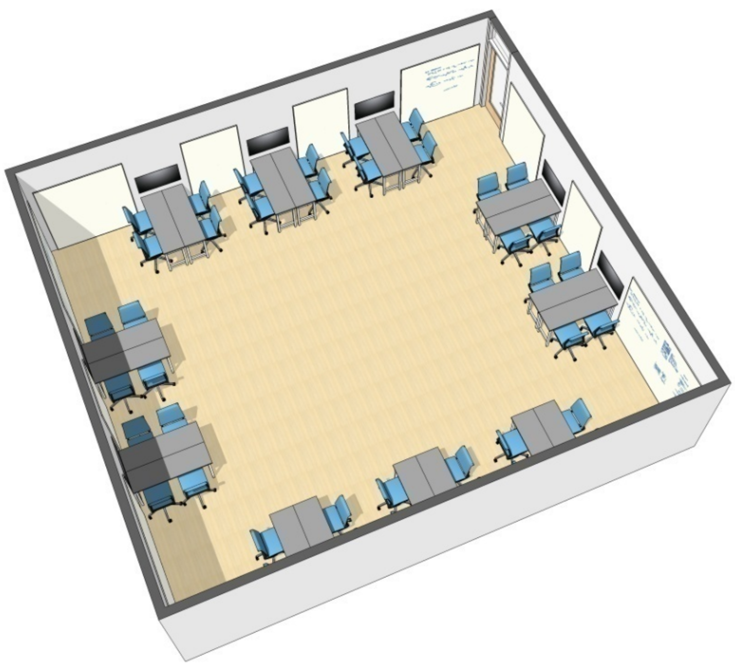
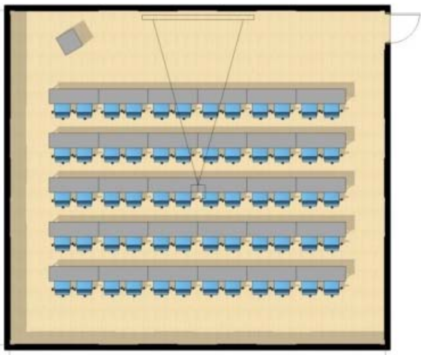


Diagram of Key Spaces

60 Person Classroom



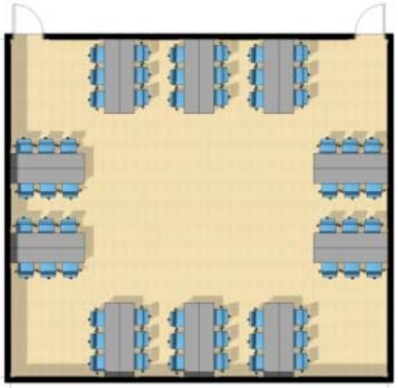
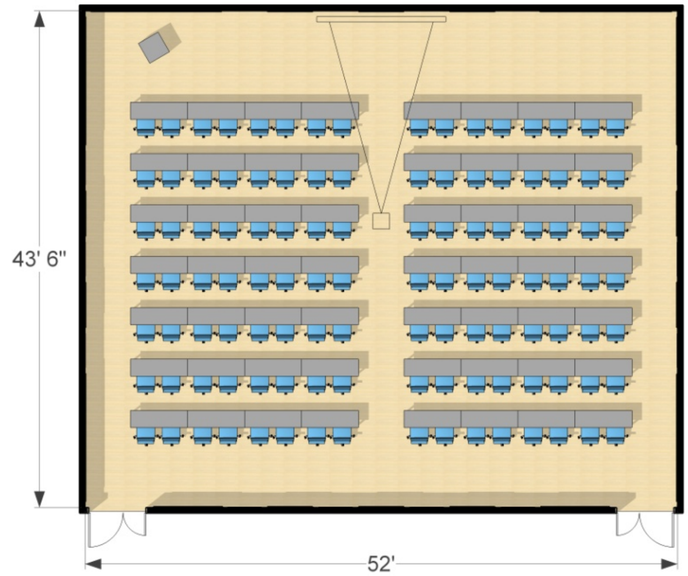


Diagram of Key Spaces

100 Person Classroom



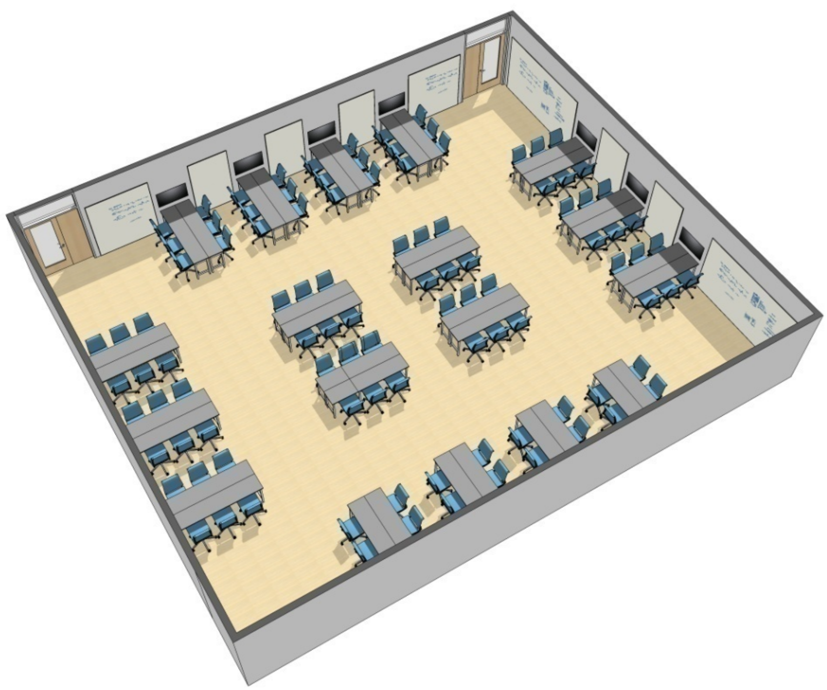


Diagram of Key Spaces

Space Program Adjacency Diagrams

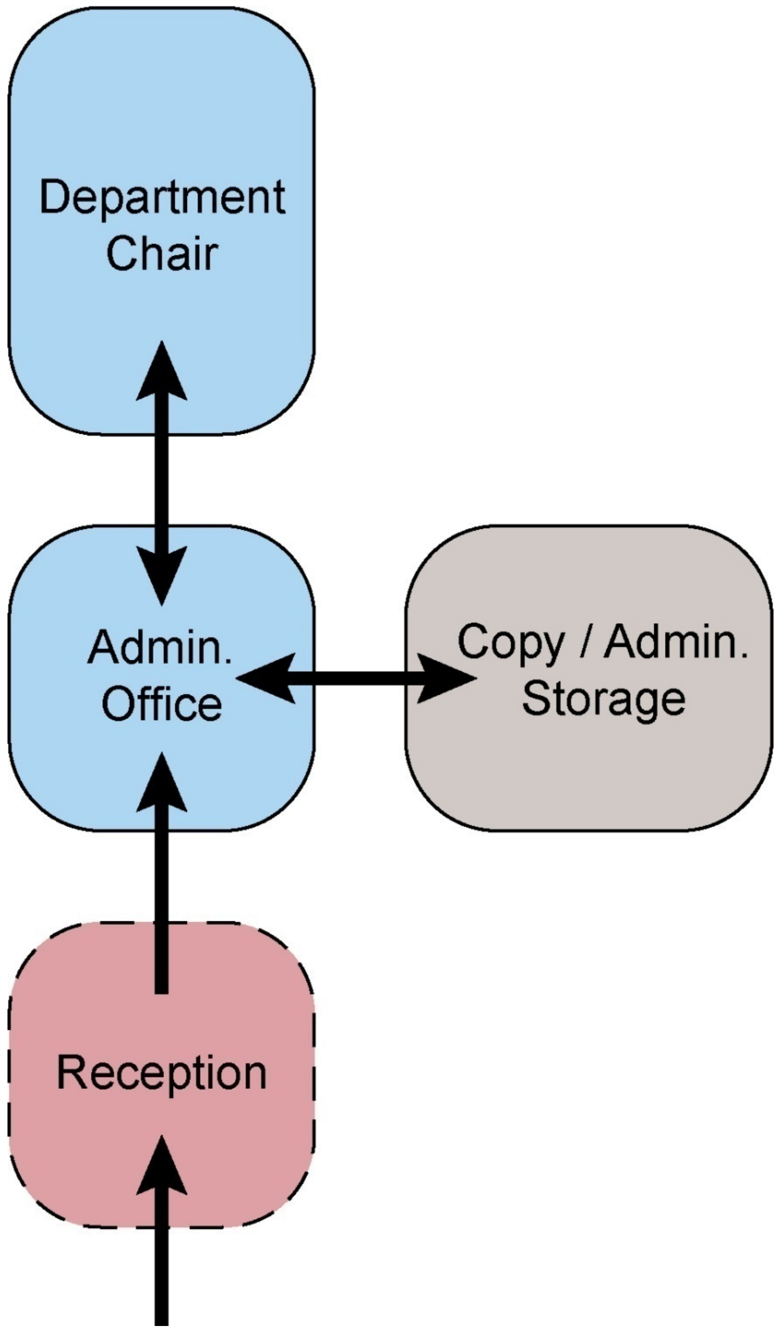
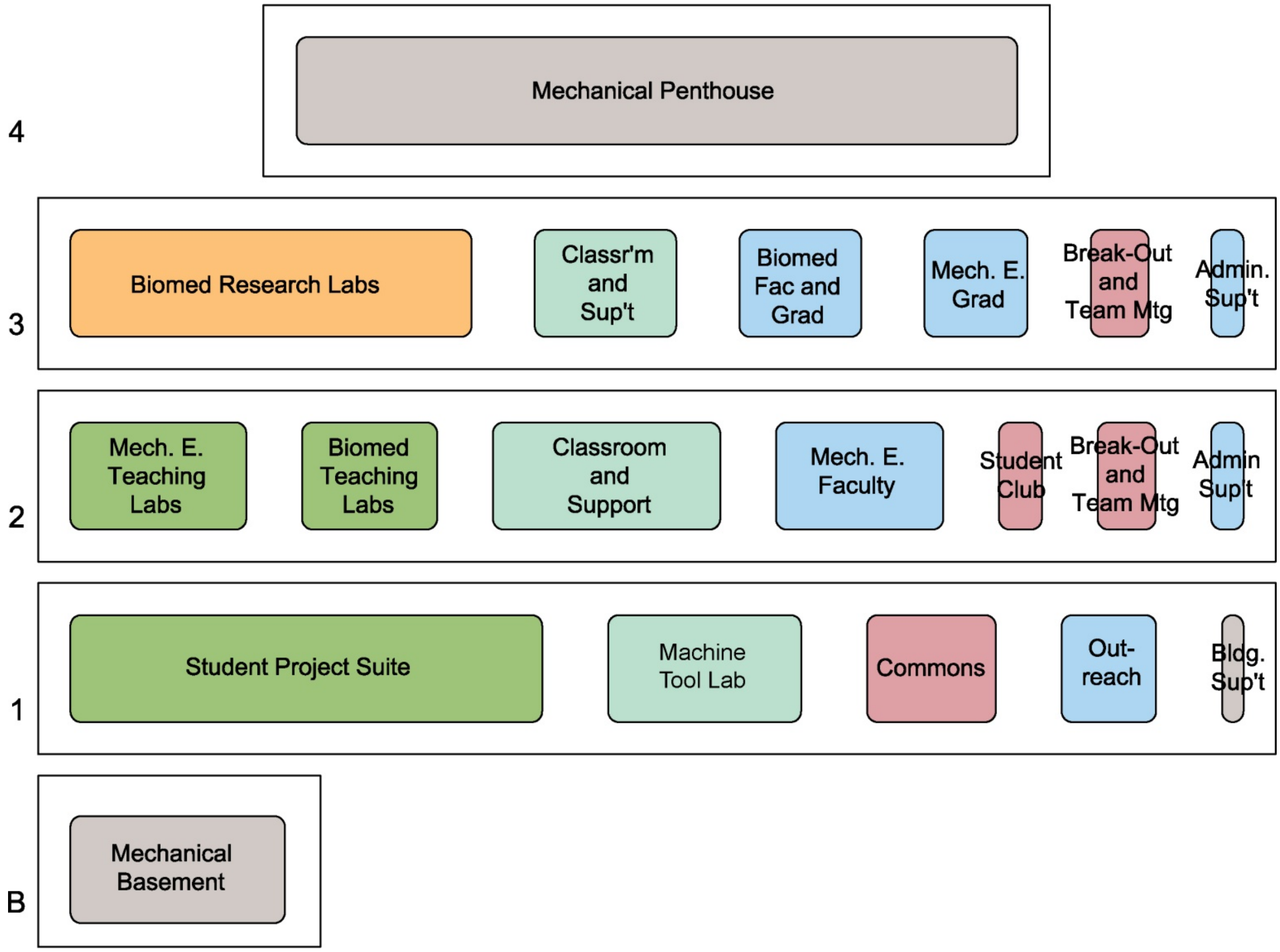


Diagram of Key Spaces

Stacking Diagrams



SITE SELECTION

Existing Conditions

The existing machine tool lab building is situated on a relatively flat and level site with the primary campus circulation road, Long Road, to the north. To the east the site is bounded by a service drive / pedestrian corridor, Beddington Road, which mainly provides vehicle service access to the ESRB building which is located to the east. The site is bounded to the south by the extension ofBeddington and more importantly by Cloke Plaza and its surrounding greenspace. This area is the central feature of the Engineering district. A small sidewalk runs along the west side of the building between it and Boardman Hall.

Mature vegetation (Spruce, Pine, and Pin Oak) is found between the building and Long Road. Some street trees exist along Beddington Road on the ESRB side of the road. A mature stand of Pines is located on the south side of the building between it and Cloke Plaza.

Sidewalks and streets are asphalt construction and in generally poor condition. A variety of curb material is used on campus. There are no seating areas located on the site including Cloke Plaza although a picnic table is located in the Pine stand between the MTL and Cloke.

Site Inventory Photographs are included below.

Looking North Between Boardman and Machine Tool Lab – Close to Crosby

Existing Conditions

View of Boardman and Parking/Service Area from Sidewalk – Mid Way along MTL

Looking North Between Boardman and Machine Tool Lab – Mid Lab

Existing Conditions

Looking South to Crosby Between MTL and Boardman – From Close to Long Road

Looking East Up Long Road with MTL – MTL on Right

Existing Conditions

Looking South down Beddington to Cloke Plaza Between MTL and ESRB – MTL on Right

Looking North Up Beddington to Long – MTL on Left

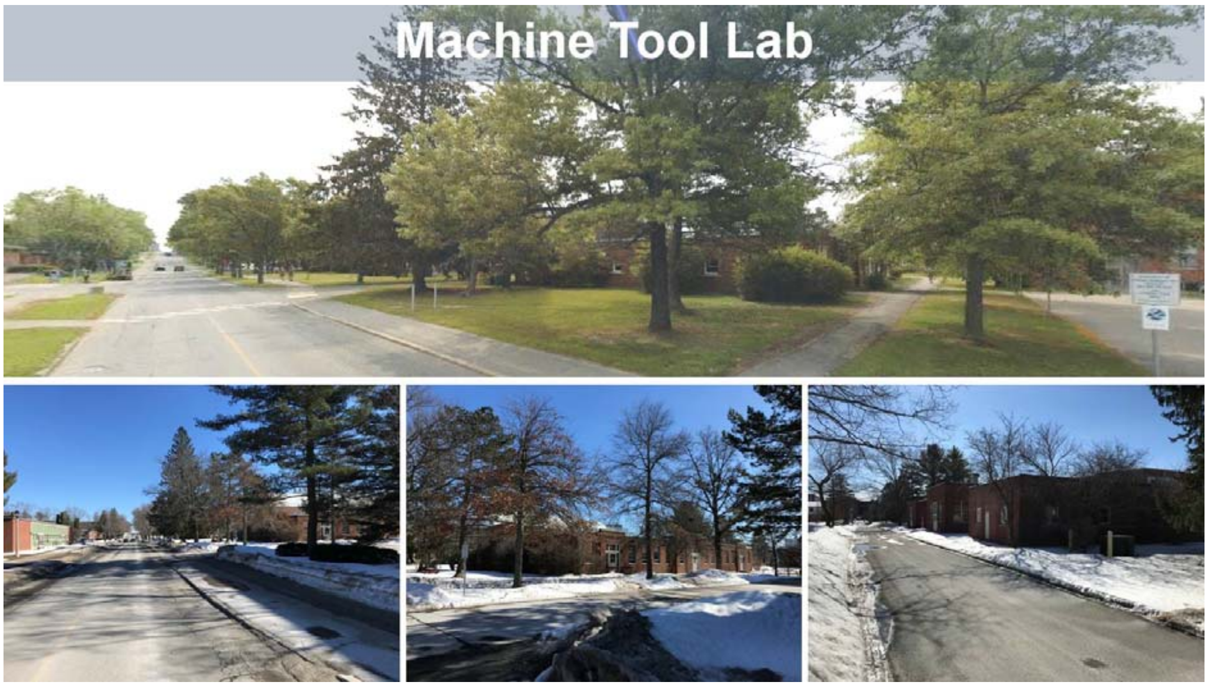
Existing Conditions

Looking North Up Beddington to Long from Cloke Plaza

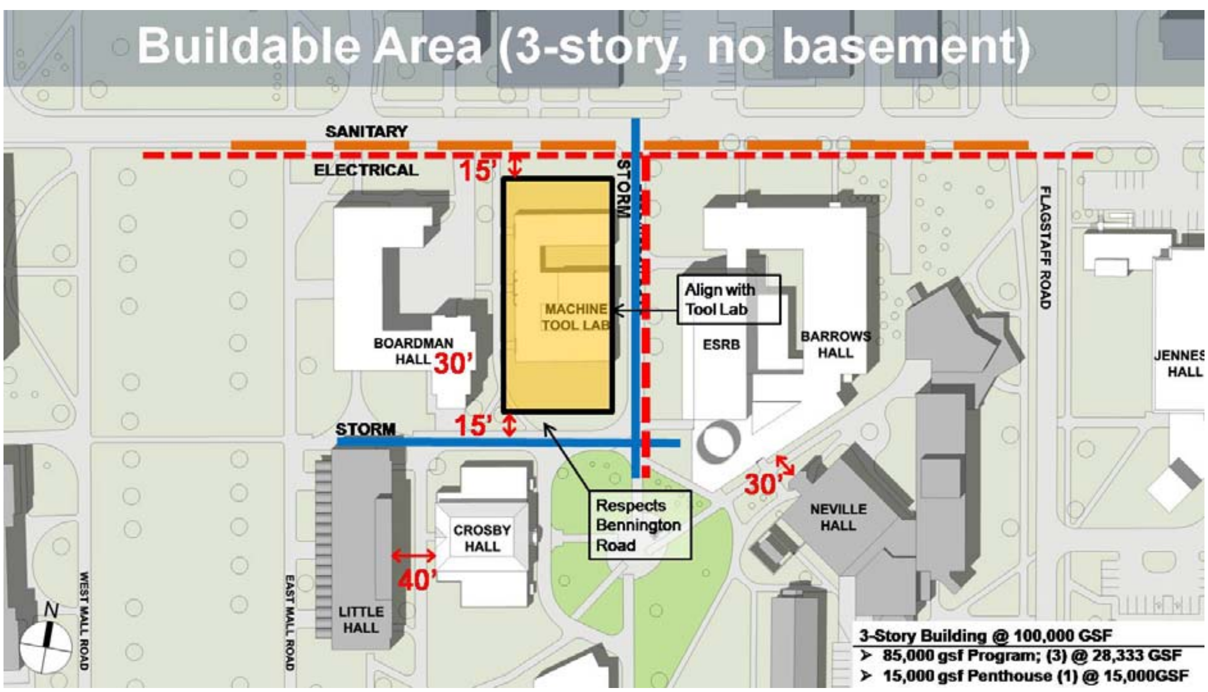
Typical Pedestrian Lighting and Signage in the District

Analysis of Selected Site

Following a point-by-point analysis of the site and test-fit building massing studies, the Building Committee chose the Machine Tool Lab site for the new Engineering Education and Design Center (EEDC). The following studies were reviewed during the site selection process.

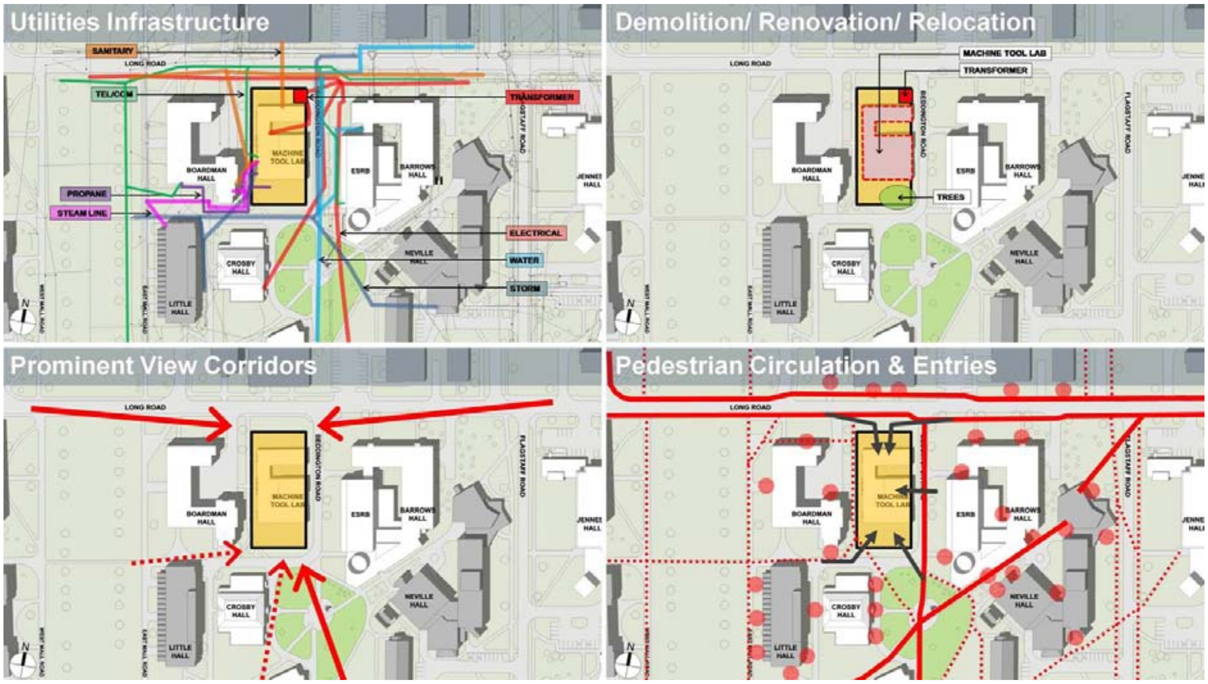


Site photography

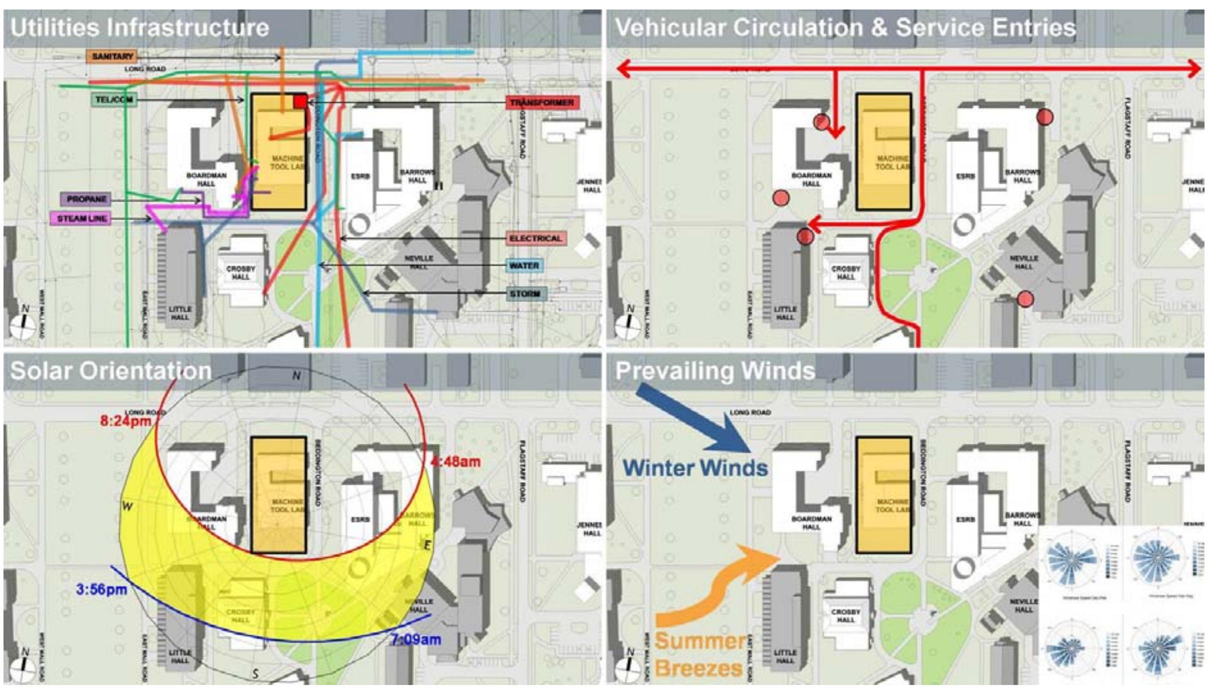


Analysis of the site's buildable area

Analysis of Selected Site

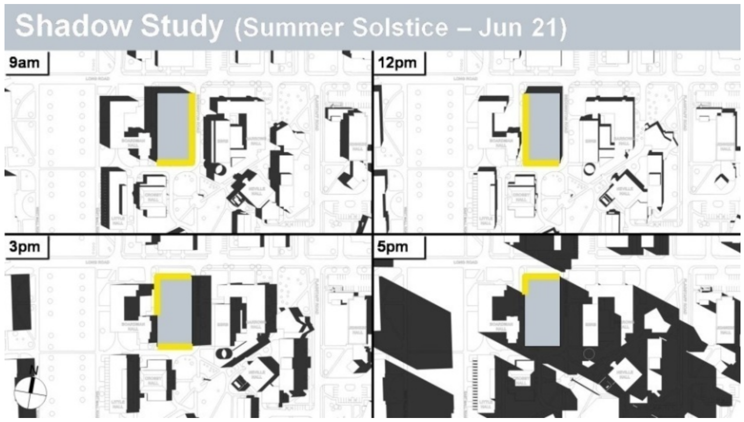


Analysis of the site's existing utilities, required demolition of the existing Machine Tool Lab building, views, pedestrian circulation, and adjacent building entries

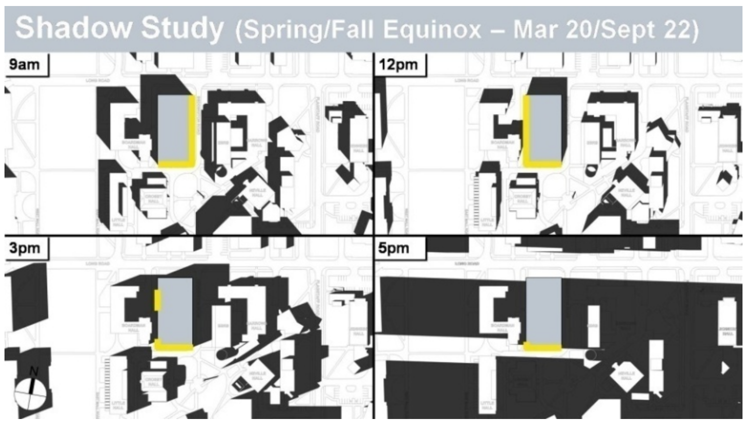


Analysis of vehicular circulation/access, service entries adjacent to the site, solar orientation, and prevailing winds

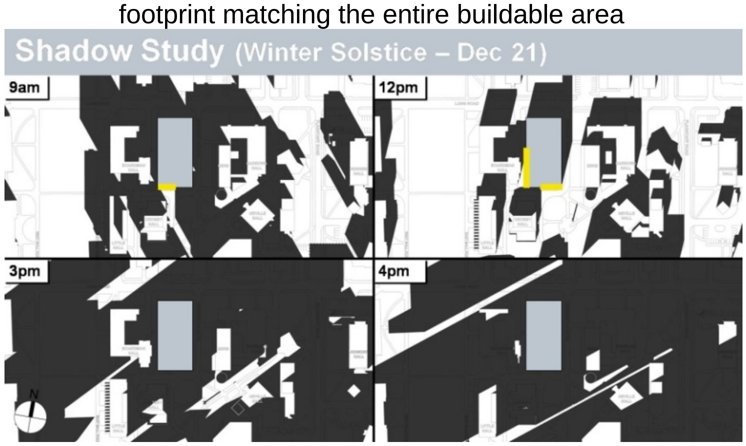
Analysis of Selected Site



Shadow studies on the site at the Summer Solstice, assuming a four story building massing (3 floors plus a penthouse) with a footprint matching the entire buildable area



Shadow studies on the site at the Spring/Fall Equinox, assuming a four story building massing (3 floors plus a penthouse) with a footprint matching the entire buildable area



Shadow studies on the site at the Winter Solstice, assuming a four story building massing (3 floors plus a penthouse) with a footprint matching the entire buildable area

Massing Options on Selected Site

Two fundamental massing options were explored for the EEDC on the site, each having two alternatives.

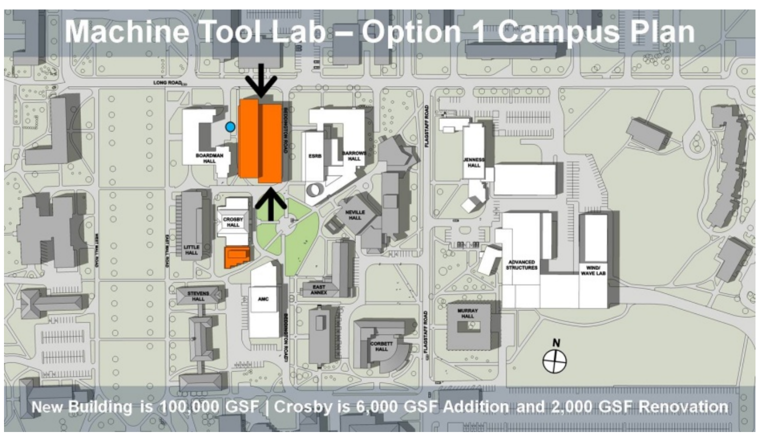
Option 1: Rectilinear EEDC Massing

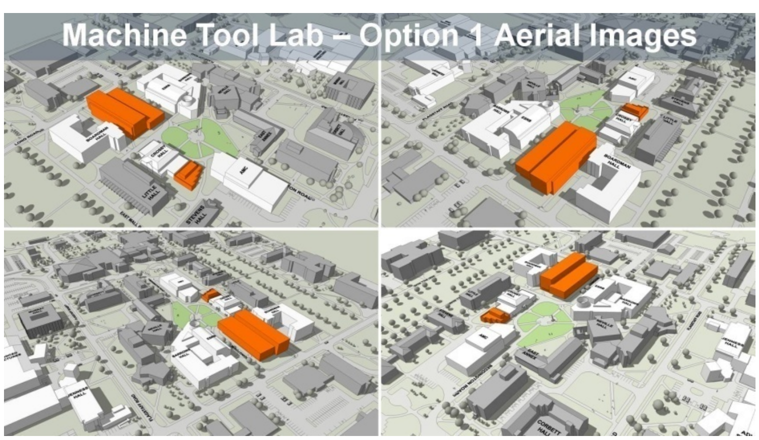
Option 1 proposed a 100,000 GSF, three-story EEDC on the Machine Tool lab site with the Machine Tool Lab program accommodated at Crosby Hall by a 6,000 GSF addition and 2,000 GSF interior renovations. This approach was also studied with an Option 1A that proposed a 108,000 GSF, three-story EEDC on the Machine Tool Lab site that would accommodate both the new program and the Machine Tool Lab program.

Option 2: Sculptural EEDC Massing

Option 2 proposed a 100,000 GSF, three-story EEDC on the Machine Tool lab site with the Machine Tool Lab program accommodated at Crosby Hall by a 6,000 GSF addition and 2,000 GSF interior renovations. This approach was also studied with an Option 2A that proposed a 108,000 GSF, three-story EEDC on the Machine Tool Lab site that would accommodate both the new program and the Machine Tool Lab program.

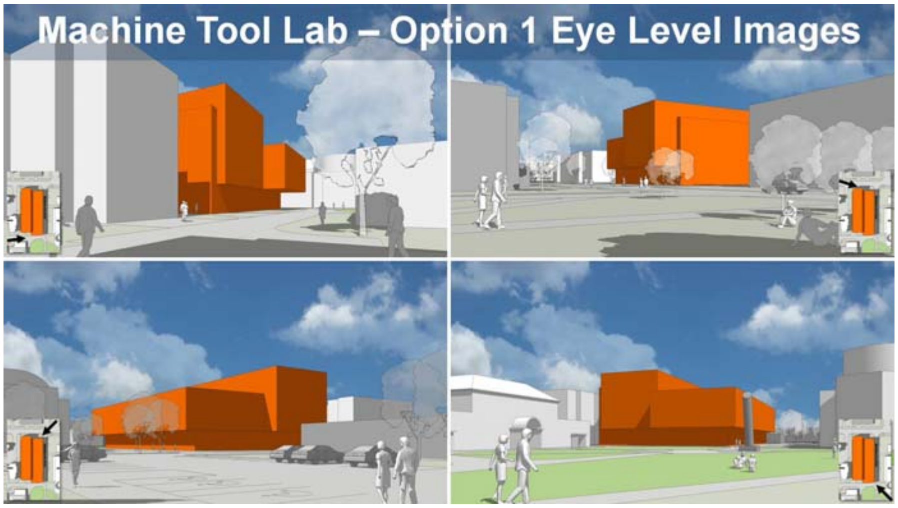
Option 1: Rectilinear EEDC Massing with Crosby Hall Addition and Renovation

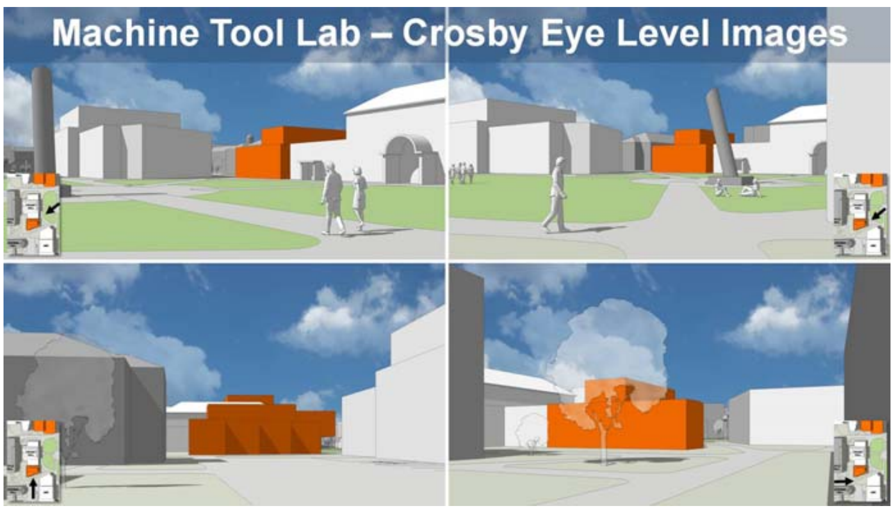


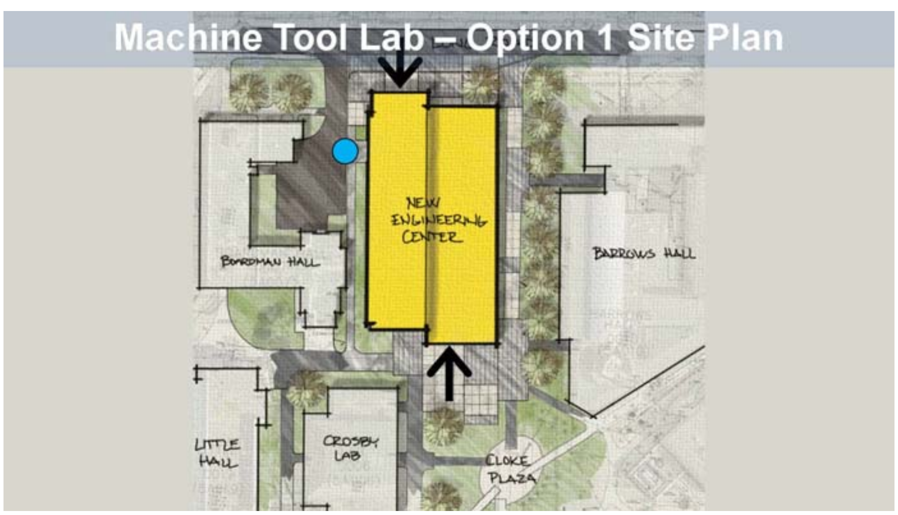


Massing Options on Selected Site

Option 1: Rectilinear EEDC Massing with Crosby Hall Addition and Renovation

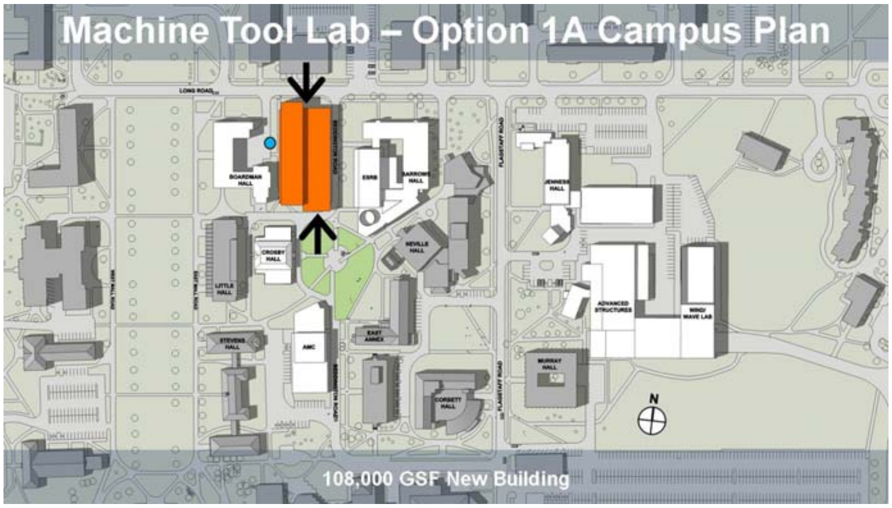


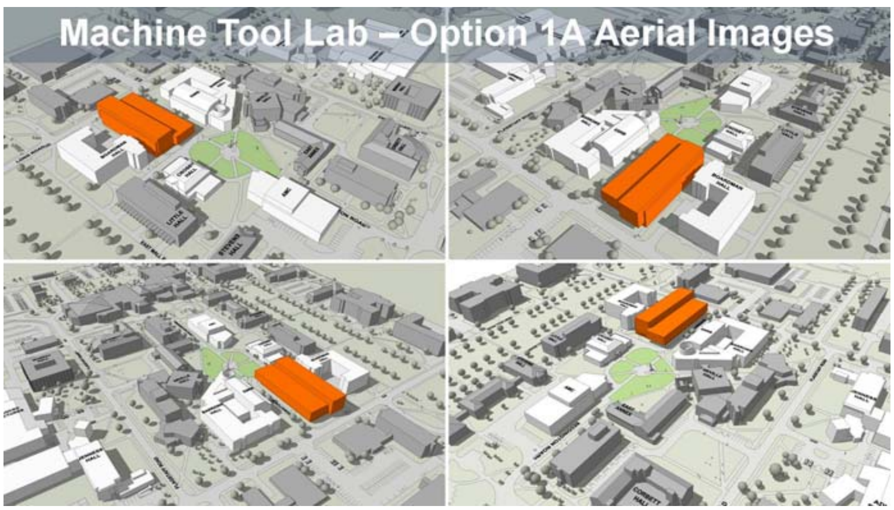


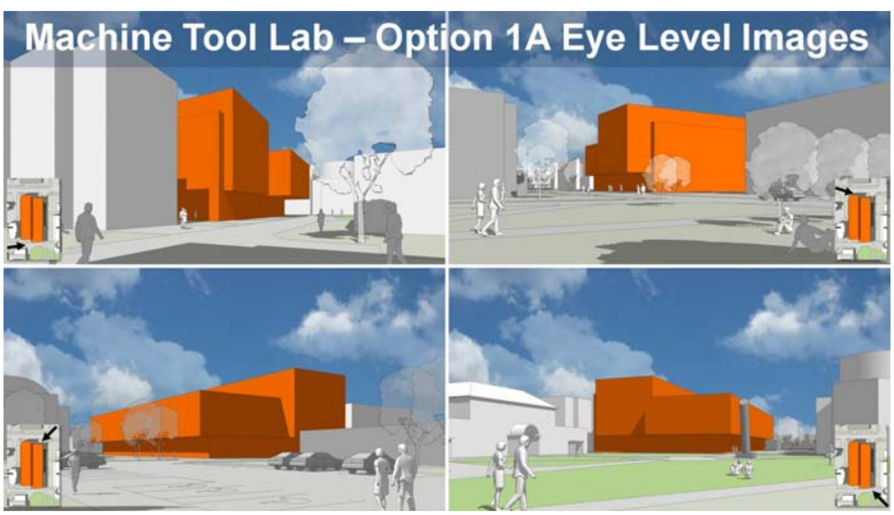


Massing Options on Selected Site

Option 1A: Rectilinear EEDC Massing with NO Crosby Hall Addition and Renovation

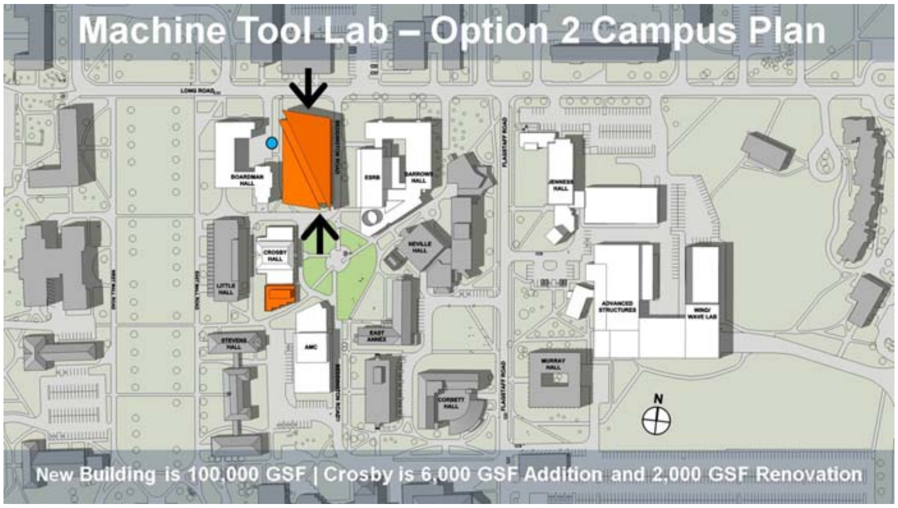


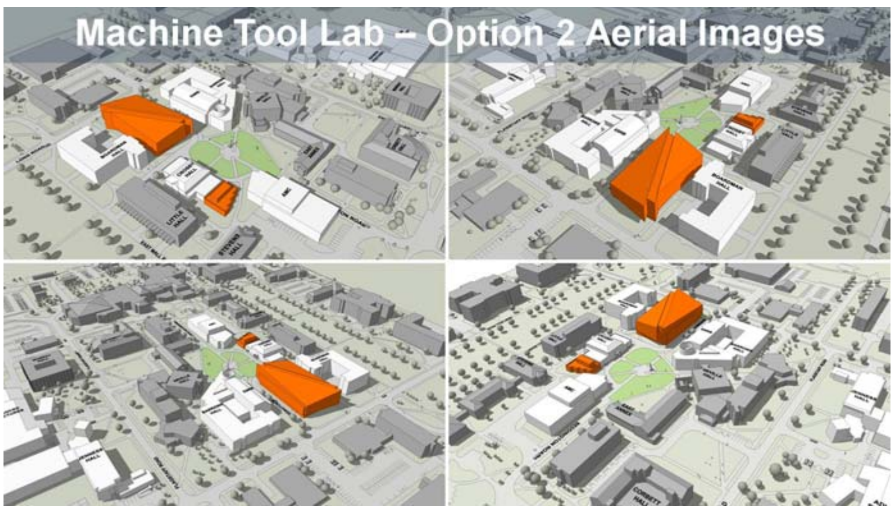


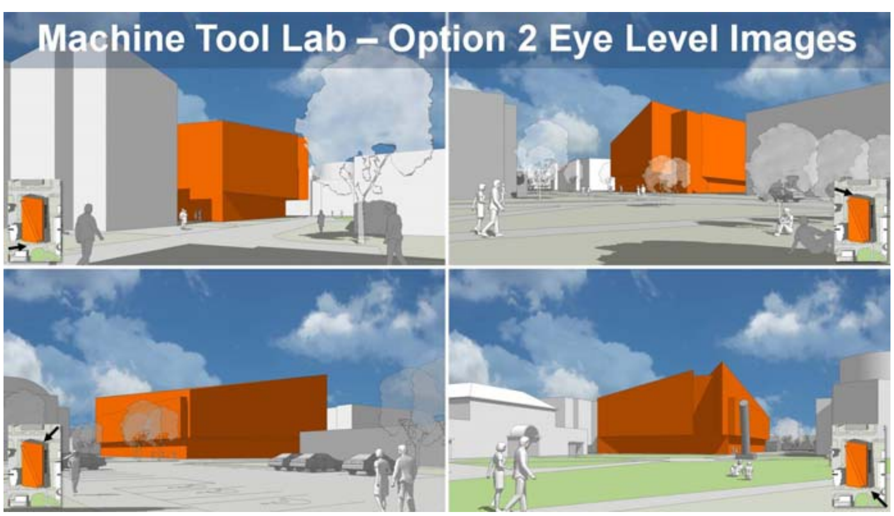


Massing Options on Selected Site

Option 2: Sculptural EEDC Massing with Crosby Hall Addition and Renovation

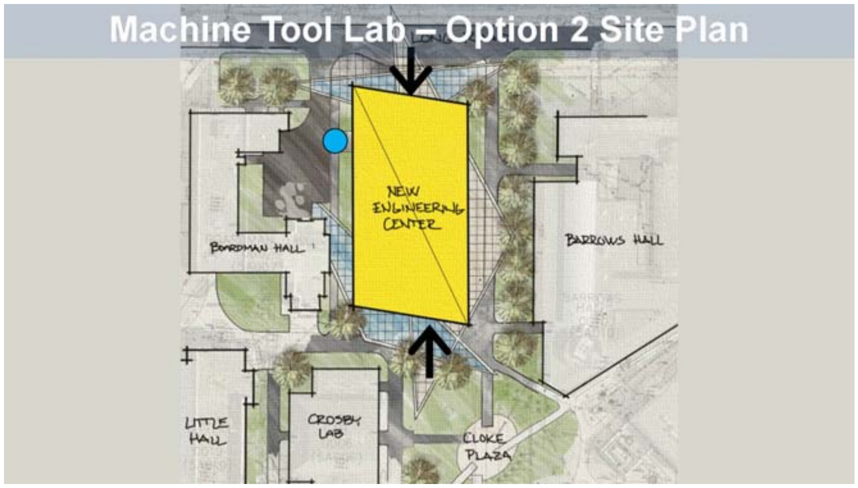




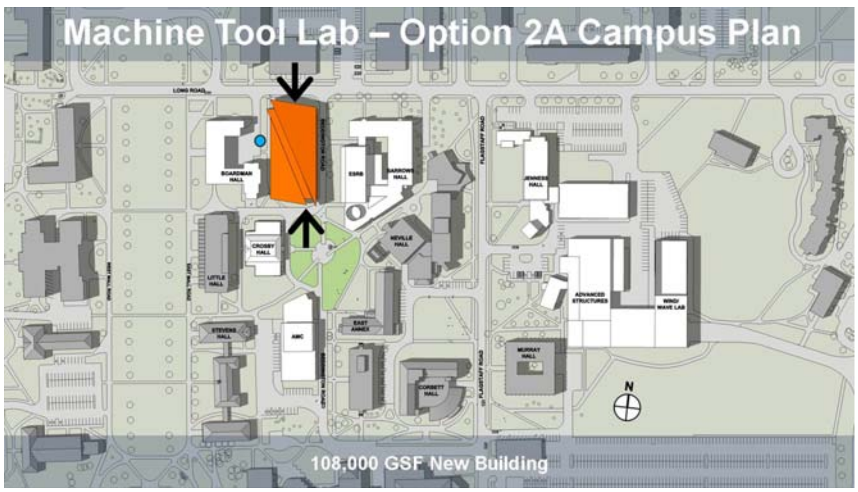


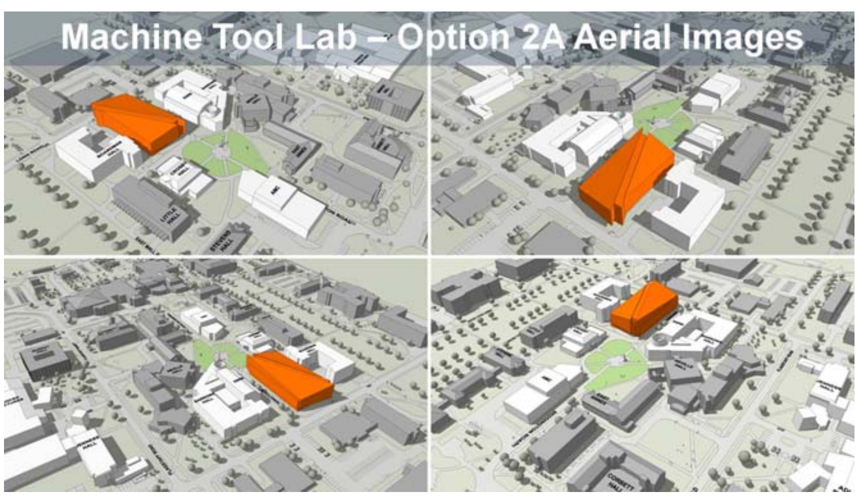
Massing Options on Selected Site

Option 2: Sculptural EEDC Massing with Crosby Hall Addition and Renovation



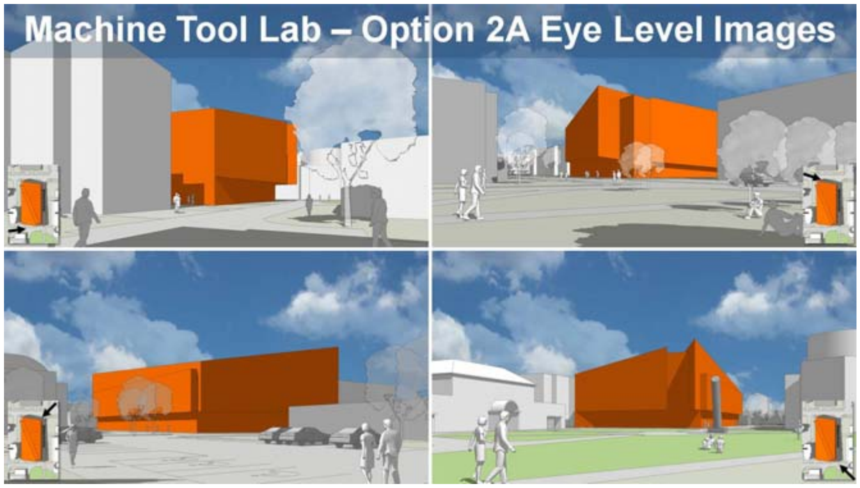
Option 2A: Sculptural EEDC Massing with NO Crosby Hall Addition and Renovation





Massing Options on Selected Site

Option 2A: Sculptural EEDC Massing with NO Crosby Hall Addition and Renovation

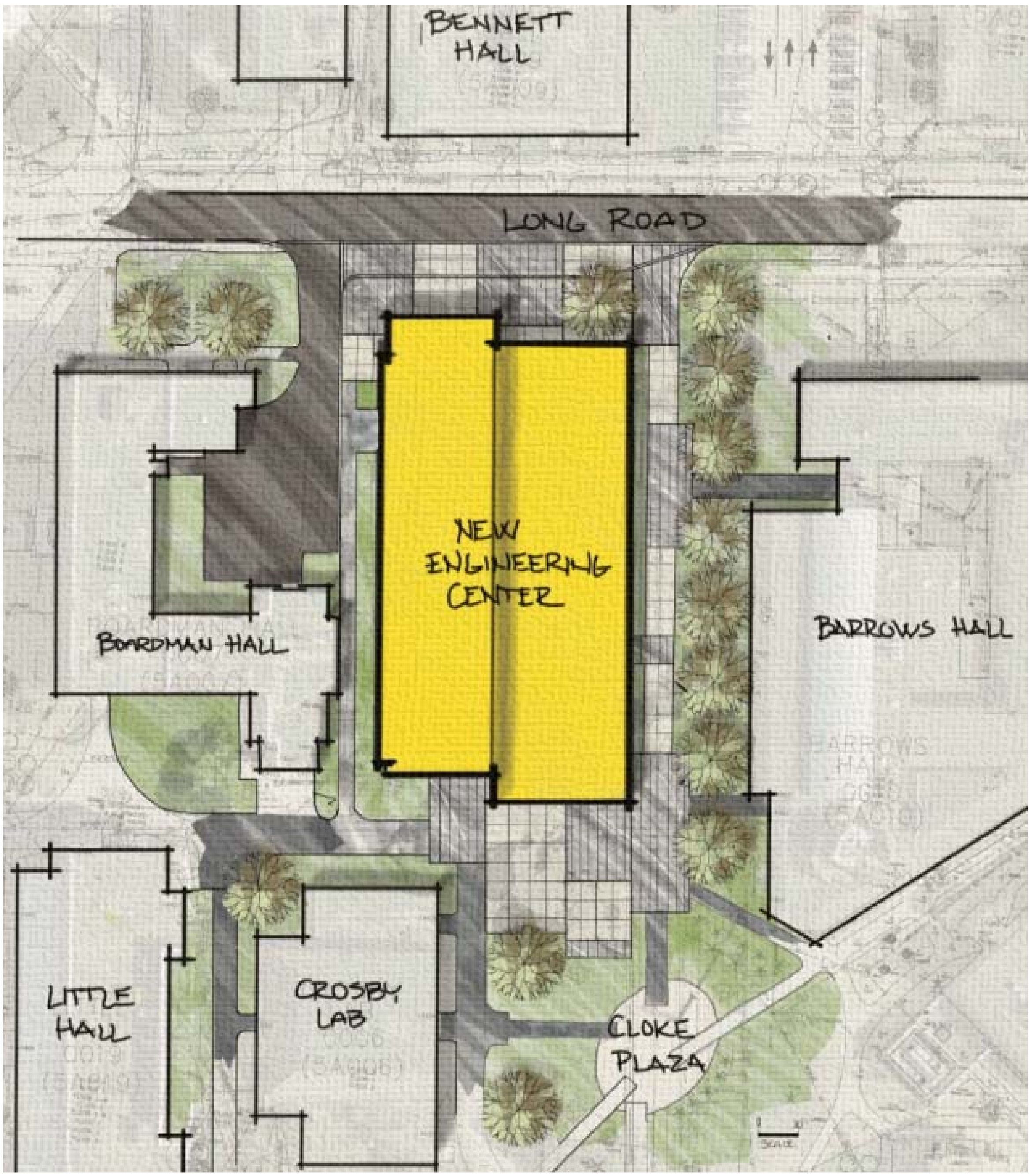


Landscape Design Issues

Mandatory Design Elements
Bus Drop for 1 bus
Maintain service to Barrows ESBB
NEC service from Boardman
Snow storage areas

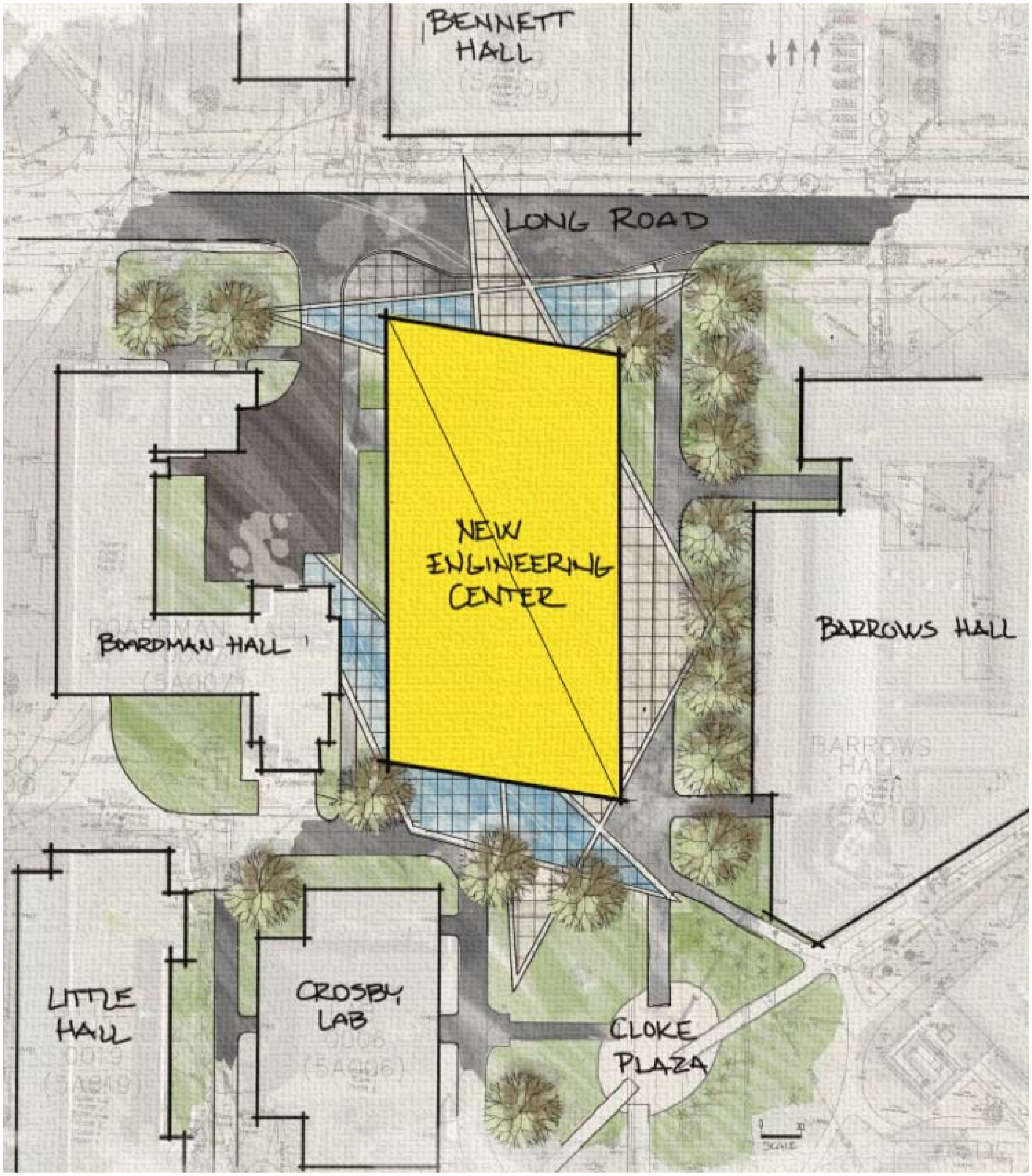
Recommended Design Elements
Pedestrian Seating
Strong Pedestrian Connection to Cloke
Outdoor Work Space
Strong Useable Entry Plaza Space
Human Scale Elements – Trees, bollards, etc
Bicycle Storage
Granite Curb
Concrete/Paver Walks

Rectilinear Option



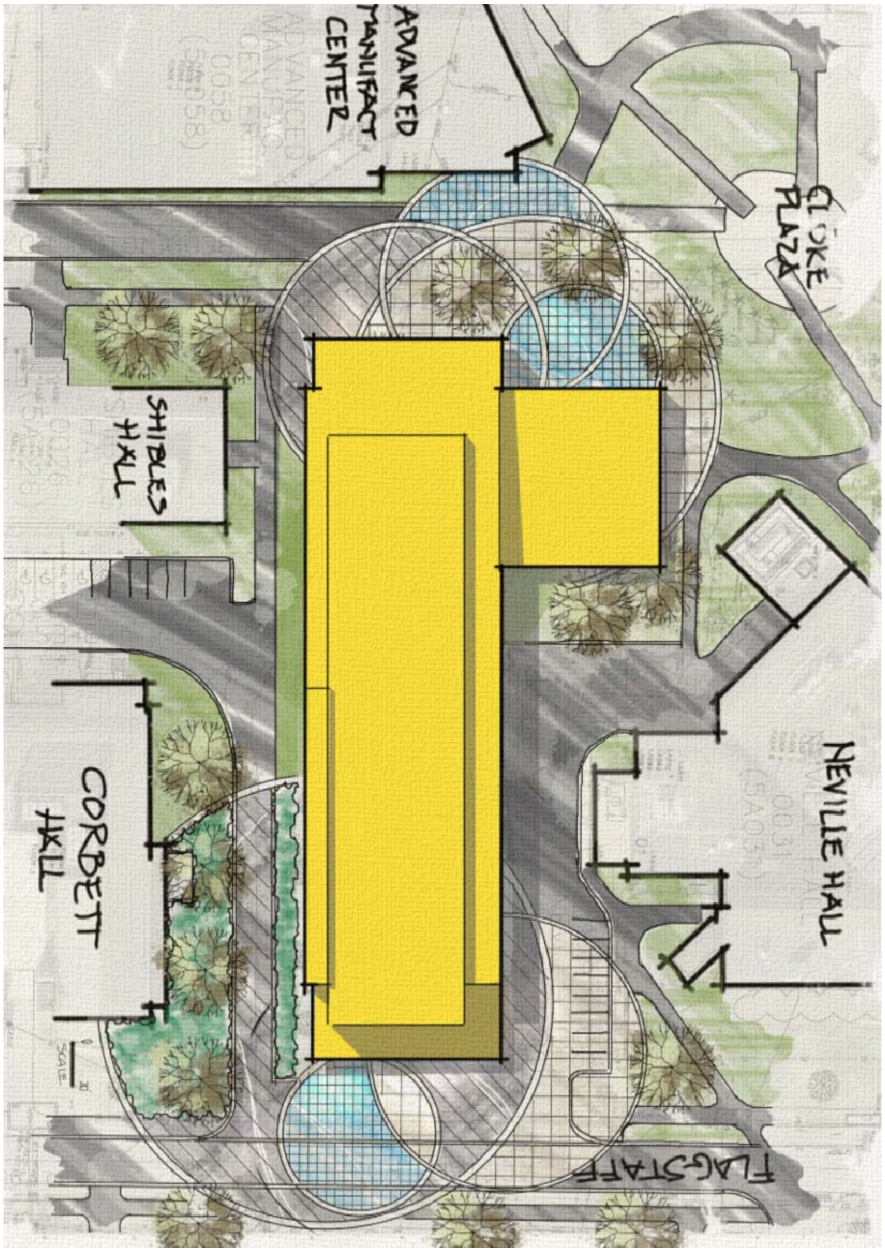
Landscape Design Issues

Angular Option



Landscape Design Issues

Radial Option (Annex site shown but could be adapted to MTL)



Landscape Design Issues

Removals

The MTL building will need to be removed as a first step. The building has many associated sidewalks and doorways that would be removed. Adjacent to the building on one side is a paved area known as Beddingtion road. That road would be removed as part of construction. On the other side of the building to the southwest is a parking lot and access road associated with Boardman Hall. That paved area will be disrupted during construction. There are various amounts of vegetation that need to be removed as part of this project. Grading/soil removals are noted in the grading section. Utility removals are noted in the utility section.

Paving

Plazas and walks will be constructed with 6” thick cast-in-place concrete (3500 psi with air entrainment and salt guard)reinforced with one (1) mat of #4 rebar set 12” o/c each way on an 18” thick (min.) layer of compacted granular base or precast pavers or perhaps a mixture of both.

Roads and parking lots will be constructed with “full depth” hot mix asphalt (HMA) pavement. The “full depth” HMA pavement section consists of a 1-1/2” thick (min.) surface course (9.5mm Superpave), a 2-1/2” thick (min.) binder course (19.5 mm Superpave), a 6” thick (min.) layer of compacted granular base material and an 18” thick (min.) layer of compacted granular sub-base material. Pavement striping and pavement markings will be provided in the on circulation areas that require additional directional measures. Striping will be white, yellow and blue as appropriate. Curbing is proposed. At this time all curbing is proposed at 5” wide by 18” tall granite curbing that will have a 6” reveal.

Grading

The site currently is relatively flat. Grading will be minimal and will be designed to manage stormwater runoff. It is anticipated that some over excavation will be needed to remove soft clay material and replace it with structural fill material to support a building of this size. More information will be available upon the completion of the geotechnical investigation.

Utilities

The utilities are an important part of this project as the new building will need service and existing infrastructure will need to be replaced or relocated to optimize the site. Each utility is described below.

- Steam
  - The steam pit to Boardman is nearly impacted but can probably remain.
  - Per the university , A new steam pit will be placed in long road. A service will come from that pit.
- Electric/Communications
  - no electric feed is displaced by the proposed building other than the one for the existing building to be removed.
  - A new service and A new transformer will be needed.

Landscape Design Issues

- No telecommunications are displaced but an old abandon duct bank lies under the proposed building.
- A new telecommunication service connection is available nearby.
- Per the university there is an additional electrical cost provided to us at $200k.

- Water
  - Along with the existing building service, there is a water main along Beddington road that needs to be relocated as it is impacted by the proposed building. A new domestic and fire service line will need to be installed from the relocated line.
- Sanitary
  - A new service connection is needed for the building. Replacing the current one for the existing building. The connection is a short run.
  - There is a small relocation associated with the nearby Boardman hall
  - Down stream capacity may be an issue as the downstream pipes are old and have been connected with pipes of varying materials and connection types.
- Storm
  - Drainage along Beddington Road will be displaced. That line is also used as a cross connect from other building and will need to be relocated.
  - Two new storm lines are proposed for roof drain connections and new pavement. Suitable connection points are very close.
  - Downstream capacity does not appear to be an issue but an investigation will be done. Treatment of the stormwater runoff should be considered.
- Gas
  - There is a 500 gal underground propane tank that needs to be relocated and reconnected to a nearby building.

Permitting requirements

The University of Maine has a Maine DEP SLODA permit. This project will impact that permit. The university should discuss impacts with their permitting consultant.

The current building falls within the Historic District on file with the Maine Historic Preservation commission (MHPC). Correspondence with the MHPC has not indicated any special measures are required.

Order of Magnitude Costs

The potential costs of each of the three site options were analyzed by both the Design Team and the University of Maine in order to better understand the total impact each site option would have on the overall project budget. All of the costs associated with each site including each of the 4 categories listed below will be borne by the EEDC project budget.

The following diagram provides a synopsis of the 4 categories, (A,B,C and D) that were examined and the subsequent totals for each site options.

SITE OPTIONS **ORDER OF MAGNITUDE COSTS**

	EEDC AT EAST ANNEX SITE EAST ANNEX REBUILD	EEDC AT MTL SITE MTL PROGRAM IN EEDC	EEDC AT MTL SITE MTL PROGRAM IN CROSBY RENOVATION & ADDITION
(A) DEMOLITION ABATEMENT INFRASTRUCTURE	$2,295,000	$210,000	$255,000
(B) RELOCATION TEMPORARY SITE	$25,000	$485,000	$35,000 Moving costs only: Assumes permanent location constructed prior to MTL demolition
(C) RELOCATION PERMANENT SITE	$9,900,000	$4,000,000	$6,350,000
(D) EEDC INFRASTRUCTURE COSTS	$1,130,000	$1,660,000	$1,660,000
(E) SUB TOTALS	$13,350,000	$6,355,000	$8,300,000

Category A includes costs associated with the demolition and abatement of the existing buildingcurrently located on each site. The costs include making each site pad ready as well as relocating existing infrastructure that must be maintained during and after construction that serves other areas of campus. Costs were relatively minor for the two Machine Tool Lab (MTL) options, however the relocation of utilities such as phone, IT, cable and television at the East Annex site required a substantial rerouting of these utilities at significant cost.

Category B includes costs associated with either a temporary building to house the existing program until a permanent building can be constructed or moving costs associated with moving occupants out of the existing buildings into a new location. The MTL site which relocates the MTL program in the EEDC requires the construction of a temporary building to house the MTL program prior to the EEDC being complete.

Category C includes costs associated with the design and construction of a new building to house the relocated program currently housed in the existing buildings. The East Annex program required the largest footprint and hence the greatest cost. The difference in cost between the MTL site options is due to the efficiency of adding additional program to the EEDC which will already contain much of the programmatic support needed that would otherwise have to be replicated as a separate standalone entity.

Category D includes costs associated with infrastructure specific to the two sites. Costs are higher at the MTL site due to the location of existing utilities serving and crossing the MTL site that will need to be moved and or modified.

NEXT STEPS

Schematic Design Expectations, Budget, & Schedule

Having achieved the goals of the Predesign phase, the project is now equipped with a final site to develop, a final program to design for and a final budget to design within. These three parameters are critical criteria for entering the subsequent design phases:

1. Schematic Design
2. Design Development
3. Construction Documents

Schematic Design

The first of these subsequent phases is Schematic Design. Schematic Design establishes the general scope, conceptual design, scale and relationships among the components of the project. The primary objective is to arrive at a clearly defined, feasible concept and to present it in a form that achieves client understanding and acceptance. The secondary objectives are to clarify the project program, explore the most promising design solutions, and provide a reasonable basis for analyzing the cost of the project.

Design Development

Schematic Design deliverables become the basis for the Design Development phase which focuses primarily on the refinement and coordination necessary for a fully integrated work of architecture. The primary purpose of design development is to further define and describe all important aspects of the project so that what remains is the formal documentation step of construction contract documents.

Construction Documents

This final phase of the design is the process of formal documentation of the project, setting forth in detail the requirements for construction of the work. In addition to drawings and specifications, the Architect assists the Owner with its development and preparation of bidding and procurement information and contracting requirements.

Schematic Design Expectations, Budget, & Schedule

Overall Schedule

The overall project schedule is targeting to be open for class at the start of the fall semester of 2022. In order to achieve that goal, the design team has proposed the following schedule:

UMAINE EEDC	**12/1/2017**	**8/12/2022**
Predesign	**12/1/2017**	4/27/2018
Peer Tours	1/8/2018	1/12/2018
Schematic Design	4/30/2018	9/17/2018
SD Estimating	8/3/2018	8/28/2018
SD Review with UM	9/3/2018	9/3/2018
Trustee Approval	9/17/2018	9/17/2018
Design Development	9/21/2018	2/26/2019
DD Estimating	3/1/2019	3/26/2019
DD Review with UM	4/1/2019	4/1/2019
Approval to Proceed	4/1/2019	4/9/2019
Construction Documents	4/9/2019	10/8/2019
CD Estimating	10/11/2019	11/12/2019
Issued for Bidding	11/15/2019	12/17/2019
Bidding	12/17/2019	2/18/2020
Contract Award	2/21/2020	3/3/2020
Initial Submittals	3/6/2020	6/9/2020
Construction	4/4/2020	4/5/2022
Closeout	4/5/2022	8/12/2022

Schematic Design Expectations, Budget, & Schedule

Schematic Design Schedule

The Schematic Design schedule is targeting a completion date that will allow the University to present the project for approval at the September 17, 2018 Board of Trustees meeting. The following is the proposed sequence and tentative agendas that will allow the Building Committee and the Design Team to reach that goal collectively:

Schematic Design	**4/30/2018**	**9/17/2018**
Owner:		
UM Identify Equipment List	4/30/2018	6/1/2018
UM Identify MTL Artifacts to Include in EEDC	4/30/2018	6/1/2018
Building Committee/Design Team Meetings:		
Owner Meeting #1 Tentative Topics:(2-3 hours, 1 day) • Review room adjacency diagram/plan vertical and horizontal • Review preliminary site orientation diagram (formal entrance, campus entrance, utility entrance and service entrance) • Building massing and section studies	5/16/2018	5/16/2018
Owner Meeting #2 Tentative Topics: (2-3 hours, 1 day) • Review first pass floor plan and site plan • Update program to reflect plan • MEP systems Initial discussion • Review MTL spatial layout • Revised building massing and section studies	6/6/2018	6/6/2018
Owner Meeting #3 tentative topics: (Day with user groups followed by Building Committee) • Second pass floor plan • First pass elevations and sections • Revised building massing and section studies • Discuss structural options • Review comparative MEP systems analysis	6/27/2018	6/27/2018
Owner Meeting #4 tentative topics: (2-3 hours, 1 day) • Approve floor plan • Approve elevations • Finalize MEP systems options to price • Discuss exterior materials	7/18/2018	7/18/2018
Estimating:		
Issue SD Deliverable to Estimator	7/27/2018	7/27/2018
SD Estimating	8/3/2018	8/28/2018
Schematic Design Approval:		
SD Final Review Meeting w/UM	9/3/2018	9/3/2018
BOT Approval	9/17/2018	9/17/2018

Schematic Design Expectations, Budget, & Schedule

Project Budget and Opinion of Probable Cost

While the Predesign phase has identified several parameters that influence the cost of the project including program and site selection, many more variables remain to be explored and defined. Therefore, the process of providing an Opinion of Probable Cost within which this project will proceed has been developed using assumptions that have influenced previous similar projects. During Schematic Design, many more of the unknown parameters of the design will be defined and so on through the subsequent phases until the project reaches the Construction Document phase and is ready for Contractor bidding. In order to assist with this process, the Design Team includes a third party estimator who will provide a revised construction level Opinion of Probable Cost at the close of each phase (see schedule above). The Opinion of Probable Cost for the Predesign phase suggests that the project should plan on a $55MM construction cost:

4212.00 | UM Engineering Education & Design Center	Date of this report: 4/27/2018
	Bid Date: Spring 2020
Orono, Maine	Proposed Occupancy Date: Fall 2022

Part A: Construction			
1	Existing Building Demolition Budget	$0	*Separate Budget*
2	Site Utility and Parking Budget	$1,592,000	*See Budget Breakdown*
3	Building Target Budget	$48,104,100	*See Budget Breakdown*
4	**Part A Subtotal**	**$49,696,000**	
5	Conceptual Level Estimate Contingency 10%	$4,969,600	
6	**Total Construction Cost**	**$54,665,600**	

As the design proceeds, the Building Committee and the Design Team will carefully evaluate decisions that impact the scope of the project, the quality of the project and the schedule of the project. These three items have a direct correlation with the construction value as well as the overall project cost.

The Schematic Design phase will commence immediately upon approval of this report by the University of Maine.

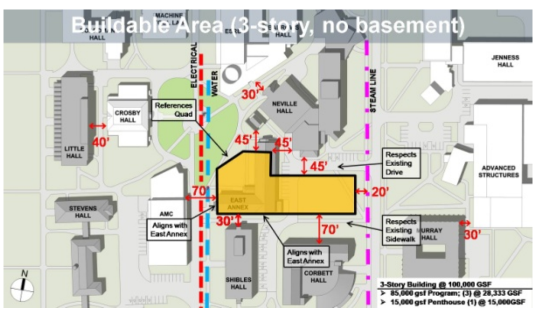
APPENDIX

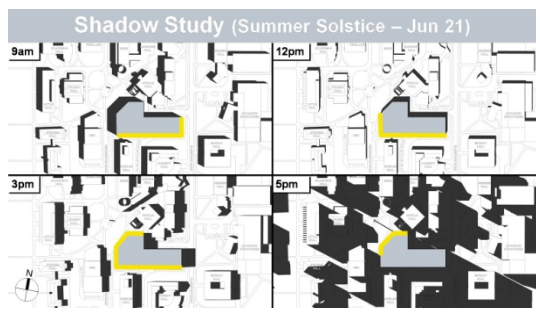
Additional Site Analysis

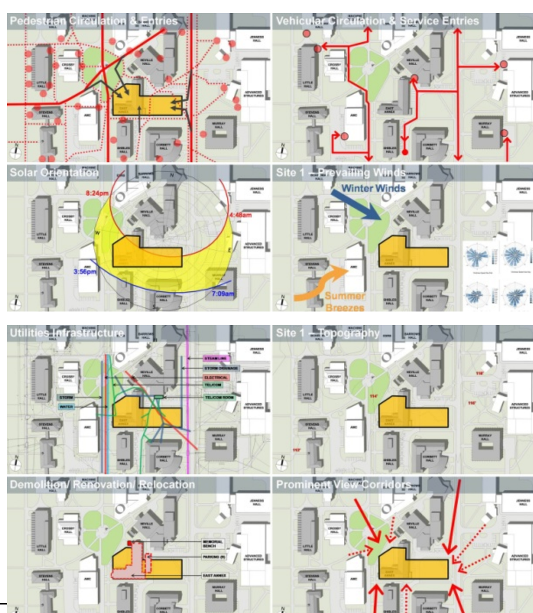
This section contains the following analyses and studies which were evaluated by the Building Committee during the site selection process:

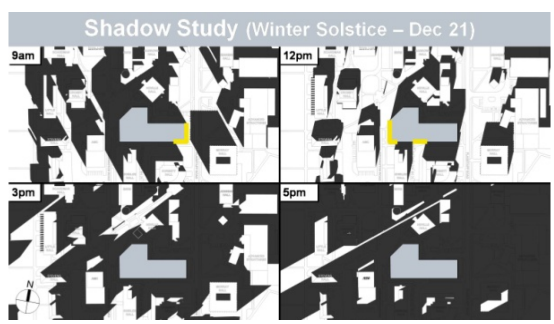
- Analysis of the East Annex site
- Test-fit building massing studies on the East Annex site
- Analysis of Crosby Hall site
- Test-fit building massing studies on the Crosby Hall site
- Campus analysis of 8 possible sites in the Engineering District

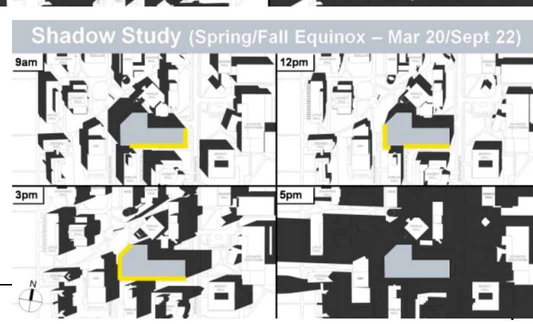
Analysis of East Annex Site







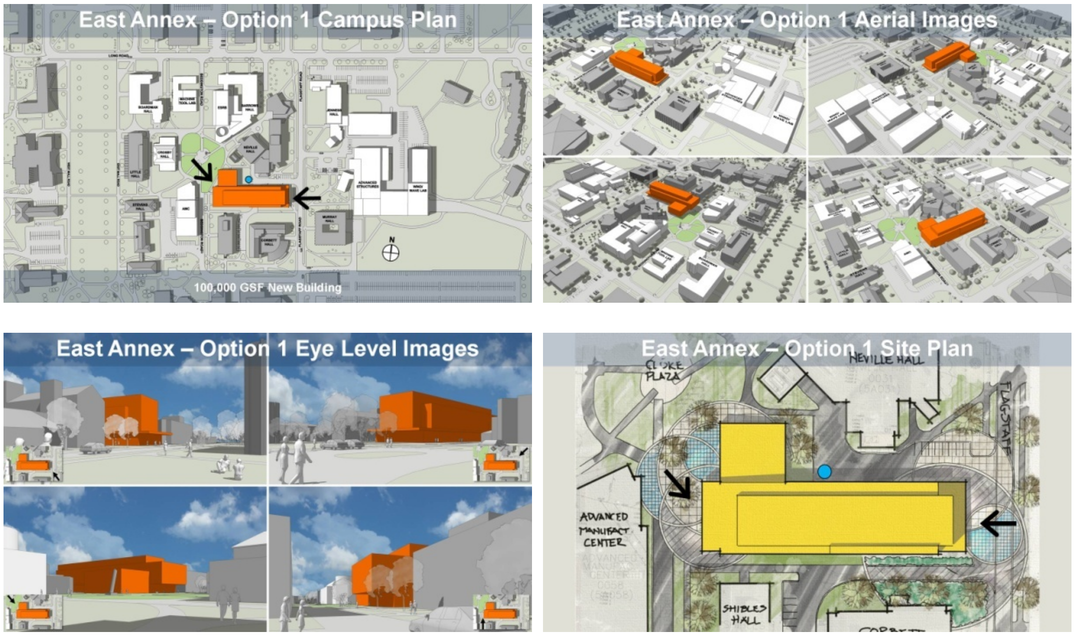




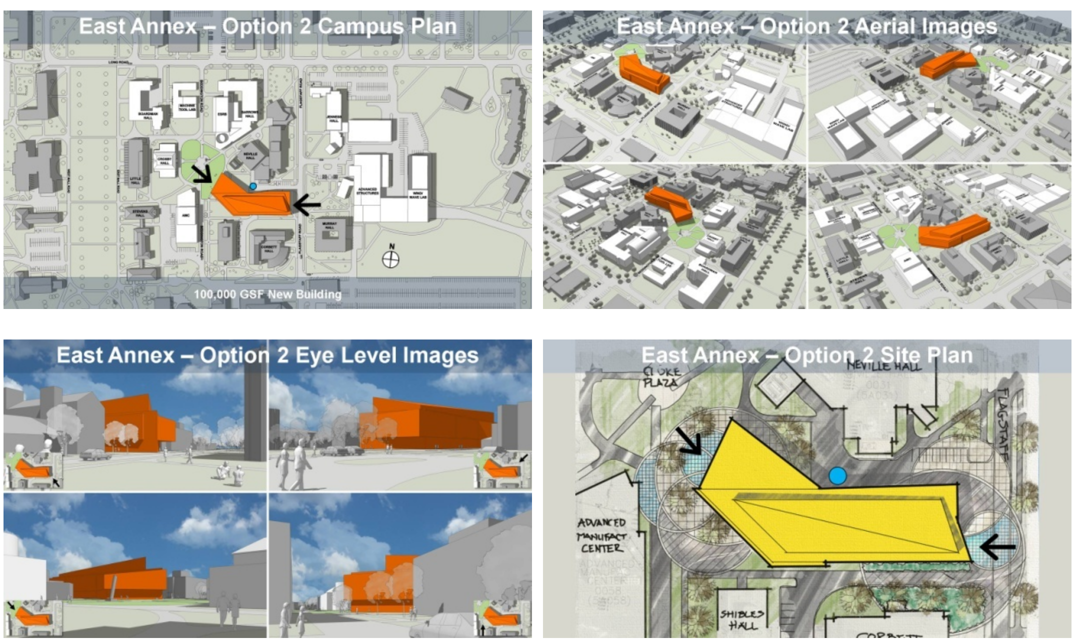
Additional Site Analysis

Test-fit Building Massing Studies on the East Annex Site

Option 1: Rectilinear EEDC Massing

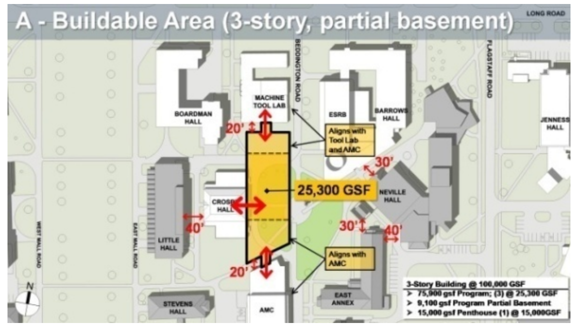


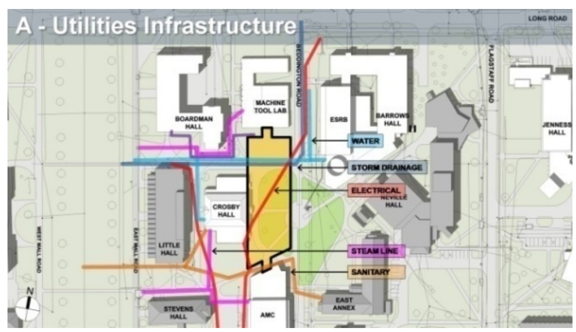
Option 2: Sculptural EEDC Massing

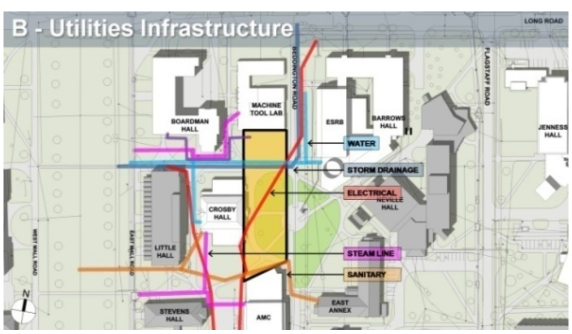


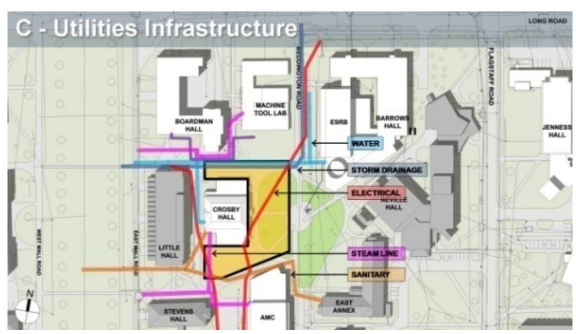
Additional Site Analysis

Analysis of Crosby Hall Site



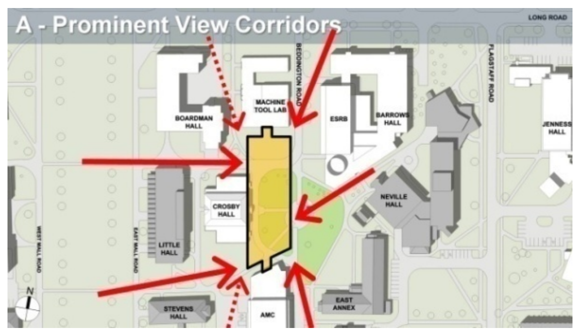


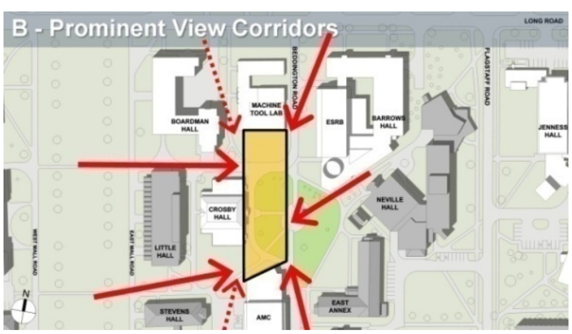


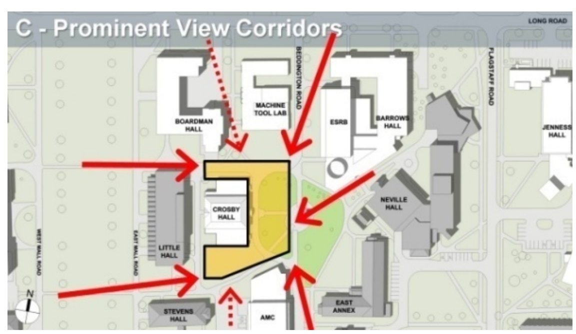


Additional Site Analysis

Analysis of Crosby Hall Site





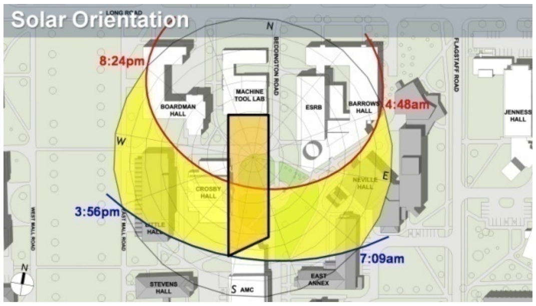


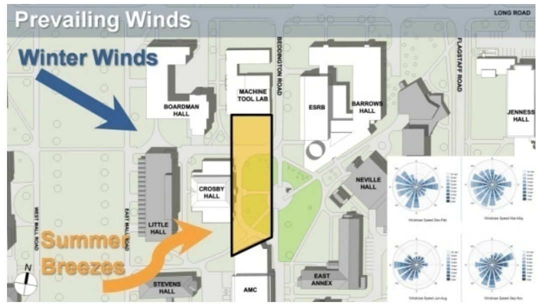
Additional Site Analysis

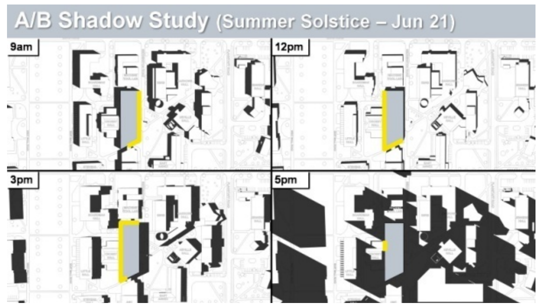
Analysis of Crosby Hall Site

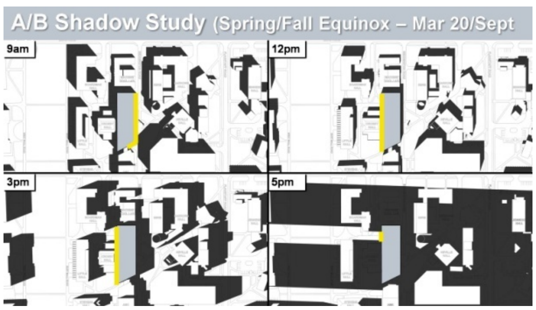
Additional Site Analysis

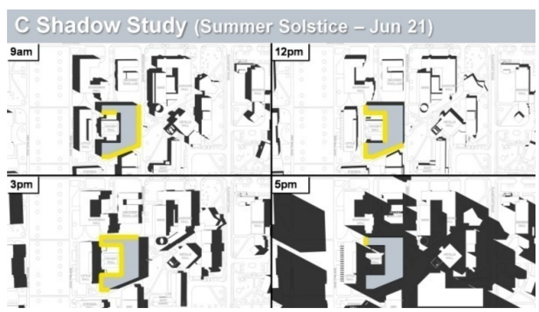
Analysis of Crosby Hall Site

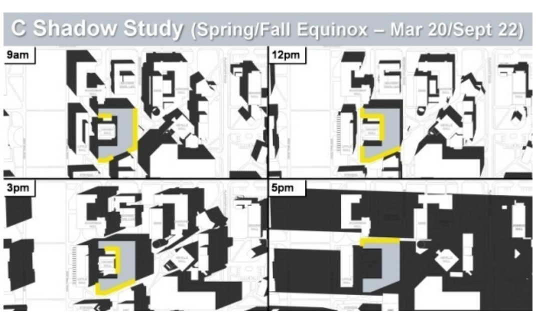






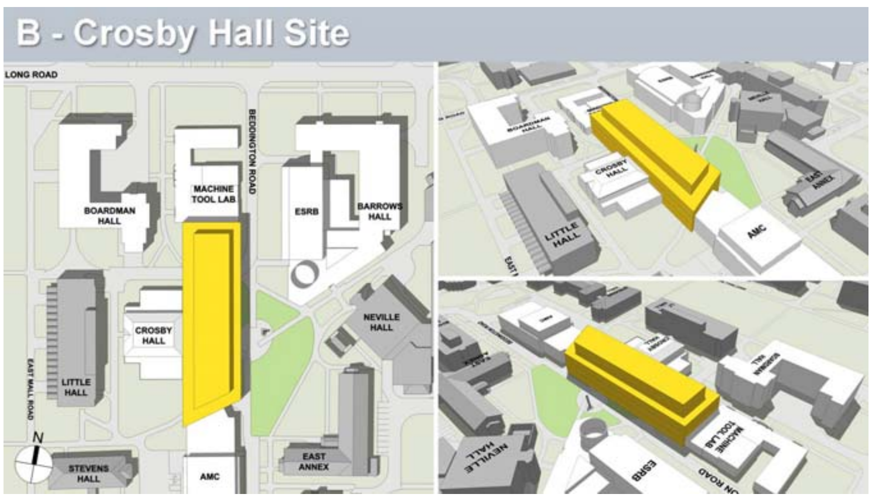


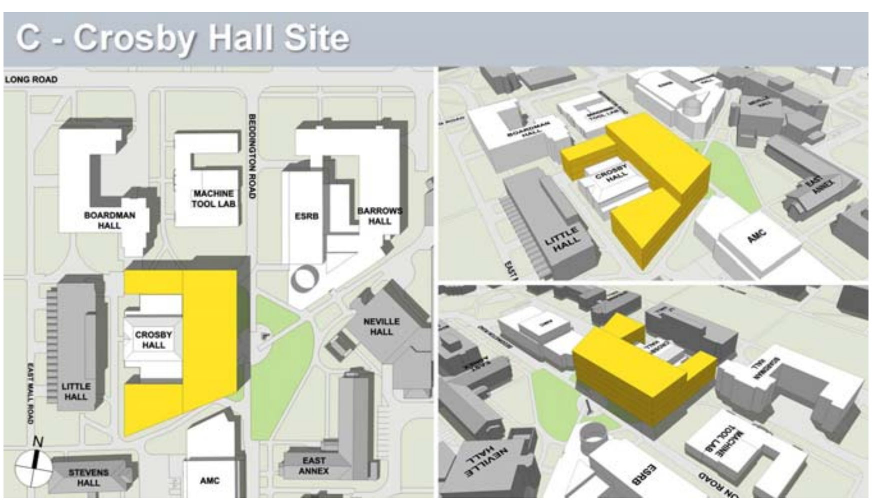




Additional Site Analysis

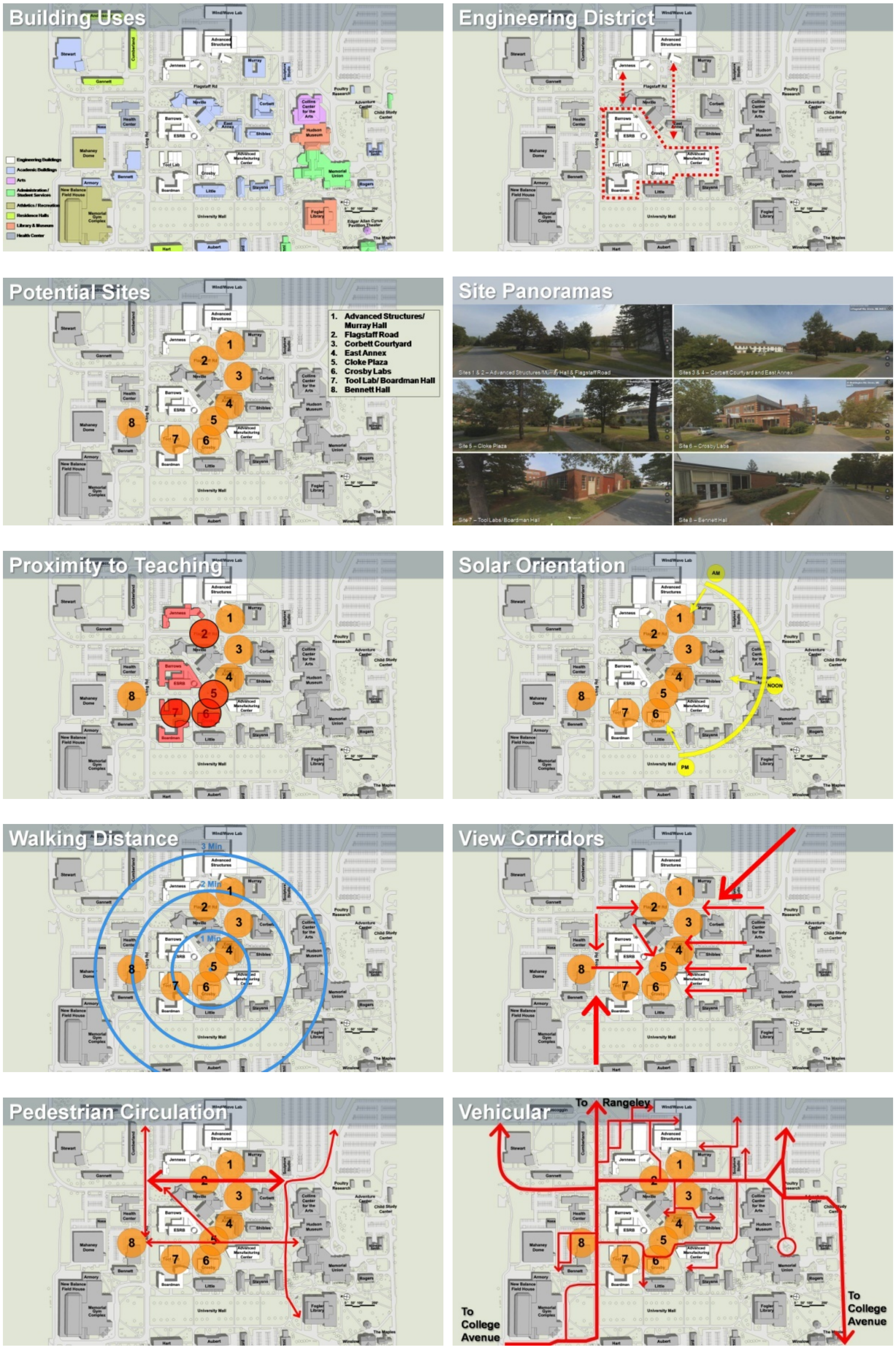
Test-fit Building Massing Studies on the Crosby Hall Site





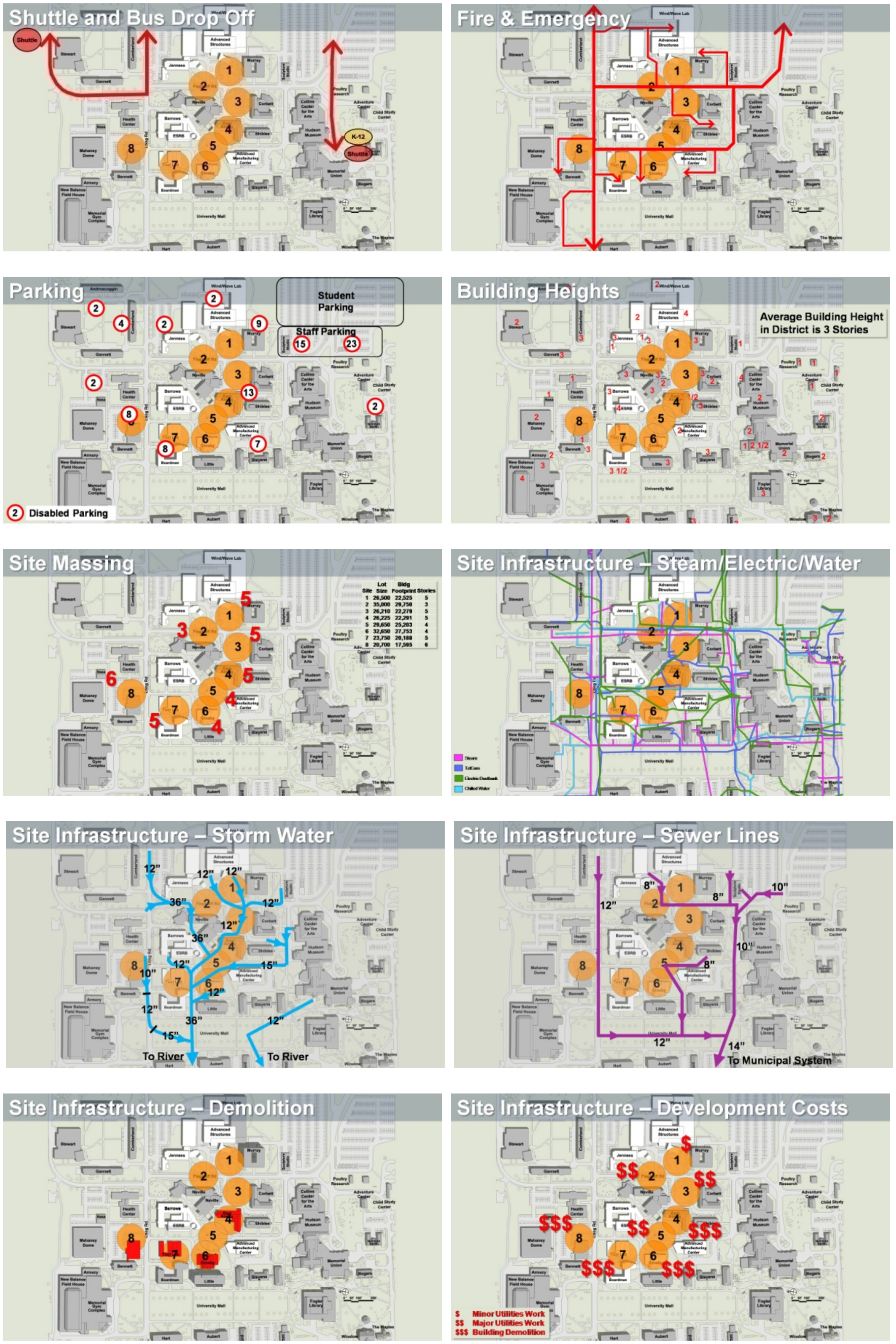
Additional Site Analysis

Campus Analysis of 8 Possible Sites in the Engineering District



Additional Site Analysis

Campus Analysis of 8 Possible Sites in the Engineering District



Appendix 5

Building and Site Estimate Assumptions

JOB #	2018.17 4/18/2018			UMO EEDC BUILDING / WBRC Architects CONCEPT				CM CONTRACTING METHOD
DIVISION		MTRL	EQPMT	SUB	LABOR	OTHER	TOTAL	ANALYSIS
1	General Conditions	8,500	59,100	109,000	834,000	977,260	**1,987,860**	**Building Pad Ready**
2	Existing Conditions			189,625			**189,625**	
3	Concrete	331,080		385,040	157,600		**873,720**	$159,850 building pad prep;
4	Masonry			1,091,960			**1,091,960**	building razing excluded;
5	Steel	2,366,705	205,000	407,000	701,250		**3,679,955**	civil behyond 5' excluded
6	Carpentry	40,315	20,000	570,825	92,000		**723,140**	laboratory equipment package excluded
7	Thermal/Moisture			1,274,360			**1,274,360**	
8	Doors/Glass			5,076,700			**5,076,700**	$427.27/sf & $47,854,250
9	Finish			3,488,690			**3,488,690**	
10	Specialties			127,125			**127,125**	
11	Equipment			2,419,500			**2,419,500**	**Building Project w/Razing Included**
12	Furnishings			350,000			**350,000**	
13	Special Construction			X			**0**	112,000 sf total project area =
14	Conveying Equipment			235,000			**235,000**	29,300 sf 1st +
21	Fire Suppression			440,405			**440,405**	34,000 sf 2nd + +
22	Plumbing			1,789,225			**1,789,225**	34,000 sf 3rd +
23	HVAC			8,247,410			**8,247,410**	14,700 sf penthouse
26	Electrical			4,357,100			**4,357,100**	exterior canopies-overhangs sf ignored
27	Communications			Div 26			**0**	civil behyond 5' excluded
28	Electronic Safety/Security			Div 26			**0**	laboratory equipment pacakge excluded
31	Earthwork			159,850	*bldg pad prep only*		**159,850**	
32	Exterior Improvements			X	*civil beyond 5' excluded*		**0**	$429.50/sf & $48,104,080
33	Utilities			X			**0**	
34	Transportation			X			**0**	
35	Waterway/Marine			X			**0**	**ALTERNATES**
41	Material Handling			X			**0**	
44	Pollution Control			X			**0**	
	SUBTOTAL	**2,746,600**	**284,100**	**30,718,815**	**1,784,850**	**977,260**	**36,511,625**	
5%	**Overhead & Profit**			CM contracting method assumed		1,825,585	**1,825,585**	
-1.25%	**Volume Adjustment**			project volume adjustment		-456,395	**-456,395**	
	Complexity & Phasing			not used			**0**	
12%	**Contingency**			Concept level cost contingency		4,381,395	**4,381,395**	
8%	**Market & Inflation**			8% inflation thru Q-1 2020		2,920,930	**2,920,930**	
2%	**Bonds & Insurance**					730,235	**730,235**	
1%	**CM design assist factor**			covers GMP requirement		365,120	**365,120**	
5%	**CM method adjust factor**			covers GMP requirement		1,825,585	**1,825,585**	
	TOTAL	**2,746,600**	**284,100**	**30,718,815**	**1,784,850**	**12,569,715**	**$48,104,080**	

JOB #	2018.17				UMO EEDC BUILDING				4/18/2018
	page 1								
					Div 1: General Conditions				
Section	**Description**	**Quantity/Unit**	**MTRL**	**EQPMNT**	**SUB**	**LABOR**	**OTHER**	**TOTAL**	**NOTES**
600	**Perf/Pay Bond**	Consol sht						**0**	
	Bldr's Risk	allowance					175,000	**175,000**	
	Building Permits	allowance					250,000	**250,000**	
1020	**Allowances**							**0**	
	Travel & Lodging	allowance						**0**	
1030	**Project Manager**	104wk/$1,750		full time		182,000	54,600	**236,600**	
	Supervision/FT	104wk/$1,750		full time		182,000	54,600	**236,600**	
	Super/Working	104wk/$1,575		full time		163,800	81,900	**245,700**	
	Clerk	104wk/$800		full time		83,200	24,960	**108,160**	
1045	**Cut/Patch**							**0**	
1050	**Design Engineering**							**0**	
	Field Engineering							**0**	
	Field Layout				10,000			**10,000**	
1170	**Safety Program**	writeoff					2,500	**2,500**	
	Safety Officer	104wk/$1500		full time		156,000	46,800	**202,800**	
1180	**Site Safety**	Super						**0**	
	Traffic Control	Div 31						**0**	
1340	**As Builts**	allowance			40,000			**40,000**	
	Shops & Submittals	Proj mgr/clerk						**0**	
1380	**Photographs**	lump	1,500			Super		**1,500**	
	Testing	Owner						**0**	
1430	**Mockups**					10,000		**10,000**	
1440	**Quality Control**	Super						**0**	
1505	**Mobilize/Closeout**	lump	2,500	2,500		2,500	1,250	**8,750**	
1510	**Temp Electrical**	allowance			15,000			**15,000**	
	Power	104w/$350					36,400	**36,400**	
	Lamping	allowance			3,500			**3,500**	
	Temporary Heat	allowance					100,000	**100,000**	
	Tenting & Heating	allowance					15,000	**15,000**	
	Snow Removal	allowance					5,000	**5,000**	
		Sub Total	**4,000**	**2,500**	**68,500**	**779,500**	**848,010**	**1,702,510**	

JOB #	2018.17			UMO EEDC BUILDING					4/18/2018
	page 2								
				Div 1: General Conditions					
Section	**Description**	**Quantity/Unit**	**MTRL**	**EQPMNT**	**SUB**	**LABOR**	**OTHER**	**TOTAL**	**NOTES**
1515	**Telephone**	104w/$150					15,600	**15,600**	
	Water	temporary			2,500			**2,500**	
	Sanitary	104w/$125					13,000	**13,000**	
	Fire Protection	lump	2,000			Super		**2,000**	
1525	**Staging**	allowance					30,000	**30,000**	
	Shoring	not required						**0**	
	Enclosures		1,500			1,500	750	**3,750**	
1530	**Barriers**	Div 31						**0**	
	Fences	1000 lf temp			10,000			**10,000**	
1540	**Security**	Owner						**0**	
1560	**Temp Controls**							**0**	
	Cleanup	104w/$500				52,000	15,600	**67,600**	
	Final Cleanup	112,000 sf			28,000			**28,000**	
	Dump Fees	20 ea $1,500	non-demo				30,000	**30,000**	
	Dust Control	Div 31						**0**	
	Surface Water	Div 31						**0**	
1570	**Traffic Control Off-Site**							**0**	
	Signals							**0**	
1580	**Signs/Project ID**	lump					3,000	**3,000**	
1590	**Field Offices**	104w/$100					10,400	**10,400**	
	Storage Trailers	104w/$100					10,400	**10,400**	**Div 1 Analysis**
1610	**Pickup Trucks**	104w/$300		41,600				**41,600**	
	Forktrucks/Lifts	lump		15,000				**15,000**	$19,115/wk
1620	**Storage/Protection**	lump	1,000			1,000	500	**2,500**	includes
1650	**Test/Balance**	see HVAC						**0**	bldr rist
									& permit
		Sub Total page 2	**4,500**	**56,600**	**40,500**	**54,500**	**129,250**	**285,350**	
		SubTotal page 1	**4,000**	**2,500**	**68,500**	**779,500**	**848,010**	**1,702,510**	$15,030/wk
									excludes
		TOTAL	**8,500**	**59,100**	**109,000**	**834,000**	**977,260**	**1,987,860**	bldr rist
									& permit

JOB #	2018.17		UMO EEDC BUILDING	CONCEPT			WORKSHEETS			(page 1)	
			4/18/2018								
Qnty	**X on**	**Units**	**Description**	**Mtrl**	**Eqpmt**	**Subcon**	**Labor**	**Other**	**TOTAL**	**SECT'N**	**DIVS'N**
				0		0	0		0		
			Div 1 - General Conditions	0		0	0		0		
			See backups	8,500	59,100	109,000	834,000	977,260	**1,987,860**	1,987,860	**1,987,860**
				0		0	0		0		
			Div 2 - Existing Conditions	0		0	0		0		
			Building Razing (slavage $$ value excluded)	0		0	0		0		
300,000	cf	$0.15	Existing building razing 20,000 sf & 1 floor assumed	0		45,000	0		45,000		
200	cy	$175	Foundation removal	0		35,000	0		35,000		
255	cy	$175	Slab removal	0		44,625	0		44,625		
200	cy	$25	Backfill @ removed foundations	0		5,000	0		5,000		
80	15 cy	$750	Cleanup & disposal (65% volume after salvaged items removed = 120 loads -40 = 80 net)	0		60,000	0		60,000	189,625	
			Total Div 2	**0**	**0**	**189,625**	**0**	**0**	**189,625**		**189,625**
				0		0	0		0		
			Div 3 - Concrete	0		0	0		0		
			Foundations	0		0	0		0		
250	$100	cy	Frost foundations 60#/cy	25,000		0	0		25,000		
50	$100	cy	Frost entry foundations 85#/cy	5,000		0	0		5,000		
110	$100	cy	Column footings 125#/cy	11,000		0	0		11,000		
25	$100	cy	Column piers 250#/cy	2,500		0	0		2,500		
10	$100	cy	Interior cmu strip footings 45#/cy	1,000		0	0		1,000		
25	$100	cy	Elevator pit & slab 85#/cy	2,500		0	0		2,500		
cy	460	$185	form material & labor	0		0	85,100		85,100	132,100	
			Slabs	0		0	0		0		
310	$110	cy	4" slab on grade 130#/cy (24,300 sf)	34,100		0	0		34,100		
125	$110	cy	8" thickened equipment slabs 100#/cy (5,000 sf)	13,750		0	0		13,750		
20	$110	cy	6" frost entry slabs 85#/cy	2,200		0	0		2,200		
735	$110	cy	5" slab on deck 6x6#8 mesh (68,000 sf)	80,850		0	0		80,850		
205	$110	cy	5 1/2" slab on deck mechanical penthouse 6x6#8 mesh (14,700 sf)	22,550		0	0		22,550		
40	$110	lf	C.i.p. trench drains	4,400		0	0		4,400		
500	$1.50	sf	Equipment pads	750		0	0		750		
hrs	250	$40	form material & labor	0		0	10,000		10,000		
5,040	lf	$2	sawcutting	0		10,080	0		10,080		
3	days	$1,400	concrete pumping	0		4,200	0		4,200		
29,300	sf	$1	finish on grade interior	0		29,300	0		29,300		
700	sf	$1.60	finish on grade exterior	0		1,120	0		1,120		
79,835	sf	$1.15	finish on deck	0		91,815	0		91,815		
10	$110.00	cy	Steel stair concrete landings & treads	1,100		0	0		1,100		
1	ls	$8,500	finishing	0		8,500	0		8,500	314,715	
			Reinforcements	0		0	0		0		
100,000	$0.65	#	Rebar	65,000		0	0		65,000		
79,835	$0.30	sf	Mesh	23,955		0	0		23,955		
ls	1	$52,500	labor	0		0	52,500		52,500	141,455	
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		

JOB #	2018.17		**UMO EEDC BUILDING**	CONCEPT				WORKSHEETS		(page 2)	
			4/18/2018								
Qnty	**X on**	**Units**	**Description**	**Mtrl**	**Eqpmt**	**Subcon**	**Labor**	**Other**	**TOTAL**	**SECT'N**	**DIVS'N**
				0		0	0		0		
			Div 3 - (cont.)	0		0	0		0		
			Miscellaneous	0		0	0		0		
5,000	sf allow	$0.75	Barrier One concrete sealing additive @ 1st floors on grade adhered floorings	0		3,750	0		3,750		
1,800	$0.45	lf	4" joint fillers	810		0	0		810		
35	$0.65	lf	6' joint fillers	25		0	0		25		
109,335	$0.10	sf ave	Membrane curing compound or burlap wet cure method	10,935		0	0		10,935		
10	$13	gal	Hardener sealer compound	130		0	0		130		
51	$275	set	Anchor bolts & grout plates	14,025		0	0		14,025		
60	$75	ea	Cmu bearing plates @ stair tower roof framing	4,500		0	0		4,500		
1	$5,000	ls	Wet stop bulbs & concrete forming accessories	5,000		0	0		5,000		
hrs	250	$40	labor	0		0	10,000		10,000	49,175	
			Precast Concrete	0		0	0		0		
3,635	sf	$65.00	Custom color precast concrete panel w/exposed sandblast agg & mounting rails & subgirts	0		236,275	0		236,275	236,275	
			Total Div 3	**331,080**	**0**	**385,040**	**157,600**	**0**	**873,720**		**873,720**
				0		0	0		0		
			Div 4 - Masonry	0		0	0		0		
			Unit Masonry	0		0	0		0		
23,270	sf	$35	Brick veneer mixed colors & patterns	0		814,450	0		814,450		
400	lf	$45	Granite window & curtain wall sills	0		18,000	0		18,000		
730	sf	$65	12" granite panel wall base	0		47,450	0		47,450		
100	sf	$120	Granite date panel & entry header	0		12,000	0		12,000		
4,200	sf	$12	8" cmu elevator shaft	0		50,400	0		50,400		
8,190	sf	$12	8" cmu stair shafts	0		98,280	0		98,280		
50	hrs	$45	Labor @ HM door frames & built ins	0		2,250	0		2,250		
36,390	sf	$1.35	Masonry staging	0		49,130	0		49,130	1,091,960	
			Total Div 4	**0**	**0**	**1,091,960**	**0**	**0**	**1,091,960**		**1,091,960**
				0		0	0		0		
			Div 5 - Metals	0		0	0		0		
			Structural Steel-Joist-Deck	0		0	0		0		
675	$2,500	tons	Building structural steel beams-headers-columns-composite beams 12#/sf	1,687,500		0	0		1,687,500		
79,835	$3.25	sf	18 ga composite galvanized floor deck 2"	259,465		0	0		259,465		
34,000	$2.10	sf	20 ga galvanized roof deck 1 1/2"	71,400		0	0		71,400		
65	$1.25	tons	Bracing & connections	85		0	0		85		
10,000	$2.50	ea	Shear studs	25,000		0	0		25,000		
hrs	7,500	$70	erection labor	0		0	525,000		525,000		
hrs	750	$95	welding labor	0		0	71,250		71,250		
hrs	750	$250	equipment	0	187,500	0	0		187,500	2,827,200	
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
Conestco.			*222 Mountain Road, Raymond ME 04071 ~ 207.627.4099 ph/fx*			*Opinions of Probable Cost ~ Construction Consulting ~ Value Engineering*					

JOB #	2018.17		UMO EEDC BUILDING	CONCEPT					WORKSHEETS	(page 3)	
			4/18/2018								
Qnty	**X on**	**Units**	**Description**	**Mtrl**	**Eqpmt**	**Subcon**	**Labor**	**Other**	**TOTAL**	**SECT'N**	**DIVS'N**
				0		0	0		0		
			Div 5 - (cont.)	0		0	0		0		
			Miscellaneous Metals	0		0	0		0		
3	$12,000	floor	Monumental concrete pan stairs w/integral rails	36,000		0	0		36,000		
7	$7,500	floor	Stair tower concrete pan stairs w/integral rails	52,500		0	0		52,500		
400	$325	lf	Open to below 7 UNDEISGNED AREA laminate glass panel & aluminum guard rail system	130,000		0	0		130,000		
16	$350	ea	OHD bollards 6" steel pipe concrete packed	5,600		0	0		5,600		
2,070	$1.80	#	C channel galvanized OHD frames	3,730		0	0		3,730		
45	$20	lf	Angle iron w/set tabs @ OHD slab edge	900		0	0		900		
1	$450	ea	Roof height change ladder	450		0	0		450		
1	$3,750	ea	Alternating tread ships ladder to mechanical penthouse	3,750		0	0		3,750		
1,500	$1.45	#	Floor angle frames @ OHD scissor lift equipment	2,175		0	0		2,175		
40	$85	lf	C.i.p. floor drain perimeter angle frames & heavy duty traffic grates	3,400		0	0		3,400		
5,000	$1.45	#	Wall mounted equipment support steel	7,250		0	0		7,250		
10,000	$1.45	#	Hvac & equipment support steel	14,500		0	0		14,500		
20,000	$1.45	#	Hvac & chiller & equipment & clerestory roof frame steel	29,000		0	0		29,000		
750	$40	sf	Roof screen @ roof mounted hvac cooling tower	30,000		0	0		30,000		
2	$2,000	set	Elevator hoist beam-floor angles-pit ladder-sump frame & grate	4,000		0	0		4,000		
hrs	1,750	$60	labor	0		0	105,000		105,000		
hrs	175	$100	equipment	0	17,500	0	0		17,500		
665	lf	$550	Extr wall south & west facing c'wall alum 3 tier sunscreen assemblies w/in-wall TS support	0		365,750	0		365,750		
150	lf	$275	Extr wall west facing window alum 1 tier sunscreen assemblies w/in-wall TS support	0		41,250	0		41,250	852,755	
			Total Div 5	**2,366,705**	**205,000**	**407,000**	**701,250**	**0**	**3,679,955**		**3,679,955**
				0		0	0		0		
			Div 6 - Carpentry	0		0	0		0		
			Rough Carpentry	0		0	0		0		
5,500	$1.15	bf	PT roof edge block-cant-curb	6,325		0	0		6,325		
600	$1.15	bf	PT roof change height block-cant-curb	690		0	0		690		
25,000	$0.75	bf	Window & door header-block-shim	18,750		0	0		18,750		
15,000	$0.75	shts	In wall & surface mounted wood blocking	11,250		0	0		11,250		
20	$65	shts	FT electric panel & telephone backer boards	1,300		0	0		1,300		
hrs	2,000	$46	labor	0		0	92,000		92,000		
hrs	200	$100	equipment	0	20,000	0	0		20,000		
1	$2,000	ls	Hardware	2,000		0	0		2,000	152,315	
			Finish Carpentry	0		0	0		0		
3,500	sf area	$10	Wood patterning @ Commons ceiling clouds	0		35,000	0		35,000		
3,000	lf	$10	Wood chair rail @ Corridors	0		30,000	0		30,000		
1,000	sf allow	$25	Wood panel & trim allowance @ Main Lobby accent areas	0		25,000	0		25,000		
365	lf	$25	Solid surface window sills w/wood stoops	0		9,125	0		9,125	99,125	
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		

JOB #	2018.17		UMO EEDC BUILDING	CONCEPT			WORKSHEETS			(page 4)	
			4/18/2018								
Qnty	X on	Units	Description	Mtrl	Eqpmt	Subcon	Labor	Other	TOTAL	SECT'N	DIVS'N
				0		0	0		0		
			Div 6 - (cont.)	0		0	0		0		
			Architectural Casework	0		0	0		0		
see Div 11			Laboratory	0		0	0		0		
50	lf	$400	Main Lobby or Admin (5 areas) reception base cabinet w/solid surface countertop ADA	0		20,000	0		20,000		
50	lf	$320	Admin base cabinet w/solid surface countertop	0		16,000	0		16,000		
50	lf	$125	Admin wall cabinet	0		6,250	0		6,250		
20	lf	$320	Conference base cabinet w/solid surface countertop	0		6,400	0		6,400		
20	lf	$125	Conference wall cabinet	0		2,500	0		2,500		
20	lf	$320	Break room base cabinet w/solid surface countertop	0		6,400	0		6,400		
20	lf	$125	Break room wall cabinet	0		2,500	0		2,500		
20	lf	$320	Copy & staff support base cabinetry w/polid survade countertop	0		6,400	0		6,400		
20	lf	$125	Copy & staff support wall cabinet	0		2,500	0		2,500		
2,000	lf	$130	Admin & staff & grad & team workstation countertop solid surface	0		260,000	0		260,000		
100	lf	$800	Corridor glass display cabinets	0		80,000	0		80,000		
30	lf	$75	Janitor 3 tier wall shelving	0		2,250	0		2,250		
200	lf	$125	Storage room 5 tier wall shelving	0		25,000	0		25,000		
60	lf	$175	Gang Toilet lavatory countertop stainless steel w/backsplash	0		10,500	0		10,500		
1	ls	$25,000	Undesignated casework additional allowance	0		25,000	0		25,000	471,700	
			Total Div 6	**40,315**	**20,000**	**570,825**	**92,000**	**0**	**723,140**		**723,140**
				0		0	0		0		
			Div 7 - Thermal & Moisture	0		0	0		0		
			Water Proofing & Damp Proofing	0		0	0		0		
520	sf	$4	Cementitious spray water proof elevator pit & slab	0		2,080	0		2,080		
26	ea	$35	Bituminous damp proof below grade steel columns	0		910	0		910	2,990	
			Insulation & Barriers	0		0	0		0		
3,930	sf	$1.70	2" extruded polystyrene rigid foundation insulation	0		6,685	0		6,685		
29,300	sf	$2	3" extruded polystyrene rigid under slab insulation	0		58,600	0		58,600		
34,000	sf	$4	R40 extruded polyisocyenurate rigid roof insulation	0		136,000	0		136,000		
27,635	sf	$2.40	3" extruded polystyrene rigid exterior wall insulation	0		66,325	0		66,325		
27,635	sf	$2.75	2" closed cell spray foam exterior wall insulation @ studs	0		76,000	0		76,000		
101,360	sf	$1.65	6" sound batt @ interior corridor & room demising walls (6,000 lf of 7,950 total lf assumed)	0		167,245	0		167,245		
1	ls	$10,000	Insulation foam ends & fillers	0		10,000	0		10,000		
27,635	sf	$3	Peel & stick exterior wall air membrane	0		82,905	0		82,905		
29,300	sf	$0.70	15 mil reinforced slab on grade VB	0		20,510	0		20,510	624,270	
			Membrane Roofing	0		0	0		0		
34,000	sf	$3.50	TPO adhered membrane system	0		119,000	0		119,000		
7,500	sf	$6.50	Roof tapers & crickets	0		48,750	0		48,750		
34,000	sf	$1.15	1/2" protection board	0		39,100	0		39,100		
150	lf	$15	Roof walkway pads	0		2,250	0		2,250		
1	set	$2,500	Roof hatch w/integral ladder & roof mounted safety rail system	0		2,500	0		2,500		
950	lf	$25	Roof perimeter cable snap rail	0		23,750	0		23,750		
100	lf	$20	Change height flashings	0		2,000	0		2,000		
950	lf	$15	Roof edge periemter drip-trim-flash	0		14,250	0		14,250		
1	ls	$150,000	Project stainless steel sheet metal flashings	0		150,000	0		150,000	401,600	
				0		0	0		0		

JOB #	2018.17		UMO EEDC BUILDING	CONCEPT				WORKSHEETS		(page 5)	
			4/18/2018								
Qnty	**X on**	**Units**	**Description**	**Mtrl**	**Eqpmt**	**Subcon**	**Labor**	**Other**	**TOTAL**	**SECT'N**	**DIVS'N**
				0		0	0		0		
			Div 7 - (cont.)	0		0	0		0		
			Metal Panels	0		0	0		0		
4,700	sf	$15	Aluminum overhang soffit color finished panels & trim on cold framed supports	0		70,500	0		70,500	70,500	
			Fire Proofing	0		0	0		0		
1	ls allow	$50,000	Fire proof allowance for limited structural steel	0		50,000	0		50,000	50,000	
			Fire Safing & Sealants	0		0	0		0		
1	ls	$50,000	Project fire safing	0		50,000	0		50,000		
1	ls	$75,000	Project caulk & seal	0		75,000	0		75,000	125,000	
			Total Div 7	**0**	**0**	**1,274,360**	**0**	**0**	**1,274,360**		**1,274,360**
				0		0	0		0		
			Div 8 - Doors & Glass	0		0	0		0		
			Doors & Hardware	0		0	0		0		
2	lvs	$2,250	HM exterior galv door & HM galv frame w/lockset-deadbolt-kickplate-closer	0		4,500	0		4,500		
8	lvs	$2,750	HM exterior galv door & HM galv frame w/panic set-kickplate-closer	0		22,000	0		22,000		
6	lvs	$2,250	HM interior door & HM frame w/panic set-kickplate-closer	0		13,500	0		13,500		
30	lvs	$1,750	HM interior door & HM frame w/lockset-kickplate-closer	0		52,500	0		52,500		
12	lvs	$3,250	HM interior door & HM frame w/corridor hold opens-panic set-kickplate-closer	0		39,000	0		39,000		
225	lvs	$1,350	Wood interior s.c. door & HM frame w/lockset-kickplate-closer	0		303,750	0		303,750		
6	lvs	$1,225	Wood interior s.c. door & HM frame w/push-pull-kickplate-closer	0		7,350	0		7,350		
6	lvs	$1,175	Wood interior s.c. door & HM frame w/privacy set-kickplate-closer	0		7,050	0		7,050		
10	set	$14,000	Slider wall assemblies laminated glass central leaf & sidelites & auto operator	0		140,000	0		140,000		
45	lvs add	$500	Over sized & mix leaf door opening add	0		22,500	0		22,500		
1	ls	$75,000	Undesignated hardware allowance add	0		75,000	0		75,000		
250	lvs allow	$1,000	Interior door leaf access control & electrification systems	0		250,000	0		250,000		
100	lvs	$150	Fire & smoke rated door leaf add	0		15,000	0		15,000		
1,000	sf	$90	HM sidelite & transom frame & impact resistant glazing add	0		90,000	0		90,000		
3,200	sf	$90	Door impact resistant glazing add (200 leaves full glazed allowance)	0		288,000	0		288,000		
a	set	$2,000	ADA pushpad entry system	0		0	0		0		
1	ls allow	$75,000	Keycard entry systems	0		75,000	0		75,000		
1	ls	$5,000	MEP access doors	0		5,000	0		5,000	1,410,150	
			Overhead Doors	0		0	0		0		
1	ea	$3,500	9' x 9' OHD insul panel w/view lites & elect op & aux chain hoist (perim seals see Div 11)	0		3,500	0		3,500		
3	ea	$5,750	12' x 12' OHD insul panel w/view lites & elect op & auxiliary chain hoist	0		17,250	0		17,250	20,750	
			Coiling Doors	0		0	0		0		
5	ea	$3,000	Allowance for stainless steel room to room countertop mounted coiling doors elect op	0		15,000	0		15,000	15,000	
			Storefronts	0		0	0		0		
4	lvs	$2,500	Vestibule exterior storefront entry door w/panic set & closer	0		10,000	0		10,000		
4	lvs	$2,000	Vestibule interior storefront entry door w/panic set & closer	0		8,000	0		8,000		
150	sf	$85	Vestibule exterior sidelites & transoms	0		12,750	0		12,750		
150	sf	$70	Vestibule interior sidelites & transoms	0		10,500	0		10,500		
17,890	sf	$95	Corridor interior wall impact resistant storefront systems to 9'(25% of 7,950 lf wall)	0		1,699,550	0		1,699,550	1,740,800	
			Clerestory Systems	0		0	0		0		
1,200	sf	$100	Clerestory glass	0		120,000	0		120,000	120,000	
				0		0	0		0		
				0		0	0		0		

JOB #	2018.17		**UMO EEDC BUILDING**	CONCEPT				WORKSHEETS		(page 6)	
			4/18/2018								
Qnty	**X on**	**Units**	**Description**	**Mtrl**	**Eqpmt**	**Subcon**	**Labor**	**Other**	**TOTAL**	**SECT'N**	**DIVS'N**
				0		0	0		0		
			Div 8 - (cont.)	0		0	0		0		
			Curtain Walls	0		0	0		0		
15,000	sf	$100	Curtain wall exterior systems	0		1,500,000	0		1,500,000	1,500,000	
			Windows	0		0	0		0		
2,000	sf	$80	Aluminum framed low e insulated glass exterior storefront style windows	0		160,000	0		160,000		
1,000	sf allow	$50	Interior borrowed light	0		50,000	0		50,000	210,000	
			Solar Tubes	0		0	0		0		
20	ea	$3,000	Roof mouinted solar tube assemblies for light harvesting	0		60,000	0		60,000	60,000	
			Total Div 8	**0**	**0**	**5,076,700**	**0**	**0**	**5,076,700**		**5,076,700**
				0		0	0		0		
			Div 9 - Finishes	0		0	0		0		
			Drywall	0		0	0		0		
27,635	sf	$9.25	6" 14 ga exterior wall steel studs & 5/8" glasswall exterior face & 5/8" drywall interior face	0		255,625	0		255,625		
101,360	sf net	$8.25	6" 20 ga corridor-demiser stagger double stud interior wall steel studs & 5/8" drywall 2.s.	0		836,220	0		836,220		
29,250	sf	$6.75	6" 20 ga interior wall steel studs & 5/8" drywall 2.s. (1,950 lf of 7,950 lf total)	0		197,440	0		197,440		
3,200	sf	$3.50	5/8" drywall on channel framing @ cmu walls requiring drywall finish	0		11,200	0		11,200		
1,200	sf	$20	Drywall ceiling soffit framed Common area cloud systems	0		24,000	0		24,000		
6,560	sf	$24	Drywall ceiling soffit framed undesigned areas & Corridors 1,500 lf x 2' wide	0		157,440	0		157,440		
1,000	sf	$3.75	Drywall ceiling suspended or furred Storage-Janitorial-MEP support spaces	0		3,750	0		3,750		
400	sf	$15	Drywall downlight & soffit @ Clerestory	0		6,000	0		6,000		
2,250	lf	$8	Window & curtain wall header & jamb drywall returns	0		18,000	0		18,000		
50,000	sf	$1.25	Impact resistant drywall add	0		62,500	0		62,500		
2,280	sf	$0.25	MR board drywall add	0		570	0		570	1,572,745	
			Acousticals	0		0	0		0		
77,740	sf	$5.50	2 x 2 tegular edge SAT typical u.n.o.	0		427,570	0		427,570		
9,345	sf	$8.50	4 x 4 square edge clean room SAT @ Research Labs	0		79,435	0		79,435		
3,500	sf	$25	Commons area SAT cloud accent add	0		87,500	0		87,500		
5,000	sf allow	$30	Acoustical wall panels impact resist face finish allowance (100 rooms @ 50 sf ave p/room)	0		150,000	0		150,000	744,505	
			Flooring	0		0	0		0		
17,335	sf	$5.50	Carpet tiles w/rubber base Admin & Staff support areas & Student Socials	0		95,345	0		95,345		
19,595	sf	$10	Poured epoxy floor w/integral cove base Research Labs & Student Suites	0		195,950	0		195,950		
15,400	sf	$4.75	Resilient tile w/rubber base Teaching Labs & Classrooms	0		73,150	0		73,150		
1,590	sf	$13	Ceramic tile w/tile base Gang & Single Stall Toilets	0		20,670	0		20,670		
1,490	sf	$15	Ceramic tile wainscot 48" height Gang & Single Stall Toilet perimeter walls w/backer board	0		22,350	0		22,350		
1,500	sf	$13	Porcelain tile w/tile base Main Lobby	0		19,500	0		19,500		
3,960	sf	$27.50	Rubber gtread-riser-landing @ Stairs	0		108,900	0		108,900		
19,700	sf allow	$0.65	Sealed concrete @ OHD receiving-MEP areas-Janitorial & Penthouse	0		12,805	0		12,805		
2,300	sf	$5	Vinyl wall covering wainscot Corridors	0		11,500	0		11,500		
250	sf	$50	Fully recessed entry grid mat & frame Vestibule	0		12,500	0		12,500		
25,690	sf	$5	Undesigned floor finishes resilient or similar	0		128,450	0		128,450		
5,000	sf bal	$13	Undesigned floor finishes ceramic tile or similar	0		65,000	0		65,000	766,120	
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		

JOB #	2018.17		UMO EEDC BUILDING	CONCEPT			WORKSHEETS			(page 7)	
			4/18/2018								
Qnty	**X on**	**Units**	**Description**	**Mtrl**	**Eqpmt**	**Subcon**	**Labor**	**Other**	**TOTAL**	**SECT'N**	**DIVS'N**
				0		0	0		0		
			Div 9 - (cont.)	0		0	0		0		
			Painting	0		0	0		0		
300	lvs	$110	Doors & frames	0		33,000	0		33,000		
260,000	sf	$1	Drywall	0		260,000	0		260,000		
6,180	sf	$1.65	Cmu exposed w/filler coat	0		10,200	0		10,200		
6,000	sf equiv	$1.50	Interior wood panel & trim finsihes	0		9,000	0		9,000		
1	ls	$12,500	Misc metals-stairs-exposed pipe & duct	0		12,500	0		12,500		
19,700	sf equiv	$3.25	Exposed structural steel & deck	0		64,025	0		64,025		
16,595	sf floor	$1	Epoxy paint add @ Labs & protected areas	0		16,595	0		16,595	405,320	
			Total Div 9	**0**	**0**	**3,488,690**	**0**	**0**	**3,488,690**		**3,488,690**
				0		0	0		0		
			Div 10 - Specialties	0		0	0		0		
			Accessories	0		0	0		0		
24	ea	$1,200	Pheniolic toilet partitions	0		28,800	0		28,800		
6	ea	$900	Phenolic urinal partitions	0		5,400	0		5,400		
1	ls	$27,750	Toilet accessories-grab bars-mirrors-hand dryers	0		27,750	0		27,750		
5	ea	$125	Fire extinguishers wall mount	0		625	0		625		
12	ea	$375	Fire extinguisher & semiflush wall cabinet	0		4,500	0		4,500		
1	ls	$6,000	Signage interior ADA & directional	0		6,000	0		6,000		
35	ea allow	$200	Signage exterior wall mounted & illuminated	0		7,000	0		7,000		
1	ls	$2,500	Bulletin boards & building directories	0		2,500	0		2,500		
1,500	sf allow	$22.50	Mark & tack boards (glass boards see Div 11)	0		33,750	0		33,750		
360	vlf allow	$30	Corner guards stainless steel	0		10,800	0		10,800	127,125	
			Total Div 10	**0**	**0**	**127,125**	**0**	**0**	**127,125**		**127,125**
				0		0	0		0		
				0		0	0		0		
			Div 11 - Equipment	0		0	0		0		
			Exhaust Capturing	0		0	0		0		
2	ea	$12,000	Vehicle exhaust capture stations & roof fan & ductwork	0		24,000	0		24,000	24,000	
			Scissor Lifts	0		0	0		0		
3	ea	$5,000	Floor mounted scissor lifts 2 ton capacity	0		15,000	0		15,000	15,000	
			Cranes	0		0	0		0		
1	ea	$7,500	Monorail 2 ton crane rail-runway beam-hoist	0		7,500	0		7,500	7,500	
			Cold Rooms	0		0	0		0		
2	ea	$50,000	Prefabricated cold room storage assemblies w/heavy duty integral entry doos	0		100,000	0		100,000	100,000	
			Kitchen Equipment	0		0	0		0		
2	set	$1,200	Break room refrigerator & microwave set	0		2,400	0		2,400		
30	ea	$500	Lab undercounter refrigerators	0		15,000	0		15,000	17,400	
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		

JOB #	2018.17		UMO EEDC BUILDING	CONCEPT			WORKSHEETS			(page 8)	
			4/18/2018								
Qnty	**X on**	**Units**	**Description**	**Mtrl**	**Eqpmt**	**Subcon**	**Labor**	**Other**	**TOTAL**	**SECT'N**	**DIVS'N**
				0		0	0		0		
			Div 11 - (cont.)	0		0	0		0		
			Laboratory Equipment & Casework	0		0	0		0		
18	ea	$7,500	Lab & Suite fume hoods complete w/ductwork & roof fan & curb	0		135,000	0		135,000		
1	ls allow	$35,000	Lab autoclaves	0		35,000	0		35,000		
2,340	lf	$475	Lab & Suite base cabinets w/epoxy countertops	0		1,111,500	0		1,111,500		
180	lf	$275	Lab wall cabinets	0		49,500	0		49,500		
2,160	lf	$120	Lab & Suite 3 tier open face wall shelving	0		259,200	0		259,200		
21	ea	$12,500	Lab & Suite bio-safety cabinet storage	0		262,500	0		262,500		
30	ea	$1,500	Lab flammable acid cabinet storage	0		45,000	0		45,000		
6,000	sf	$15	Lab & Suite glass markerboards 8' x 4' assumed	0		90,000	0		90,000		
29	ea	$850	Lab epoxy top 7' & 8' tables	0		24,650	0		24,650		
10	ea	$500	Lab mobile shelving units 72" long assumed	0		5,000	0		5,000		
44	ea	$1,500	Suite heavy duty work benches	0		66,000	0		66,000		
70	lf	$1,500	Suite double height storage wardrobes	0		105,000	0		105,000		
35	fxtr	$1,750	Lab & Suite sinks w/eyewash bubbler & fitting integral to countertop	0		61,250	0		61,250		
30	lf	$200	Lab & Suite laser curtain & track assemblies 8' height assumed	0		6,000	0		6,000		
	Owner FFE		Laboratory equipment packages	0		0	0		0	2,255,600	
			Total Div 11	**0**	**0**	**2,419,500**	**0**	**0**	**2,419,500**		**2,419,500**
				0		0	0		0		
			Div 12 - Furnishings	0		0	0		0		
			Window Treatment	0		0	0		0		
2,000	sf	$10	Vertical slat blind manual operated window treatment	0		20,000	0		20,000		
11,000	sf	$30	Curtain wall south & west facing power operated window treatment	0		330,000	0		330,000	350,000	
			Owner FFE	0		0	0		0		
x	x	x	Movables & furnishings & projector screens-mounts & seating	0		0	0		0	0	
			Total Div 12	**0**	**0**	**350,000**	**0**	**0**	**350,000**		**350,000**
				0		0	0		0		
			Div 14 - Conveying Systems	0		0	0		0		
			Elevators	0		0	0		0		
1	ea	$135,000	Elevator 1 door 4 stop 4500# service	0		135,000	0		135,000		
1	ea	$100,000	Elevator 1 door 3 stop 3500# passenger	0		100,000	0		100,000	235,000	
			Total Div 14	**0**	**0**	**235,000**	**0**	**0**	**235,000**		**235,000**
				0		0	0		0		
			Div 21 - Fire Protection	0		0	0		0		
			Sprinklers	0		0	0		0		
1	ls	$12,000	Building entry & backflow	0		12,000	0		12,000		
1	ls	$25,000	Fire pump allowance (storage tanks excluded)	0		25,000	0		25,000		
112,000	sf	$3	Wet system interior	0		336,000	0		336,000		
9,345	sf add	$5	Clean room chemical suppression system add	0		46,725	0		46,725		
4,700	sf	$4.40	Dry system exterior soffit overhangs	0		20,680	0		20,680	440,405	
			Total Div 21	**0**	**0**	**440,405**	**0**	**0**	**440,405**		**440,405**
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
				0		0	0		0		
Conestco.			*222 Mountain Road, Raymond ME 04071 ~ 207.627.4099 ph/fx*			*Opinions of Probable Cost ~ Construction Consulting ~ Value Engineering*					

JOB #	2018.17		**UMO EEDC BUILDING**	CONCEPT			WORKSHEETS			(page 9)	
			4/18/2018								
Qnty	**X on**	**Units**	**Description**	**Mtrl**	**Eqpmt**	**Subcon**	**Labor**	**Other**	**TOTAL**	**SECT'N**	**DIVS'N**
				0		0	0		0		
			Div 22 - Plumbing	0		0	0		0		
			Plumbing	0		0	0		0		
30	fxtr	$2,250	WC wall mount chair carrier infrared flush w/rough	0		67,500	0		67,500		
6	fxtr	$2,250	UR wall mount chair carrier infrared flush w/rough	0		13,500	0		13,500		
9	fxtr	$1,650	LAV countertop timed ADA fitting w/rough	0		14,850	0		14,850		
6	fxtr	$2,000	LAV wall mount chair carrier timed ADA fitting w/rough	0		12,000	0		12,000		
35	fxtr	$800	SK laboratory rough (SK @ lab casework see Div 11)	0		28,000	0		28,000		
25	fxtr	$2,000	EYE drench shower unit w/rough (bubblers see Div 11)	0		50,000	0		50,000		
3	fxtr	$1,500	JAN floor sink & mopstrip	0		4,500	0		4,500		
3	fxtr	$1,500	DF dual height chilled water ADA	0		4,500	0		4,500		
40	ea	$850	FD nickel bronze top w/strainer	0		34,000	0		34,000		
5	ea	$675	FD cast iron top w/strainer	0		3,375	0		3,375		
25	ea	$200	HB interior washdown	0		5,000	0		5,000		
30	ea	$8,000	Clean water in-line purification systems	0		240,000	0		240,000		
112,000	sf mix	$1.50	Air & gas piping & compressors	0		168,000	0		168,000		
6	ea	$1,500	Roof drains w/overflows	0		9,000	0		9,000		
1	ls	$12,000	Roof drain manifold	0		12,000	0		12,000		
1	ea	$3,000	Sand trap @ c.i.p. trench drains	0		3,000	0		3,000		
112,000	sf	$5	Plumbing specialty systems & interfacing w/laboratory equipment & proprietary systems	0		560,000	0		560,000		
112,000	sf	$5	Plumbing infrastructure	0		560,000	0		560,000	1,789,225	
			Total Div 22	**0**	**0**	**1,789,225**	**0**	**0**	**1,789,225**		**1,789,225**
				0		0	0		0		
			Div 23 - HVAC	0		0	0		0		
			HVAC	0		0	0		0		
7,500	mbh	$35	Boiler systems complete	0		262,500	0		262,500		
1	ls	$50,000	Steam to hot water conversion 7 connections to UMO systems	0		50,000	0		50,000		
94,635	sf	$6	Radiant slabs all floors 1st thru 3rd	0		567,810	0		567,810		
70,000	cfm	$8	AH systems heated air Commons-Corridors-Toilets-Public-Staff non-Lab areas	0		560,000	0		560,000		
40,000	cfm	$15	AH systems heated air & filtration/air cleaning Lab & Suite areas	0		600,000	0		600,000		
10,000	cfm	$7	ERU systems Corridors & Toilets	0		70,000	0		70,000		
40	ea	$3,750	VAV boxes & reheat coils Commons-Corridors-Toilets	0		150,000	0		150,000		
100	ea	$3,750	VAV boxes & reheat coils Lab & Suite areas	0		375,000	0		375,000		
40	tons	$5,000	HP cassettes & condensing Offices	0		200,000	0		200,000		
350	tons	$2,000	Chiller & tower for AH & HP systems	0		700,000	0		700,000		
150	ea	$1,250	Chilled beams	0		187,500	0		187,500		
92,300	sf	$12	Ductwork-insulation-grilles-registers for AH & HP systems	0		1,107,600	0		1,107,600		
1	ls allow	$200,000	EF dedicated Lab & Suite exhaust systems	0		200,000	0		200,000		
1	ls allow	$30,000	EF Janitorial & MEP room area exhaust systems	0		30,000	0		30,000		
10	ea	$2,500	Cabinet & unit heaters	0		25,000	0		25,000		
112,000	sf	$10	Hvac specialty systems & interfacing w/laboratory equipment & proprietary systems	0		1,120,000	0		1,120,000		
112,000	sf	$10	Hvac infrastructure	0		1,120,000	0		1,120,000		
112,000	sf	$6	Controls	0		672,000	0		672,000		
1	ls	$250,000	Test & balance	0		250,000	0		250,000		
	Owner		Commissioning	0		0	0		0	8,247,410	
			Total Div 23	**0**	**0**	**8,247,410**	**0**	**0**	**8,247,410**		**8,247,410**
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JOB #	2018.17		**UMO EEDC BUILDING**	CONCEPT				WORKSHEETS		(page 10)	
			4/18/2018								
Qnty	**X on**	**Units**	**Description**	**Mtrl**	**Eqpmt**	**Subcon**	**Labor**	**Other**	**TOTAL**	**SECT'N**	**DIVS'N**
				0		0	0		0		
			Divs 26-27-28 - Electrical-Technology-Security	0		0	0		0		
			Site Electrical	0		0	0		0		
1	ls	$200,000	Primary power system electrical upgrade allowance	0		200,000	0		200,000		
100	lf	$175	Primary u.g. power conduit concrete encased (wiring by UMO-utility company)	0		17,500	0		17,500		
x	x	x	Primary transformer by UMO	0		0	0		0		
20	lf	$125	Secondary u.g. conduit & wiring	0		2,500	0		2,500		
120	lf	$30	Telecomdata u.g. conduit & wiring	0		3,600	0		3,600		
12	ea	$3,000	Site light standards w/concrete bases	0		36,000	0		36,000		
10	ea	$1,000	Walkway bollard lights w/concrete bases	0		10,000	0		10,000	269,600	
			Building Electrical-Technology-Security	0		0	0		0		
112,000	sf	$4	Power & distribution (4000 amp main service assumed)	0		448,000	0		448,000		
40	rooms	$3,500	Lab overhead cold rail systems	0		140,000	0		140,000		
112,000	sf	$7	Lighting LED & wiring & switching	0		784,000	0		784,000		
112,000	sf	$1	Light harvesting-room dimming-auto occupancy sensor systems	0		112,000	0		112,000		
12	ea	$1,000	Lighting exterior wall mounted & soffit mounted	0		12,000	0		12,000		
112,000	sf	$2.50	Telecomdata & specialty conduits & wiring (hardware by Owner)	0		280,000	0		280,000		
112,000	sf	$0.75	Fire & smoke alarm w/egress lights & limited battpaks & horns-strobes	0		84,000	0		84,000		
900	kw	$200	Emergency generator w/autoswitch	0		180,000	0		180,000		
1	ls		Security exterior weatherproof cameras (10) & interior cameras (40) to UMO central monitor	0		0	0		0		
250	lvs allow	$750	Security entry keycode & door electrification system wiring & conduits	0		187,500	0		187,500		
1	ls	$100,000	Photovoltaic allowance	0		100,000	0		100,000		
1	ls	$75,000	Hvac & OHD & crane & elevator & equipment wiring	0		75,000	0		75,000		
112,000	sf	$7.50	Electrical specialty systems & interfacing w/laboratory equipment & proprietary systems	0		840,000	0		840,000		
112,000	sf	$7.50	Electrical infrastructure	0		840,000	0		840,000		
1	ls	$5,000	Temporary construction power & wiring & lamping	0		5,000	0		5,000	4,087,500	
			Total Div 26-27-28	**0**	**0**	**4,357,100**	**0**	**0**	**4,357,100**		**4,357,100**
				0		0	0		0		
			Div 31 - Earthwork	0		0	0		0		
			Building Pad Prep	0		0	0		0		
800	lf	$3	Snowfencing @ open excavations	0		2,400	0		2,400		
1,125	cy	$17.50	Excavation for structure	0		19,690	0		19,690		
600	cy	$25	Backfill granular compacted	0		15,000	0		15,000		
65	cy	$27.50	5' frost entry subslab gravel	0		1,790	0		1,790		
1,305	cy	$32	12" building subslab stone	0		41,760	0		41,760		
220	cy	$35	2" sand cushion for radiant slabs	0		7,700	0		7,700		
500	lf	$16	Excavation & backfill interior utilities	0		8,000	0		8,000		
786	lf	$13	Foundation drains	0		10,220	0		10,220		
29,300	ls	$1.25	Subslab radon venting	0		36,625	0		36,625		
58,600	sf	$0.15	Fine grade slabs stone & sand	0		8,790	0		8,790		
1,125	cy	$7	Haul excavated materials	0		7,875	0		7,875	159,850	
			Site Prep	0		0	0		0		
1	ls eng'r	??	Superintendence-safety-traffic & pedestrian control-perimeter fencing-signage	0		0	0		0		
1	ls eng'r	??	Tree removal-loam strip & stockpile-cuts & fills-utility excavation & backfill-road gravels	0		0	0		0	0	
			Total Div 31	**0**	**0**	**159,850**	**0**	**0**	**159,850**		**159,850**
				0		0	0		0		
Conestco.			***222 Mountain Road, Raymond ME 04071 ~ 207.627.4099 ph/fx***			***Opinions of Probable Cost ~ Construction Consulting ~ Value Engineering***					

JOB #	2018.17		**UMO EEDC BUILDING**	CONCEPT			WORKSHEETS			(page 11)	
			4/18/2018								
Qnty	**X on**	**Units**	**Description**	**Mtrl**	**Eqpmt**	**Subcon**	**Labor**	**Other**	**TOTAL**	**SECT'N**	**DIVS'N**
				0		0	0		0		
			Div 32 - Exterior Improvements	0		0	0		0		
			Site Finishes	0		0	0		0		
1	ls eng'r	??	Paving-curbing-walkways-dumpster area-signage-fencing-gates-grasses-landscaping	0		0	0		0	0	
			Total Div 32	**0**	**0**	**0**	**0**	**0**	**0**		**0**
				0		0	0		0		
			Div 33 - Utilities	0		0	0		0		
			Site Utilities	0		0	0		0		
1	ls eng'r	??	Water domestic & fire protection to 5'	0		0	0		0		
1	ls eng'r	??	Sanitary sewer to 5'	0		0	0		0		
1	ls eng'r	??	Storm to 5'	0		0	0		0		
	ls eng'r	??	Gas lines & regulators to 5'	0		0	0		0		
	see Div 26		Electrical	0		0	0		0	0	
			Total Div 33	**0**	**0**	**0**	**0**	**0**	**0**		**0**
				0		0	0		0		
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				0		0	0		0		
				0		0	0		0		

COST ESTIMATE

Project Name:	**UMO Engr Bldg Site C (Tool Lab)**	Estimator:	Civil group
Location:	Orono, Maine	Date of Estimate:	26-Feb-18
Project Number:	**WBRC # 3752.00**		
Engineer:	***Paul Monyok***		
Bid Date/Time:			
Scope of Work:	Concept Site Work Estimate	Estimated Price:	$ 1,325,881.00
Plans Dated:	*26-Feb-18*	Contingency 20%	$ 265,176.20
		TOTAL	$ 1,591,057.20

Item #	Description	Quantity	Unit	Unit Price	Price Extension
1	**Division 02 Sitework**				
2	Mobilize	1	LS	$ 10,000.00	$ 10,000.00
3	Temp Access Road	1	LS	$ 7,500.00	$ 7,500.00
4	Construction Fence	0	L/ft	$ 35.00	$ -
5	Test Pits	5	Ea	$ 2,500.00	$ 12,500.00
6	**0201 Erosion Control**				
7	Silt Fence	1,200	L/ft	$ 5.50	$ 6,600.00
8	Hay Bales	0	Ea	$ 10.00	$ -
9	Stone Check Dams	0	Ea	$ 750.00	$ -
10	Level Lip Spreader	0	Ea	$ 2,500.00	$ -
11	Chip Berms	0	Cy	$ 6.00	$ -
12	Geo-Fabric		R	$ 500.00	$ -
13	**0205 Demolition, Removals & Relocate**				
14	Misc. Removals	1	LS	$ 400,000.00	$ 400,000.00
15	Remove Gate		LS	$ -	$ -
16	Remove Stumps	8	Cy	$ 6.50	$ 52.00
17	Remove U.G. Elec	550	L/ft	$ 6.00	$ 3,300.00
18	Remove Steam	1	LS	$ 2,500.00	$ 2,500.00
19	Remove Curb		L/ft	$ -	$ -
20	Remove Fence		LS	$ -	$ -
21	Reclaim Hot Top	7,350	Sq/yd	$ 5.75	$ 42,262.50
22	Reuse Excess Reclaim Mat'l on Site		Cy	$ -	$ -
23	Remove Storm Line	270	L/ft	$ 6.00	$ 1,620.00
24	Remove Sewer Line	50	L/ft	$ 6.00	$ 300.00
25	Remove Guard Rail		L/ft	$ -	$ -
26	Remove Water Line		L/ft	$ -	$ -
27	Remove Catch Basin	1	LS	$ 500.00	$ 500.00
28	**0205 Underground Tank Removal**				
29	Tank Excavation		LS	$ -	$ -
30	Tank Disposal Fee		LS	$ -	$ -
31	Disposal of Contaminated Material		Cy	$ -	$ -
32	Backfill with Existing Material		Cy	$ -	$ -
33	Backfill with Off Site Material		LS	$ -	$ -

34	**0210**	**Clearing and Grubbing**						
35		Clearing	0	A	$	5,500.00	$	-
36		Grub and Remove From Site		Cy	$	-	$	-
37		Grub and Bury on Site		Cy	$	-	$	-
38	**0222**	**Earthwork for Structures and Pavements**						
39		Strip Loam to Stock Pile	335	Cy	$	4.50	$	1,507.50
40		Strip Loam to Off Site		LS	$	-	$	-
41		Cut Pavement	1	LS	$	2,500.00	$	2,500.00
42		Site Cut to Fill	0	Cy	$	4.00	$	-
43		Import Site Fill	300	Cy	$	13.00	$	3,900.00
44		Site Cut Waste	950	Cy	$	8.50	$	8,075.00
45		Ledge Removal (OPEN)		Cy	$	-	$	-
46		Gravel (Under Buildings, Athletic Fields, Etc.)	0	Cy	$	13.00	$	-
47		Gravel MDOT Type "A" Roads and Parking	230	Cy	$	15.00	$	3,450.00
48		Gravel MDOT Type "C" Roads and Parking	130	Cy	$	13.00	$	1,690.00
49		Gravel for Walks	716	Cy	$	20.00	$	14,320.00
50		Precast Concrete Box Culvert	0	Ea	$	45,000.00	$	-
51		Concrete Sidewalks	2,150	Sq/yd	$	125.00	$	268,750.00
52		Brick Pavers		Sq/ft	$	-	$	-
53		Geo-Block Walls	600	Sq/ft	$	18.00	$	10,800.00
54		Foundation Excavation to Site Fill		Cy	$	-	$	-
55		Foundation Excavation to Waste		Cy	$	-	$	-
56		Underdrain 4" S&D		L/ft	$	-	$	-
57		3/4" Stone	35	Cy	$	30.00	$	1,050.00
58		Walk Insulation 2"	2,150	Sq/Yd	$	5.50	$	11,825.00
59		Geo Fabric--140N		R	$	-	$	-
60		Geo-Fab 600x	0	R	$	650.00	$	-
61		Turf Reinforcement	0	Sq/ft	$	2.75	$	-
62		Foundation Back Fill Gravel		Cy	$	-	$	-
63		Interior Exc and Backfill		LS	$	-	$	-

64	Description	Quantity	Unit	Unit Price	Price Extension
65	**02225 Excavation, Backfill, & Compaction- Utilities**				
66	Road Opening Permits		LS	$ -	$ -
67	Trench Box		LS	$ -	$ -
68	Warning Tape		LS	$ -	$ -
69	Ledge Removal (OPEN)		LS	$ -	$ -
70	Ledge Removal (TRENCH)		Cy		$ -
71	Special Backfill		Cy	$ -	$ -
72	Filter Fabric		Ea	$ -	$ -
73	10000 Gal Oil Tank Exc.& B.Fill only		Ea	$ -	$ -
74	Underground Natural Gas	0	L/ft	$ 35.00	$ -
75	Material Testing	1	LS	$ 7,500.00	$ 7,500.00
76	Compaction Testing	1	LS	$ 15,000.00	$ 15,000.00
77	**0225 Site Electric (Conduit by Div.16)**				
78	Walk light Bases	3	LS	$ 3,500.00	$ 10,500.00
79	Park Lot Lights	5	Ea	$ 7,000.00	$ 35,000.00
80	Primary/Secondary Trench	40	L/ft	$ 10.00	$ 400.00
81	Aerial Poles & Wire	0	Ea	$ 10,500.00	$ -
82	Transformer Pad	1	Ea	$ 4,500.00	$ 4,500.00
83	Fiber Optics Trench	40	L/ft	$ 12.00	$ 480.00
84	Pull Boxes		Ea	$ -	$ -
85	Concrete encasement	4	Cy	$ 120.00	$ 480.00
86	**0257 Bituminous Hot Mix Pavement**				
87	Roads and Parking--Binder 2.5"	1,200	S/yd	$ 13.50	$ 16,200.00
88	Roads and Parking--Surface 1.5"	1,200	S/yd	$ 8.50	$ 10,200.00
89	Granite Curb	650	L/ft	$ 45.00	$ 29,250.00
90	Slipform Curb	0	L/ft	$ 22.00	$ -
91	Ledge Dust		Cy	$ -	$ -
92	Concrete Wheel Stops		Ea	$ -	$ -
93	Bituminous Curb		L/ft	$ -	$ -
94	Sidewalks--2.5"		S/yd	$ -	$ -
95	Pavement Markings	1	LS	$ 1,500.00	$ 1,500.00
96	Seal Coat Pavement		Sq/Yd	$ -	$ -
97	**026 Water Distribution System**				
98	4" D.I.	0	L/ft	$ 50.00	$ -
99	6" D.I.	0	L/ft	$ 50.00	$ -
100	8" D.I.	230	L/ft	$ 55.00	$ 12,650.00
101	12" D.I.		L/ft	$ -	$ -
102	6" Fittings		Ea	$ -	$ -
103	8" Fittings	0	Ea	$ 450.00	$ -
104	12" Fittings		Ea	$ -	$ -
105	Taps	1	Ea	$ 1,500.00	$ 1,500.00
106	Gate Valve	1	Ea	$ 650.00	$ 650.00
107	Hydrants	0	Ea	$ 3,500.00	$ -
108	Bore		LS	$ -	$ -
109	Thrust Block	1	Ea	$ 250.00	$ 250.00

110	**027 Storm Drainage**							
111		4' Dia. Catch Basin	28	V/ft	$	275.00	$	7,700.00
112		8' Dia Catch Basin		V/ft	$	-	$	-
113		Overflow Structures	0	Ea	$	7,500.00	$	-
114		Frames and Grates	4	Ea	$	400.00	$	1,600.00
115		Detention Pond	1	LS	$	250,000.00	$	250,000.00
116		36" HiQ Pipe		L/ft	$	-	$	-
117		30" HiQ Pipe		L/ft	$	-	$	-
118		24" HiQ Pipe	300	L/ft	$	110.00	$	33,000.00
119		18" CL 52		L/ft	$	-	$	-
120		18" HiQ PipeType "C"		L/ft	$	-	$	-
121		18" HiQ Pipe	0	L/ft	$	80.00	$	-
122		15" HiQ Pipe	0	L/ft	$	75.00	$	-
123		12" HiQ Pipe Type "C"		L/ft	$	-	$	-
124		12" HiQ Pipe	40	L/ft	$	70.00	$	2,800.00
125		10" HiQ Pipe		L/ft	$	-	$	-
126		8" HiQ Pipe		L/ft	$	-	$	-
127		6" HiQ Pipe		L/ft	$	-	$	-
128		Pipe Insulation 4"		Sq/Ft	$	-	$	-
129		Geo- Fabric		R	$	-	$	-
130		Rip Rap	0	Cy	$	75.00	$	-
131		4" U- Drain	950	L/ft	$	18.00	$	17,100.00
132		6" Type B Under- Drain	0	L/ft	$	35.00	$	-
133		12" Type B Under- Drain		L/ft	$	-	$	-
134		6" SDR-35		L/ft	$	-	$	-
135		8" SDR-35		L/ft	$	-	$	-
136		12" SDR-35		L/ft	$	-	$	-
137		15"SDR-35		L/ft	$	-	$	-
138		Geo Fabric--140N	0	R	$	550.00	$	-
139		Stone 3/4	0	Cy	$	27.00	$	-
140		Tie-In		Ea	$	-	$	-
141								
142		**Description**	**Quantity**	**Unit**		**Unit Price**		**Price Extension**
143	**027 Sewer**							
144		Grease Trap	0	LS	$	5,500.00	$	-
145		4' Dia Man Hole	18	V/ft	$	275.00	$	4,950.00
146		Frames and Covers	3	Ea	$	-	$	-
147		Pump Station	0	LS	$	17,500.00	$	-
148		Septic Tank--5000 Gal		LS	$	-	$	-
149		4" Force Main	0	L/ft	$	42.00	$	-
150		6" SDR-35	0	L/ft	$	45.00	$	-
151		8" SDR-35	70	L/ft	$	55.00	$	3,850.00
152		12" SDR-35		L/ft	$	-	$	-
153		Tie-In	1	LS	$	2,500.00	$	2,500.00
154		Concrete Chambers		Ea	$	-	$	-
155		Distribution Box		Ea	$	-	$	-

156								
157	**028**	**Site Signs & Fences**						
158		12 High Chain Link		L/ft	$	-	$	-
159		8' High Chain Link	0	L/ft	$	35.00	$	-
160		6' High Chain Link		L/ft	$	-	$	-
161		4' High Chain Link		L/ft	$	-	$	-
162		Hand Rail		LS	$	-	$	-
163		Bollards	2	Ea	$	2,500.00	$	5,000.00
164		Stop Signs		Ea	$	-	$	-
165		Wood Guard Rail		L/ft	$	-	$	-
166		Steel Guard Rail		L/ft	$	-	$	-
167		Misc. Signage	1	Ea	$	750.00	$	750.00
168	**029**	**Landscaping**						
169		Loam (From Site)	3	Cy	$	18.00	$	54.00
170		Loam (From OFF Site)	3	Cy	$	35.00	$	105.00
171		Seed, Fertilizer & Mulch	98	Unit	$	45.00	$	4,410.00
172		Weed Barrier		LS	$	-	$	-
173		Granite Bollards	0	Ea	$	2,750.00	$	-
174		Steel Bollards		Ea	$	-	$	-
175		Stone Mulch		LS	$	-	$	-
176		Soil Filter Mix	0	Cy	$	37.50	$	-
177		Flag Pole	0	Ea	$	3,500.00	$	-
178		Traffic Gate	0	Ea	$	5,000.00	$	-
179		Erosion Control Mesh	0	S/yd	$	3.50	$	-
180		Planting Allowance	1	LS	$	20,000.00	$	20,000.00
181		Misc. Site Improvements	1	LS	$	11,000.00	$	11,000.00

Options;

1

2

3

4

Note:

Estimate Excludes the Following;

Ledge Removal

Contaminated Material

electric costs from UM Facilities

steam costs from UM facilities

Appendix 5

Programming Meeting Minutes

Meeting Minutes

Project: **University of Maine**
Engineering Education & Design Center
Meeting Date: **January 29, 2018**

Topic: **Mechanical Engineering Teaching - Programming** Meeting Number **1**

Attendees:		
University of Maine Mechanical Engineering Teaching Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Dana Humphrey	DH	Dean, College of Engineering
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Justin Lapp	JL	Associate Professor, Mechanical Engineering
Andy Goupee	AG	Associate Professor, Mechanical Engineering
Eric Martin	EM	Lecturer, Mechanical Engineering
Ellenzweig:		
Carolyn Day	CED	Lab Architect
Michael Lauber	ML	Programming Architect
WBRC:		
Kris Kowal	KK	Project Manager
Jenifer Richard	JR	Interior Designer

#	Item	Action
1.0	**Introductions**	
1.1	Oliver Putzey was unable to attend. He sent notes which were circulated by JA.	
2.0	**Current Mechanical Engineering Curriculum**	
2.1	**Current Course Organization**	
2.1.1	Major is declared when students begin school • 400 total students currently in the Mechanical Engineering (MEE) program. • 250 total students currently in the Mechanical Engineering Technology (MET) program.	
2.1.2	Students currently take MEE labs in three consecutive semesters; 2nd semester (spring) junior year, 1st semester (fall) senior year, and 2nd semester (spring) of senior year. This has been criticized by students because they learn the related material two years earlier in a lecture course. Would want to change so lab and lecture are aligned.	
2.1.3	Considering moving to a distributed lab experience throughout curriculum. MEE is currently working on a small introductory course. Currently teach thermodynamics and materials classes every semester. These are possible courses which could integrate a lab component.	
2.1.4	Lecture does not typically occur in the labs.	
2.2	**Current Lab Organization**	
2.2.1	MET uses the current lab space and almost the same equipment. Currently workbenches are about 2 ft wide and 5-6 feet long. Utilities are between benches, which are “back to back” but with room to get in for setup of utilities.	
2.2.2	Course is taught as a lecture with a size of 70-90 students. This is broken into lab sections of 20 (3-4 sections per class). They currently have 6 setups,	

#	Item	Action
	but would like more for smaller groups. Course alternates between lecture and lab.	
2.2.3	Current MEE teaching lab space is dedicated to a particular course and only used 6-7 times during year. MET uses the current space and almost the same equipment. It would be better if we could find a way to use it more effectively.	
2.2.4	Experiment review in lecture: • Experiments are commonly brought into the lecture room ahead of time to go over what will be happening in the lab sections. • Have broken up by section and gone to lab in smaller groups • Sometimes do 15-30 minutes in the lab to do a demonstration to a large class of 50 but this is not encouraged.	
2.2.5	Spaces they don't currently have but would like to accommodate: • Room for MET electives to use lab space (confirm) • Robotics space • Wind energy testing • Graduate level thermo/fluids course • Computational fluid dynamics • Controls lab – leverage capstone areas – Students get kits and go out • Composite materials • Plastics MET course	
3.0	**Future Mechanical Engineering Curriculum**	
3.1	**Growth**	
3.1.1	Growth plan for whole college. Size of the student body: • Plan for 150 incoming students in the major per year. • Projected growth for MET is 50%	UM to confirm
3.1.2	Larger section sizes: • Discussion of instructor + TA sections of 40 instead of 24 • Could this option use an approach that has tables moving in and out of the lab? • One or two benches could set up for an elective so two courses are using the lab but don't need to break down. Allows smaller courses to use the space simultaneously.	
3.2	**Type of Labs**	
3.2.1	Discussion centered on having both a dry and wet lab. One is for strength of materials and one for fluids and thermodynamics. • 2 labs would streamline process of set-up and break-down.	
3.2.2	Some of the setups for dry experiments are large and may be in the way for other lab uses, precluding concurrent use with a wet lab.	
3.2.3	Benches and spaces might be similar. The infrastructure is what is different.	

#	Item	Action
3.2.4	Equipment • Will continue to use instructional, small scale, wind tunnel. • Interest in flexible space so Wind Tunnel, Wave Tunnel or Universal Testing Machine could be rolled in and out of lab and benches can be moved around. • Dean expressed the idea that interesting equipment should be left out so tours can see. • Need an understanding of required benchtop equipment space needed vs. fixed floor equipment.	UM
3.3	**Future Lab Physical Space**	
3.3.1	All experiments are benchtop. There is not a separate worktable vs. equipment area. The large wind tunnel will stay in its current location.	
3.3.2	4 students per setup, groups of 6 are too large. Ideal number of groups for one instructor is no more than 6 (confirm).	UM
3.3.3	Discussion about partitioning the labs for use at the same hour. Soft partition could be use to split larger space but visitors disliked the heavy curtain seen at Marquette. There are acoustic issues with any partition so this is not a preferred option.	
3.3.4	Coat and Bag Storage • Right now the lab is large enough that everyone throws their things on the floor. • Do not need a breakout area in front of the lab. Liquids are allowed in lab since there is no chemistry. • Ideal is cubbies and hooks inside lab.	
3.3.5	Benches in the middle with equipment surrounding could work, but would also like flexibility of using different equipment.	
3.4	**Service requirements**	
3.4.1	Materials lab: • Overhead power • Compressed Air • Vacuum in special locations	
3.4.2	Fluids lab: • Power • Water • Drain • Compressed air • Vacuum in special locations	
3.4.3	General preference for overhead cord reels. Wary of centralized air because if one person does something wrong it affects work elsewhere. If in room would need closet for sound attenuation.	
3.4.4	Water Source: • Trench drains get expensive and can have odor issues • Try a couple of options of how this would work out. • Currently only one experiment uses water. Even with expansion would be 3 or 4 experiments.	

#	Item	Action
	• Students are circulating water so don't need "live" source of water? • Investigate for new building as there are experiments that need live water. • Suggestion that perimeter is for water experiments and center is mobile tables that can be rearranged. Easy to add utilities later.	
3.5	**Bench Requirements**	
3.5.1	Need to be heavy because they are measuring strain but can be mobile. If there are casters they should be off the floor when table is in set position.	
3.5.2	Overall size: • 8-10 tables • 30 or 36 inches deep would be better • 8 ft wide Helpful to have everything on one side so the whole lab group can view results, rather than being around a table.	
3.5.3	Power • Comes to table from above and plug in 5-6 items. 10-12 outlets would be max in use • No high drain experiments at bench tops • Space on table to plug in laptop Students do not typically need laptops but one or two will bring them in.	
3.5.4	Have a shelf now with power supplies – some like and some don't. Take up a lot of space but can read output at eye level and everyone in group can see. 16 inches is sufficient depth for this shelf. Investigate carts like Rowan but not full width.	Ellenzweig
3.6	**Presentation Media Requirements**	
3.6.1	Distributed media is preferred over centralized. TVs to project testing results to stations but sporadically used. May be better localized.	
3.6.2	Rarely use whiteboards for teaching in labs. No mention in this session if students would use whiteboards.	
3.6.3	Portable camera to go around and show everyone what one group is using. One instructor used his iPhone.	
4.0	**Next Steps**	
4.1	Next meeting to occur on February 26th or 27th. Time and location to be confirmed	WBRC/UM
4.2	MEE to provide size of typical experiment set-ups	MEE
4.3	Deliverables for next meeting: • First draft program • Draft room diagrams	Ellenzweig
4.4	Information will be posted to Google Group when available. Provide AF with any files for upload.	AF

Topic: **Mechanical Engineering Teaching - Programming** Meeting Number **2**

Attendees:		
University of Maine Mechanical Engineering Teaching Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Carolyn McDonough	CMD	Director, Capital Planning and Project Management
Peter Schilling	PS	Executive Director, Division of Lifelong Learning
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Justin Lapp	JL	Associate Professor, Mechanical Engineering
Andy Goupee	AG	Associate Professor, Mechanical Engineering
Eric Martin	EM	Lecturer, Mechanical Engineering
Ellenzweig:		
Carolyn Day	CED	Lab Architect
Michael Lauber	ML	Programming Architect
WBRC:		
Kris Kowal	KK	Project Manager

#	Item	Action
1.0	**Program Area Review**	
1.1	MEE doesn't need flex lab	
2.0	**Lab Diagram Review**	
2.1	**Dry Lab** • Currently have 12 tables of 4 – 48 • Request to increase cubby storage • May not need space for so much equipment consider shrinking area • Tables are movable but not on casters • Do need side bench space for more permanent equipment like UTM • "Seems bigger than necessary"-EM • Room this size can provide space to set up for other class set-ups	

2.2	**Wet Lab**
	• What equipment would be permanent benchtop?
	• May need two areas: Smaller tables at perimeter for experiments and round tables (8 per) in center where they can put down laptops and work – increases work area
	• Students read instrumentation so they need to all be on one side of the table or have a monitor where all information is displayed
	• Discussion of layout:
	  o Make it the same configuration as dry lab with water on perimeter
	  o Work parallel to perimeter water access
	• Space water appropriate for access, not number of seats
	• Deck mounted air and water would be beneficial
	• Include a floor drain
	• See if we can fit 40 or still have space between back-to-back benches with a sink at the end
		EM to verify equipment
		
		EZ to revise layout

#	Item	Action
2.3	**Storage** • Storage only for small pieces of equipment, remove in favor of larger storage area • Generally better to have more bench space than tall storage • Prefer a separate room over small storage in the labs • One lockable location	
2.4	**Media** • Need a “document camera" area to show a sample experiment setup on screen to students - Currently iPhone to VGA and a movable table • Mini lecture so need to connect laptop • One wireless connection point in each room because no data intensive uses	
3.0	**Next Steps**	
3.1	Arrange for video conference before the next meeting to discuss revised layouts.	WBRC/EZ
3.2	Next meeting to occur on March 27th or 28th. Time and location to be confirmed.	WBRC/UM

Meeting Minutes

Project: **University of Maine Engineering Education & Design Center**
Meeting Date: **March 27, 2018**

Topic: **Mechanical Engineering Teaching - Programming**

Meeting Number **3**

Attendees:		
University of Maine Mechanical Engineering Teaching Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Peter Schilling	PS	Executive Director, Division of Lifelong Learning
Carolyn McDonough	CMD	Director, Capital Planning and Project Management
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Dana Humphrey	DH	Dean, College of Engineering
Ellenzweig:		
Carolyn Day	CED	Lab Architect
Michael Lauber	ML	Programming Architect
Jim Blount	JB	Lab Planner
WBRC:		
Kris Kowal	KK	Project Manager
Jenifer Richard	JR	Interior Designer

#	Item	Action
1.0	**Program review**	

1.1	Fluids Lab
	• Review of curved benches vs straight benches:
	  o Curved benches make it too difficult to get to the back of the equipment, but like that it delineates teams – try to capture this in any design moving forward
	  o Flat is more flexible for bringing in equipment and for set-ups
	  o Flat benches at wall: 36” is the right depth
	• Add 1 sink to the wall with 4 groups so there is one between each group
	• Need an extra spigot at each sink so each set-up has its own control
	• Make sure one of the sinks is a hand wash
	• Discussion of screens
	  o One for every lab group
	  o No larger than 32”
	• Storage in room
	  o High shelves are difficult to reach
	  o Rolling 18” cabinets/carts that can go under counters or tables in center. Dedicated to experiment set-ups.
	  o Cabinet below sink would not be for storage	

1.2	Dry Lab • Need monitor to these stations - on shelving unit? On grid? To be decided later • Will keep a handheld device (iPad) in room with a camera, no fixed camera location or recording the room • Add a hand-wash sink	

#	Item	Action
1.3	General requirements • No lectern – just a connection for a laptop • Counters typically standing height • Each room will have one ADA height bench	
1.4	Storage Room • Located between labs • Roll-in and roll-out of lab equipment • 5’ aisle with equipment set-ups on either side	

Topic: **Biomedical Engineering Teaching - Programming** Meeting Number **1**

Attendees:		
University of Maine Biomedical Engineering Teaching Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Mike Mason	MM	Professor, Chemical and Biological Engineering
Paul Millard	PM	Associate Professor, Chemical and Biological Engineering
Mohsen Shahinpoor	MS	Professor, Mechanical Engineering
Lisa Weeks	LW	Lecturer, Chemical and Biological Engineering
Ellenzweig:		
Michael Lauber	ML	Principal in Charge/Programming Architect
Carolyn Day	CED	Lab Architect
WBRC:		
Kris Kowal	KK	Project Manager
Jenifer Richard	JR	Interior Designer

#	Item	Action
1.0	**Introductions**	
2.0	**Current Biomedical Engineering (BME) Curriculum**	
2.1	**Current Course Organization**	
2.1.1	• First year classes are larger than upper classes – tend to run more sections of small classes • 20-24 students per section – 30 max	
2.1.2	Currently have 19 courses but not all have a lab component	
2.2	**Current Lab Organization**	
2.2.1	First year classes are larger than upper classes	
2.2.2	Don’t generally need hoods but do use wet benches Storage is at a premium	
2.2.3	3D printers – 3 to 6 – primary use is capstone. These should be located in the project lab.	
2.2.4	Currently have 3 labs that are “tapped out”. Ideal is to have 1 lab for 30 students used for multiple courses.	
2.2.5	MEE has a BME lab that concentrates on plastic torsos used by both undergraduate and graduate students for robotic surgery and artificial organs	
2.2.6	MEE Cell Mechanics and Tissue Engineering Lab is research and going into new building. Also used for some teaching. Currently has one tissue hood.	
2.2.7	Teach Tissue Culture as a lab course	
2.2.8	Non-capstone projects, primarily first year, can last approximately 5 weeks. Work is currently left on counter for duration of project.	
3.0	**Future Biomedical Engineering (BME) Curriculum**	
3.1	**Growth**	
3.1.1	• Projected growth to 45 person classes with a desire to keep them together	

#	Item	Action
	• Could work with lecture hall style tables for 111 level course but a regular classroom would be sufficient • One large 100+ class, probably 150 expected and largest section is likely a 50 person class	
3.2	**Type of Labs and Accessory Spaces**	
3.2.1	Discussion on number and types of labs needed. Open to sharing one lab (Biomechanics) and using MEE labs for other teaching needs, for a total of 4 in the building.	
3.2.2	Biomechanics Lab: • Room for 24-30 students • Parts locker for items students take apart and put back together • Overhead power • Hoods are not required • Storage for plastic torsos and organs for teaching anatomy • Prefer a dedicated spot for each experiment (one bank of drawers per experiment) which could be at the perimeter under the benchtop	
3.2.3	Wet Lab: • Prefer 4 person groups, 32 is a good class size • Hoods down one wall away from entry to avoid airflow issues • 3-4 sinks at perimeter • Chemical storage cabinet – under a hood is OK • Need a glassware washer • Room could to be used for capstone overflow work	
3.2.4	Prep Area: • Does not need to be a separate room • Fume Hood for acid solutions, 3 hoods total • Students prep the material themselves	
3.2.5	Tissue Culture: Open format is fine and could be shared between disciplines • Only space with Biosafety Cabinets • 2 rows of 3 BSCs to teach 12 students at a time - 5 ft hoods are preferred – with write-up space beside or have a larger room overall so other classes could be taught concurrently • Might have 20 students registered but they don't all need to be served all at the same time • Preference is for TC room off of lab (as shown in the diagram in the presentation) but it is not required to be adjacent • Incubators– Stacked with a couple of CO_2 tanks • Sink • Room for a centrifuge	

#	Item	Action
3.2.6	Microscopy: • Should be adjacent to Tissue Culture • Optical benches are shared and need to be on the first floor	
3.2.7	Small Instrumentation Room should be close to labs	
3.2.8	Freezer storage: Have a -80, a couple of -20s, and a refrigerator or two	
3.2.9	Robotics: One table for robotics surgery teaching and research that is permanent – could off another room but does not need to be adjacent to teaching space.. Contains 3-4 robots and plastic torsos. Demonstration for up to 6 students at a time. Needs to be isolated so students can't get near equipment.	
3.3	**Future Lab Physical Space**	
3.3.1	Organization: • PPE is behavior: tie back hair and safety glasses – will need station for glasses in room • Would like only one glass wall so we "don't lose wall space for storage and equipment" • Showplace rooms that visitors can tour by, separate from research if possible • 2nd floor location is appropriate	
3.3.2	General Storage: • More tall storage rather than being over-benched • Instrumentation/fabrication • Small electronics equipment and parts storage	
3.3.3	Coat and Bag Storage • Ideal is to have cubbies and hooks inside lab • Liquids are not allowed in the lab so there should be physical separation, however in the hall cubbies are not often used	
3.3.4	Project Storage: • Non-capstone projects can be 5 weeks or so, primarily first year students • 8-10 storage units for lockable projects that are approximately 24"x24"x16"	
3.3.5	Services: • Power and Vacuum in center of room with valves on the tables, not overhead • Wireless data, can use hardwired data in Active Learning Classroom when needed • Pure water somewhere in lab. Current model is central DI with localized Millipore	
3.3.6	Benches: • Standing stools that fit under bench out of the way. Students destroy nice stools – no backs are preferred • Tops do not need to be chemically resistant so epoxy is not required	

#	Item	Action
	• Did not discuss size of bench	
3.3.7	Presentation Media: • Lots of whiteboards • Digital media in multiple walls	
4.0	**Next Steps**	
4.1	Next meeting to occur on February 26th or 27th. Time and location to be confirmed.	WBRC/UM
4.2	Deliverables for next meeting: • First draft program with space sizes • Draft room diagrams and adjacency diagrams	Ellenzweig
4.3	Information will be posted to Google Group when available. Provide AF with any files for upload.	AF
4.4	Comments go through Jeff between meetings	All

Meeting Minutes

Project: **University of Maine Engineering Education & Design Center**
Meeting Date: **February 26, 2018**

Topic: **Biomedical Engineering Teaching - Programming** Meeting Number **2**

Attendees:		
University of Maine Biomedical Engineering Teaching Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Carolyn McDonough	CMD	Director, Capital Planning and Project Management
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Peter Schilling	PS	Executive Director, Division of Lifelong Learning
Mike Mason	MM	Professor, Chemical and Biological Engineering
Paul Millard	PM	Associate Professor, Chemical and Biological Engineering
Mohsen Shahinpoor	MS	Professor, Mechanical Engineering
Lisa Weeks	LW	Lecturer, Chemical and Biological Engineering
Ellenzweig:		
Michael Lauber	ML	Principal in Charge/Programming Architect
Carolyn Day	CED	Lab Architect
WBRC:		
Kris Kowal	KK	Project Manager

#	Item	Action
1.0	**Review of Program Areas**	
1.1	Electronics/Instrumentation Typical electronics shop for assembly • Include soldering station with snorkel • Could be smaller • Need to control afterhours access	EZ to update layout
1.2	Tissue Culture • Equipment included is: centrifuge, Water bath, Incubators, Refrigerator(s), (2) CO_2 tanks • Spread the BSCs out a little but don't sacrifice bench area • Only need one door • Leave one area open below counter next to a BSC for equipment • Handwash sink with eyewash	
1.3	Shared resources • Autoclave • -80s and refrigerator • Glasswash	
1.4	Prep Lab One or two TAs use this space. It is basically a wet bench area so electronics and water aren't in the same place. • Shrink the size • Add chemical storage and a small benchtop autoclave • Water, Vac, CA in hood and at wall	EZ to update layout
2.0	**Layout**	
2.1	Swap instrumentation and microscope room so you can see into	EZ to update

#	Item	Action
	instrumentation from corridor Desire to use windows as marker boards	layout

2.2	**Main Lab**
	• Size and layout looked reasonable to committee
	• Committee would like visibility into the room
	• Services
	  o Dropdown power at tables
	  o Vacuum at perimeter
	  o Localized RODI
	• Sinks at perimeter don't need a lot of space at two of them
	• Add safety station
	• Add eyewash to sinks closer to hoods
	• Tall storage is for torsos, etc are needed
	• Don't need benchtop on both sides
	• Standing height benches with backless stools but also a preference for adjustable-height tables
	• One ADA hood, table and sink will be in final design
	• Storage for student projects – short gym locker size for ½ the number of chairs (work in groups of 2)
	• Rollaway cart for demonstrations
	• Indicate teaching station at sidewall - could be with a rolling table
		EZ to update layout

2.3	Microscopy • This room needs to be larger than proposed • Split into two halves with 2 stations on each side and darken room • Microscopes stored on benches – preference for 36" deep • Isolation table for one AFM but not doing laser work • Ethernet connections are required	
3.0	**Next Steps**	
3.1	Next meeting to occur on March 27th or 28th. Time and location to be confirmed	WBRC/UM
3.2	Ellenzweig will update layouts and program totals	EZ
3.3	All files will be uploaded to the shared Google Group	CD

Meeting Minutes

Project: **University of Maine Engineering Education & Design Center**
Meeting Date: **March 28, 2018**

Topic: **Biomedical Engineering Teaching - Programming** Meeting Number **3**

Attendees:		
University of Maine Biomedical Engineering Teaching Committee:		
Dana Humphrey	DH	Dean, College of Engineering
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Peter Schilling	PS	Executive Director, Division of Lifelong Learning
Mike Mason	MM	Professor, Chemical and Biological Engineering
Paul Millard	PM	Associate Professor, Chemical and Biological Engineering
Mohsen Shahinpoor	MS	Professor, Mechanical Engineering
Lisa Weeks	LW	Lecturer, Chemical and Biological Engineering
Ellenzweig:		
Michael Lauber	ML	Principal in Charge/Programming Architect
Carolyn Day	CED	Lab Architect
WBRC:		
Kris Kowal	KK	Project Manager

#	Item	Action
1.0	**Layout Updates**	
1.1	**Electronics/Instrumentation** Typical electronics shop for assembly • Include soldering station with snorkel • Will require ventilation • One wall to have tote storage system	
1.2	**Tissue Culture** • Layout works • Add a biohazard collection station	
1.3	**Prep Lab** • Need to add storage cabinets for acid, base, and organics • Add biohazard waste collection • Include small under-counter freezer and refrigerator • Prefer cabinets with shallow drawers • Leave room for prep carts below counter	EZ to update layout
1.4	**Main Lab** • General layout appears good	
1.5	**Microscopy** • (2) stations should be standard 30" depth, and (2) 36" • Add a counter to the "back" wall, 30" deep to create L-shaped workstation and prep zone • All counters and work stations are seated height • Include cabinet storage above and below counter • Dark finishes throughout • Lighting should be zoned separately on dimmers. No need for red	EZ to update layout

#	Item	Action
	light. • Divide room with optical curtain.	
2.0	**Next Steps**	
2.1	Next design phase is Schematic Design, beginning in May. Committee meeting time and frequency to be determined.	WBRC/UM
2.2	All rooms will be updated during Schematic design with items previously discussed during the programming phase.	EZ
2.3	All files will be uploaded to the shared Google Group	CD

Meeting Minutes

Project: **University of Maine**
Engineering Education & Design Center
Meeting Date: **January 30, 2018**

Topic: **Biomedical Engineering Research - Programming** Meeting Number **1**

Attendees:		
University of Maine Biomedical Engineering Research Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Caitlin Howell	CH	Assistant Professor, Chemical and Biomedical Engineering
Mike Mason	MM	Professor, Chemical and Biomedical Engineering
Rosemary Smith	RS	Professor, Electrical and Computer Engineering
Qian Xue	QX	Assistant Professor, Mechanical Engineering
Ellenzweig:		
Michael Lauber	ML	Principal in Charge/Programming Architect
Carolyn Day	CED	Lab Architect
Jim Blount	JB	Research Lab Architect (via GoTo Meeting)
WBRC:		
Kris Kowal	KK	Project Manager
Jenifer Richard	JR	Interior Designer

#	Item	Action
1.0	**Introductions and Overview**	
1.1	Karissa Tilbury, Assistant Professor in Chemical and Biomedical Engineering, was unable to attend the meeting.	
1.2	MM distributed a layout for BME research based on an internal departmental discussion using information previously provided by JB (see attached).	
1.3	Design team noted this meeting is an overview and determining need is an iterative process.	
2.0	**Research Activities**	
2.1	**Undergraduate Research**	
2.1.1	Undergraduates must do research to be competitive in field. Still voluntary but want to make mandatory. Currently pay or offer credits.	
2.1.2	Need to connect undergrads and grads. Grads would mentor several undergrads. 2-4 undergrads (usually 2) per grad student	
2.1.3	Undergraduates will use research labs. 8-20 undergrads at any given time.	
2.1.4	Likely they will become a Research Education for Undergraduates (REU) site, which has a special funding mechanism, for BME department. Have one in electrical and have some in ChemE. • 10-20 students over the summer. (ECE got 25 one summer). • Need desks and weekly meetings space.	
2.2	**Graduate Research**	
2.2.1	Only have graduate students that do research. All thesis students, some Masters and some Doctorate.	
2.2.2	Type of research varies.	
2.3	**Faculty Research**	
2.3.1	Meeting Participants:	

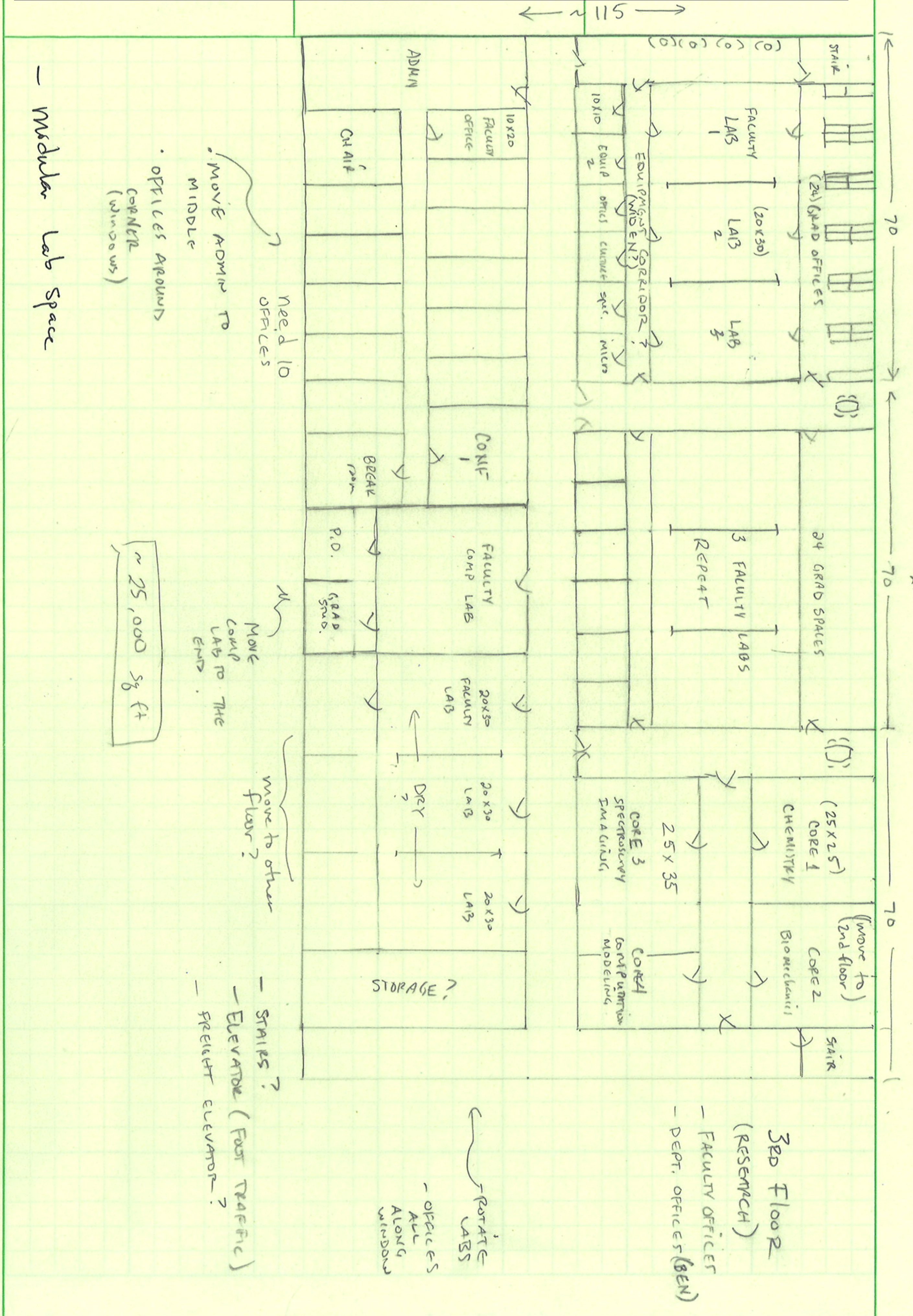
#	Item	Action
	• RS has a PhD in BME but is in ECE department. She often collaborates with BME faculty on research projects. • QX and her partner focus on using Computational Fluid Dynamics to study the human voice.	
2.3.2	Other Departments: • 12 or 14 faculty members who do all or some of their work in BME, however only 7 are in the department • MEE currently has 3 faculty with major research in BME. One does some tissue engineering. • Non-departmental faculty will not have offices in the new building, but want all “hard core” biomedical research to happen in building. • Need to have flex space in this building for other departments	
2.3.3	Bacteria work includes making materials and surfaces using 3D printing and modeling	
2.3.4	At least one researcher needs only dry computational labs	
2.3.5	Every other faculty member in BME is required to do research and productivity evaluation is 50% research.	
2.3.6	Departmental composition: • 3.5 graduate students/faculty member • 7 undergrads/faculty member • Some researchers only use post-docs and need whiteboard meeting space • At least 8 faculty members will do research, as much as 10. Lecturers also do some research but more education research. • How do we incorporate non-BME staff into building?	
2.3.7	Industry partners are common: • Small business short-term work for hire research that may lead into long-term work at a later date. Usually very short, up to a year, with one grad student. • Small locker room required for intellectual property storage • Electrical, Sensor development and EEG recording	
3.0	**Lab Requirements**	
3.1	**Dry Labs**	
3.1.1	Do not need to be on the same floor as the rest of the department.	
3.1.2	Per MM sketch preferred size would be for 3 labs on lower portion of plan.	
3.1.3	Could be visible for tours	
3.2	**Computational Labs**	
3.2.1	Qian does not need a dedicated room. Her students are doing mostly desk work.	
3.2.2	Large lab shown on MM plan is for a particular researcher. • Large workstations: 2 post-docs, 6 total workstations • “Pow-wow” space in center	

#	Item	Action
	• Computing equipment at perimeter	
3.3	**Wet Labs** Per MM sketch preferred size is for 6 labs on upper portion of plan.	
3.3.1	Bodily fluid work. Make one “unit of 3” a BSLII with isolated storage.	
3.3.2	No BSCs in main labs.	
3.3.3	Separate chemistry core lab with gasses	
3.3.4	Chemical fume hoods for materials prep, at least two per each 600 sqft lab. One might need four. All 5ft are hoods.	
3.4	**Tissue Culture** Used by multiple disciplines. Managed by one person with a nearby office.	
3.4.1	Some researchers work with mammalian cells and others with bacteria. These need to be separated. • Envision at least 2 TC spaces that are isolated from one another for contamination but can share resources. • Bacteria room needs to be adjacent to a lab. Low demand. • Mammalian work is in more use so needs to be larger. See if approx 200 sf works.	
3.4.2	Incubators • Dedicated but don’t need to be in same room (no instrumentation). • Could have incubators under center benchtop, 6 per lab. • Long-term projects are one month with incubation and data collection.	
3.4.3	• 3 hoods for mammalian and 3 for bacteria would be the most needed.	
3.5	**Shared Core Labs**	
3.5.1	Optics • Larger than other support rooms. Perhaps25x35 • 6 dedicated subdivided spots with curtains. Room needs to be dark • Some need an optics table but won’t need a large footprint • Electron microscope. • CW (building water is fine) • AFM • SPM	UM to confirm equipment
3.5.2	Computational modeling – separate from large computational lab • 6 workstations • Windows into space for tours monitors to display data and information to visitors	UM to confirm number of workstations

#	Item	Action
3.5.3	Biomechanics – small stuff, making implements, not exercise physiology • Force measurements (Instrons, etc) • Simulators, models • Careful of proximity to sensitive equipment • Windows into space for tours monitors to display data and information to visitors	UM to confirm equipment
3.5.4	Chemistry – standard wet chemistry • (5) 5ft hoods, some with glass racks • One glove box • Maximize sinks • Chem storage in hood bases (acid, base, flam)	
4.0	**General Discussion**	
4.1	**General requirements**	
4.1.1	Work in small groups and need lots of whiteboard space	
4.1.2	Space is about 600 sf per faculty member	
4.1.3	JB ask if there are restrictions on space due to grants. eg: • Intellectual property • NIH doesn't like material shared with other groups • Secured areas • Technology for securing intellectual property	UM
4.1.4	Would like groups closer so data exchange and students need to talk. For example the computational grad students and experimental grad students sitting with each other would be nice	
4.1.5	Consider traffic flow for restroom locations in regards to noise and vibration	
4.1.6	Like the idea of equipment corridor, smaller equipment in rooms. Takes larger equipment and storage out of lab if they are only periodically used.	
4.1.7	Conference room and break area can be shared, such as for seminars	
4.1.8	Would prefer to be on top floor for access control. If something had to move from this floor, dry labs and biomechanics could be with teaching labs.	
4.2	**Discussion of MM's sketch (attached)**	
4.2.1	General layout is 3 lab units with nearby core labs, faculty offices, and computational space.	
4.2.2	Desire to avoid reproducing uses in multiple locations: • Computational space could also be used to teach graduate course. • Tissue Culture Lab manager could also responsible for undergraduate TC lab (This also came up in the Teaching discussion)	
4.2.3	Large lab vs. separate smaller labs: • Smaller spaces discourage researchers from "parking" with unused or excessive equipment. • Concerns are cleanliness and air flow. Currently it is "impossible to get the labs clean" so MM does not want people walking through	

#	Item	Action
	units. • DH noted that faculty members will not "own" a space because needs shift so size of space is not as important as function. Need to maintain flexibility and a larger combined lab allows researchers to work together • JB noted the visioning group decided on larger room with some dedicated labs	
4.2.4	No Tissue Culture shown in diagram	
5.0	**Next Steps**	
5.1	Next meeting to occur on February 26th or 27th. Time and location to be confirmed.	WBRC/UM
5.2	Deliverables for next meeting: • First draft program with space sizes • Draft room diagrams and adjacency diagrams	Ellenzweig
5.3	Information will be posted to Google Group when available. Provide AF with any files for upload.	AF
5.4	Comments go through Jeff between meetings.	All

Sketch from Mike Mason, Associate Professor, Chemical and Biomedical Engineering - Jan 30, 2018



Meeting Minutes

Project: **University of Maine**
Engineering Education & Design Center
Meeting Date: **February 27, 2018**

Topic: **Biomedical Engineering Research - Programming** Meeting Number **2**

Attendees:		
University of Maine Biomedical Engineering Research Committee:		
Dana Humphrey	DH	Dean, College of Engineering
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Caitlin Howell	CH	Assistant Professor, Chemical and Biomedical Engineering
Mike Mason	MM	Professor, Chemical and Biomedical Engineering
Rosemary Smith	RS	Professor, Electrical and Computer Engineering
Karissa Tilbury	KT	Assistant Professor, Chemical and Biomedical Engineering
Qian Xue	QX	Assistant Professor, Mechanical Engineering
Ellenzweig:		
Michael Lauber	ML	Principal in Charge/Programming Architect
Carolyn Day	CED	Lab Architect
Jim Blount	JB	Research Lab Architect
WBRC:		
Kris Kowal	KK	Project Manager
Jenifer Richard	JR	Interior Designer

#	Item	Action
1.0	**Program Review**	
1.1	Note that faculty and graduate student offices are not included in research program numbers but included in Office program numbers. They are included in diagrams. The aim is to program research laboratories for 10 faculty principal investigators each with active researcher groups. The average research group size is 6-8 active bench researchers. The average research group consists of 3-5 graduate students and approx. 3 undergraduates all working in the main research lab at a time. As there can be larger numbers of undergrads supporting each research group, the committee does not want to aim for “ultra-efficient” lab design as this will create lab use and safety issues. General comments: • The Dean indicated a preference to have a “defined BME research suite or wing” that can be a candidate for donation/naming rights. Presently, there is a donor candidate and possible naming naming opportunity for the BME teaching lab.	
1.2	Program Area Reductions and Trade-offs; Ellenzweig was asked to suggest space program reductions for the BME research labs totaling approx. 2,500 NSF. Comments: • Eliminated equipment corridor in program plan. Should this come out or are there other spaces that could come out? UM to review. • The committee thought the 100 NSF Support Labs were too small.	

<table>
<tr><th>#</th><th>Item</th><th>Action</th></tr>
<tr><td></td><td>Action Item: EZ to to combine the smaller lab support rooms to make larger lab support rooms. This will result in less, but larger rooms approximately 150 NSF
Action item:
• EZ to study alternate small lab options.
• The proposed program area reductions including the decision to eliminate the equipment corridor should be reviewed and approved or modified by the Biomedical Engineering Research Committee.</td><td>EZ to investigate larger lab support rooms Alex Freiss to follow up with EZ on action item</td></tr>
<tr><td>2.0</td><td>Diagram Review</td><td></td></tr>
<tr><td>2.1</td><td>BSL2 Research Lab
The BSL2 <u>cellular Main Research Labs</u> (MRL) are planned as (3) separate 600 NSF main research lab MRL spaces each with direct connection to the Student Work Area (SWA), Lab Support Rooms and adjacent MRL's. Each separate MRL contains (2) 54" wide Biological Safety Cabinets (BSC), (2) mobile tissue culture carts, flexible "Core type" lab casework with adjustable benches, cabinets and shelves, (1) sink bench, and space designated for floor mounted equipment to include refrigerators, freezers and incubators. Lab services are to include compressed air, lab vacuum, standard power, some emergency power circuits and data to be located at all bench locations and lab vacuum, standard power circuits and data within each BSC. All MRL's will have a lab safety shower and eyewash station.
Comments:
• The committee agreed to proceed with more useable wall space and less doorways, mobile casework would not be necessary within the smaller cellular MRL's and Chemical Fume Hoods would not be needed in the BSL2 MRL as long as the Chemistry Core Lab was close by.
Action items:
• UM to confirm if natural gas is required within the MRL. If needed, it could be a local small gas cylinder.
• UM to confirm if BSL2 MRL's are to be planned/engineered to accommodate a certain amount of Wet MRL utility and services to enable a more flexible lab environment.</td><td>Alex Freiss to follow up with EZ on action items</td></tr>
<tr><td>2.2</td><td>BSL2 Research Lab
The BSL2 <u>open Main Research Lab</u> (MRL) is planned as (1) 1,800 NSF space. The entire open lab space contains (6) 54" wide Biological Safety Cabinets (BSC), (6) mobile tissue culture carts, flexible "Core type" lab casework with adjustable benches, cabinets and shelves at the wall locations and mobile "Cart type" lab casework with adjustable benches, cabinets and shelves at the island bench locations, (3) sink benches, and space designated for floor mounted equipment to include refrigerators, freezers and incubators. Lab services are to include compressed air, lab vacuum, standard power, some</td><td></td></tr>
</table>

<table>
<tr><th>#</th><th>Item</th><th>Action</th></tr>
<tr><td></td><td>emergency power circuits and data to be located at all bench locations and lab vacuum, standard power circuits and data within each BSC.
All MRL’s will have a lab safety shower and eyewash station.
Comments:
• The committee agreed to proceed with more useable wall space and less doorways, mobile casework could be used at certain island bench locations within the larger and more open MRL’s and similar to the cellular labs Chemical Fume Hoods would not be needed in the BSL2 MRL as long as the Chemistry Core Lab was close by.
Action items:
• Confirm if natural gas and processed pure water is required within the MRL. If natural gas is needed, it could be a local small gas cylinder.
• UM to confirm if BSL2 MRL’s are to be planned/engineered to accommodate a certain amount of Wet MRL utility and services to enable a more flexible lab environment.</td><td>Alex Freiss to follow up with EZ on action item</td></tr>
<tr><td>2.3</td><td>Wet Research Lab
The Wet open Main Research Lab (MRL) is planned as (1) 1,800 NSF space. The entire open lab space contains (1) 54” wide BSC and (1) 72” wide Chemical Fume Hood (CFH), flexible “Core type” lab casework with adjustable benches, cabinets and shelves at the wall locations and mobile “Cart type” lab casework with adjustable benches, cabinets and shelves at the island bench locations, (3) sink benches, and space designated for floor mounted equipment to include refrigerators, freezers and centrifuges. Lab services are to include compressed air, lab vacuum, standard power, some emergency power circuits and data to be located at all bench locations and lab vacuum, compressed air, standard power circuits and water with cup sinks within each CFH. All MRL’s will have a lab safety shower and eyewash station.
Comments:
• The committee agreed to proceed with more useable wall space and less doorways, mobile casework could be used within the larger and more open MRL’s, more CFH’s will be required in the Wet MRL The committee requested (6) 72” wide Chemical Fume Hoods (1 per aisle)
• BSC’s would not be needed in the Wet MRL as long as the Tissue Culture Core Labs were situated close by.
• UM would consider a cellular Wet Research Lab as an option to all open.
Action items:
• UM to confirm if natural gas and processed pure water is required within the MRL. If natural gas is needed, it could be a local small gas cylinder.</td><td>EZ to develop cellular Wet Research Lab

Alex Freiss to follow up with EZ on action item</td></tr>
</table>

#	Item	Action
2.4	Dry Research Lab The Dry open Main Research Lab (MRL) is planned as (1) 1,800 NSF space. The entire open lab space contains flexible "Core type" lab casework with adjustable benches, cabinets and shelves at the wall locations and mobile "Cart type" lab casework with adjustable benches, cabinets and shelves at the island bench locations, (3) sink benches, and space designated for floor mounted equipment to include refrigerators, freezers and centrifuges. Lab services are to include compressed air, lab vacuum, standard power, some emergency power circuits and data to be located at all bench locations and lab vacuum, compressed air, standard power circuits and water with cup sinks within each CFH. All MRL's will have a lab safety shower and eyewash station. Comments: • The committee agreed to change the Dry Lab name to Flex Lab. • The committee agreed to proceed with more useable wall space and less doorways. • The committee requested (3) sink benches equally distributed along the long wall. • The committee agreed the Flex MRL's are to be planned/engineered to accommodate a certain amount of Wet MRL utility and services to enable a more flexible lab environment. (2 or 4 future CFH's) • The committee requested the Flex Lab to be capable of accommodating laser optical tables with dark room environmental criteria. Action items: • UM to confirm if natural gas and processed pure water is required within the MRL. If natural gas is needed, it could be a local small gas cylinder. • EZ to study creating an open and flexible optical lab environment.	Alex Freiss to follow up with EZ on action item EZ to develop flexible optical lab environment
2.5	Computational Research Lab The computational modeling lab layout (3.3.3) presented later in the meeting was preferred in lieu of the Computational Lab layout (3.1.4) With this switch in mind, the committee requested a space with 8-10 workstations with a separate meeting space for 6-8. Action item: • UM to set up a separate internet meeting with Andre.	EZ to revise layout Alex Freiss to follow up with EZ on action item
2.6	Student Work Areas (SWA): The SWA are open office environments separate, but directly adjacent to the MRL's for graduate students with semi-private desks and one common collaboration area per 1,800 NSF of MRL. • It was noted that there may be more student desks in the diagram than are needed. However, after further review, it was determined there may be as many as 6 to 8 bench researchers per 600 NSF MRL	

#	Item	Action
	(6-8 per PI) • Collaboration area – layout could take different forms with writing surfaces and monitor or different types of furniture. EZ to provide alternate layout for UM review.	
2.7	Core Lab – Tissue Culture (Mammalian) Reduced from 300 to 200 NSF and includes (2) BSC, (2) mobile Tissue Culture Carts, (3) sets of stacked incubators, (2) Refrigerators, a large consumables storage cabinets and a wet preparation / sink bench. Comments: • The committee prefers the BSCs on one side and the incubators and refrigerators on the other side. • Mammalian culturing needs to be remote from the bacteria culturing. Action item: • EZ to update diagram	EZ to modify TC core lab
2.8	Core Lab – Tissue Culture (Bacterial) • Same as Tissue Culture (Mammalian) noted above	
2.9	Core Lab – Imaging Suite Core lab includes common shared preparation area, (3) separate enclosed labs for highly sensitive activities (Electron Microscope, Atomic Force Microscope and Scanning Probe Microscope), (1) open area subdivided into (3) smaller areas with optical curtains for activities requiring light control (Confocal Microscope, UV VIS on vibration isolation tables), Core Lab Manager Office. Comments: • Core lab manager's office is located within the suite, but the manager will likely support undergraduates and need to be in a more accessible location. • Expensive equipment or equipment requiring special environmental conditions should be located in an enclosed room such as EM, AFM and SPM. Others can be in open lab subdivided with curtains. • Like having sinks in the area of the open lab. • Want access from prepare into open lab, but not direct access off corridor. Don't allow for walk through. • Like the overhead grid above open labs to provide unlimited flexibility in locating vibration isolation tables and instrumentation shelving above. Action items: • It was noted after the meeting the new information provided at the meeting including the need to accommodate (3) vibration isolation tables will require more than 600 NSF.	EZ to study options for new core lab layout in larger suite

<table>
<tr><th>#</th><th>Item</th><th>Action</th></tr>
<tr><td>2.10</td><td>Core Lab - Computational:
The computational lab layout (3.1.4) presented earlier in the meeting was preferred in lieu of the Computational Lab layout (3.3.3)
With this switch in mind, the committee requested a space with 8-10 workstations with a separate teaming space for 6-8.
Comments:
High partitions for privacy.
May be a space where a graduate computational class so a marker board and monitor would be needed.
Transitory space, not office space. Could be space for summer students as well.
Action item:
UM to set up a separate internet meeting with Andre</td><td>EZ to revise layout
Alex Freiss to follow up with EZ on action item</td></tr>
<tr><td>2.11</td><td>Core Lab - Chemistry
400 NSF lab dedicated to Chemistry activities and contains (2) 60” CFH’s, flexible “Core type” lab casework with adjustable benches, cabinets and shelves, (2) sink bench, and space designated for floor mounted equipment to include refrigerators, freezers and flammable storage cabinets. Lab services are to include compressed air, lab vacuum, standard power, some emergency power circuits and data to be located at all bench locations and compressed air, lab vacuum, standard power circuits and water/cup sinks within each CFH. The Chemistry Core Lab will have a lab safety shower and (2) eyewash station.
Comments:
Size and shape OK, need (2) more CFH’s
Needs adequate chemical storage
Action items:
EZ to revise layout</td><td>EZ to revise layout</td></tr>
<tr><td>2.12</td><td>Core Lab - Biomechanical
400 NSF lab dedicated to Biologically based mechanical engineering activities and contains (1) 60” CFH and (1) 54” BSC, flexible “Core type” lab casework with adjustable benches, cabinets and shelves, (2) sink bench, and space designated for floor mounted equipment to include Instron UTM’s, tension , compression and other material testing equipment. Lab services are to include compressed air, lab vacuum, standard power, some emergency power circuits and data to be located at all bench locations and compressed air, lab vacuum, standard power circuits and water/cup sinks within each CFH. The Biomechanical Core Lab will have a lab safety shower and (2) eyewash station.
Comments:
No need for BSC. Likely no need for CFH. Need input from MEE researchers.
Heavy duty tables in lieu of lab casework.</td><td></td></tr>
</table>

#	Item	Action
	• One sink is sufficient (Need soil separator/Filter?) • Hoist on a rail and unistrut or 80/20 structure grid above for mounting equipment and securing experiments. • Similar to WHOI Lab shown during meeting	EZ to revise layout
2.13	Lab Support: (10) Small 100 NSF labs dedicated to research activities that cannot take place within open MRL's or Core Labs including housing noisy, messy or heat producing instrumentation or equipment, isolated tissue cultures, dark room or alternate light source (ALS) microscopy, or other highly specialized research activities. Comments: • Use them as you need them, all are small sink bench with mobile furnishings. • Spaces should be mostly fit out with mobile casework or tables, except where sink benches are necessary. • Concern was expressed that 100 NSF is too small to be functional. Action items: • EZ to study larger lab support rooms	EZ to revise layout

Meeting Minutes

Project: **University of Maine**
Engineering Education & Design Center
Meeting Date: **March 28, 2018**

Topic: **Biomedical Engineering Research - Programming** Meeting Number 3

Attendees:		
University of Maine Biomedical Engineering Research Committee:		
Dana Humphrey	DH	Dean, College of Engineering
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Caitlin Howell	CH	Assistant Professor, Chemical and Biomedical Engineering
Mike Mason	MM	Professor, Chemical and Biomedical Engineering
Rosemary Smith	RS	Professor, Electrical and Computer Engineering
Karissa Tilbury	KT	Assistant Professor, Chemical and Biomedical Engineering
Qian Xue	QX	Assistant Professor, Mechanical Engineering
Andre		
Ellenzweig:		
Carolyn Day	CED	Lab Architect
Jim Blount	JB	Research Lab Architect
WBRC:		
Kris Kowal	KK	Project Manager

#	Item	Action
1.0	**Program Review**	
1.1	Need to review sizes of Computational Modeling Core lab and Chemistry Core Lab • Not all showers are shown in diagrams. Note that there will be no floor drains at showers – this is a building maintenance issue. • Emergency power discussion will happen later in the design process.	
2.0	**Research Labs**	
2.1	Student Work Areas (SWA) Comments: • Enclose interaction & collaboration area with glass walls to address concerns about acoustics as well as maintain visual connectivity to and from space and enable better daylight penetration to MRL's.	EZ to update diagrams accordingly
2.2	BL2 - Main Research Labs (BL2 MRL) / 3.1.1 Comments: • Most on the committee liked the cellular main research lab modules and not the open BL2 lab. The decision was made to go forward with cellular BL2 MRL's. • Each MRL module should have (1) BSC and (1) CFH • The window area along the public corridor-side of the diagram seems large. Reduce window area, increase lab bench/equipment space while maintaining some amount of window from lab to corridor.	EZ to update diagrams accordingly
2.3	Chemistry Main Research Lab (Wet MRL) / 3.1.2 Comments: • No decision was made regarding open vs. cellular Chemistry MRL	EZ to update diagrams accordingly

#	Item	Action
	• The area shown with flammable storage cabinet adjacent to the CFH could be for floor mounted equipment • The window area along the public corridor-side of the diagram seems large. Reduce window area, increase lab bench/equipment space while maintaining some amount of window from lab to corridor.	UM to make decision on open vs. cellular Chem MRL
2.4	Flex Main Research Lab (Dry MRL) / 3.1.3 Comments: • The decision was made to go forward with an open Flex MRL. • The flex MRL could be used for optical / laser experiments and should be capable of being subdivided with optical curtains. • The window area along the public corridor-side of the diagram seems large. Reduce window area, increase lab bench/equipment space while maintaining some amount of window from lab to corridor.	EZ to update diagrams accordingly EZ to prepare MRL option with optical layout.
2.5	Computational Main Research Lab (Cpt MRL) / 3.1.4 Comments: • Increase size of interaction/collaboration table to 8 people and engage with technology wall. • Round edges of desks of desks • Heavy wattage in room. Will need extra cooling • Show furniture solutions and equipment	EZ to update diagrams accordingly
3.0	**Support Rooms**	
3.1	General Comments for all Lab Support spaces: The lab support spaces have been shown fit out for specific functions, but can be easily adapted to other support research activities. Once exception is cold storage. If walk-in cold storage is required, this must be determined early in the design phase. UM has been encouraged to consider the energy use of cold room vs. smaller shared refrigerators which are much less energy efficient. Comments: • As lab support space is typically shared space, the use of open wall shelving is less desired. Provide lockable wall cabinets with windows, where possible. • Cylinder vs. distributed gases needs to be discussed with EH&S	UM to decide on need for walk-in cold storage EZ needs to meet with UM EH&S
3.2	Research Support (Tissue Culture) / 3.2.1 • No comments	
3.3	Research Support (Chemistry) / 3.2.2 Comments: • Needs wall cabinets for dry chemical Storage above bench.	EZ to update diagrams accordingly
3.4	Research Support (Imaging) / 3.2.3 • No comments	
3.5	Research Support (Instrument Lab) / 3.2.4 Comments:	EZ to update diagrams

#	Item	Action
	• Move sink to end of bench in center of room to make smaller to maximize counter space	accordingly
3.6	Research Support (Equipment Lab) / 3.2.5 • No comments	
3.7	Research Support (Specialty Lab) / 3.2.6 • No comments	
4.0	**Core Labs**	
4.1	General Comments for all Core Lab spaces: • As Core Lab space is typically shared space, the use of open wall shelving is less desired. Provide lockable wall cabinets with windows, where possible. • Cylinder vs. distributed gases needs to be discussed with EH&S	
4.2	Core Lab (Tissue Culture) / 3.3.1 • No comments	
4.3	Core Lab (Imaging Suite) / 3/3/2 Comments: • The smaller version is tight but manageable. Proceed with smaller version. • Include shelving above microscope tables in center room	EZ to update diagrams accordingly
4.4	Core Lab (Computational modeling) / 3.3.3 Comments: • Add cabinets and counter for storage and printers at one wall • Add cubbies and hooks on other wall nearest entry door for students when lab is in “classroom” mode.	EZ to update diagrams accordingly
4.5	Core Lab (Chemistry) / 3.3.4 Comments: • Space can be reduced but need to run 4 experiments at once (more hoods and less bench) • Large deep sinks and chemical storage • Like 2 racks of drawers next to hoods • Discussion about U-shape to eliminate circulation area vs safety • 2 lighting zones – yellow light	EZ to update diagrams accordingly
4.6	Core Lab (Biomechanical Lab) / 3.3.5 Comments: • Switch sink bench with floor mounted equipment space to provide flexibility for deeper lab, when needed.	EZ to update diagrams accordingly
5.0	**Next Steps**	
5.1	Submit revised diagrams for Programming Report Phase-end review	

Meeting Minutes

Project: **University of Maine**
Engineering Education & Design Center
Meeting Date: **January 30, 2018**

Topic: **Project Lab – Programming**

Meeting Number **1**

Attendees:		
University of Maine Project Lab Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Peter Schilling	PS	Innovation in Teaching and Learning
Andy Goupee	AG	Assistant Professor, Mechanical Engineering
Caitlin Howell	CH	Assistant Professor, Chemical and Bioengineering
Jim McClymer	JM	Associate Professor, Physics and Astronomy
Will Manion	WM	Associate Professor, School of Engineering Technology
Yifeng Zhu	YZ	Professor, Electrical and Computer Engineering
Xenia Rofes	XR	Lecturer, Civil and Environmental Engineering
Ellenzweig:		
Michael Lauber	ML	Principal in Charge/Programming Architect
Carolyn Day	CED	Lab Architect
WBRC:		
Kris Kowal	KK	Project Manager
Jenifer Richard	JR	Interior Designer

#	Item	Action
1.0	**Introductions**	
1.1	Edwin Nagy was unable to attend this meeting.	
2.0	**Engineering Project Structure**	
2.1	**Mechanical Engineering (MEE) Capstone** • MEE is a yearlong project during senior year, 1st semester is design and 2nd semester is assembly. Not necessarily a clear-cut division – assembly may start late 1st semester. • MEE senior class estimate is 150 = 30 teams. • Project lab is also a course with instructor.	
2.2	Projects are varied in size and scope. For example boats are 1x1.5 meter and land drones are put on bench tops. Range of materials in use: metals, increasingly composite materials, balsawood (advanced structures for airplanes and drones), plastics, 3D printing, rapid prototyping, etc.	
2.3	**Biomedical Engineering (BME) Capstone** • Capstones are still evolving, but share some similarities with MEE and Chemical Engineering. • Many require a wet lab environment. • Faculty mentors instead of a set course. • BME student body growth to 170 total with 40 doing capstone (UM to confirm), for approximately 10 groups total.	UM
2.3.1	Flex space to do human trials for biomechanical projects. Need monitors to show data in real time that is visible to group. Will use all the equipment and areas used by MEE.	

#	Item	Action
	Wants to be attractive to other fields outside of engineering.	
2.4	**Electrical and Computer Engineering (ECE) Capstone** Most projects are done on the benchtop and left in place. They will be built and re-built repeatedly. Moving projects can sometimes be sensitive. Number of project teams to be confirmed.	UM
2.5	**Other Project Use**	
2.5.1	U Maine has other engineering buildings so it may make sense for ECE's to work mostly in Barrows because there is excellent space there. The new space will not accommodate 700 seniors building/designing in this space.	
2.5.2	Engineering Technology: Most projects have assembly in fall semester. 3 semesters total (spring- fall-spring) • CET projects are too large for the Project Lab space and are generally done in the field. They may use some Project Lab space for a small projects like building a bench. This would be in and out in a period of weeks for a special class • MET and EET are doing things very similar to MEE and ECE so uses overlap	
2.5.3	General: • Hope is for interdisciplinary teams in the future. This means pedagogy will change but total teams and needs won't. • Would like every student in the college to circulate through the space for a period of time, e.g. Civil will practice presentations or ECE will do car racing.	
2.6	**Spaces not needed:** • Civil and Chem E don't need capstone project assembly space. They work on a design problem. Might use 3D printers but need more presentation and team working areas. • Engineering Physics declare a focus in one of the engineering majors	
3.0	**Work Spaces**	
3.1	**Assembly Space** Assembly space "flavor" should be neutral, more like Marquette's.	
3.1.1	Support rooms transparent but separate like the diagram in the presentation.	
3.1.2	General preference for movable tables with lots of overhead services, including power and CA throughout.	
3.1.3	Rice has a "terrific space" because it looks like all kinds of cool things are going on in there. Early example of comprehensive assembly. Old production kitchen. So popular they ended up renovating a second floor. General sense that the University of Wisconsin maker space of an interactive and collaborative space was the desired feel when you look in.	
3.2	**Design and Collaboration Space**	
3.2.1	Envision more of an active learning classroom type space – multi use space.	

#	Item	Action
	Open environment is good for collaboration, rather than individual rooms. Students like the fishbowl in Crosby. Congregate with self organization.	
3.2.2	Should be accessible in the evening so students can work on their own schedule.	
3.2.3	RPI has a team collaboration area which is one room with niche where they can work with a separate area in center for teaching or interaction. More decentralized learning.	
3.3	**Team Rooms**	
3.4	**Club Space** 3 main types: automotive, electronic/robotic, and BME. Concrete canoe will stay in its newly renovated area.	
3.4.1	BME Club: similar to capstones on a smaller scale. Can overlap with the capstone space. Require table space with outlets and assembly area.	
3.4.2	Robotics Club: currently does not have a space to work on campus.	
3.4.3	Auto Clubs (SAE, ASME, AIAA, Mini Baja, etc) Plan is to have spin-off capstone projects from club projects. • Auto club of 2-bay garage with room for 3 projects • Engine dynamo is underutilized – will need room for a portable one • Room for moveable gantry. Likely rented as needed, note stored in space. • Open 24/7 • Needs access to other fabrication areas	
3.5	**General Accommodations** • Forklift needs to get all the way into lab and perhaps into Welcome Center for display. • Access to outdoors from Assembly area • Double doors between all spaces to move larger equipment and projects. • Freight elevator for large equipment	
3.5.1	Housekeeping: Minimize surfaces (pipes, etc) so horizontal areas do not need constant cleaning. Consider ventilation needs.	
3.5.2	Goal is for some of the student groups that aren't building projects will use space for the purpose. Distributed media and meeting rooms are important. Don't expect every student in the college always being there.	
3.5.3	The Project Lab Suite needs to come off with a feel that it's everyone's space and not MEE dominated. *DH: "No matter a person's origin or gender, we don't want to be attracting a bunch of gearheads." Must be appealing to a broader range of individuals.* *AF: "Portray engineering as 'I can solve a problem that is good for humanity.'"*	
3.5.4	Need space for project display areas, not just poster areas or pin-up space. Could spill into Welcome Center or other public areas.	
3.5.5	Need to control access so that only trained students can use particular	

#	Item	Action
	equipment.	
3.5.6	Double-height spaces are not required.	
4.0	**Support Spaces**	
4.1	**Testing equipment** (MEE) Increasingly used for both manufacturing and testing of materials. All are running per equipment specifications.	
4.2	**Machine Shop** (MEE, BME) • Lathe • Mill • CNC router or mill • Drill press • Band saw • Bridgeport	
4.3	**Wood Shop** (MEE, BME) • Router • Mold making	
4.4	**Composite materials area** (MEE, BME) Lots of students in these courses in addition to capstone. Could use as teaching lab for a small section – currently go over to composites center. 4 tables for the different functions • Roll of fiber • Cutting area • Basic tool storage • Layup area including space for molding and snorkel ventilation • Fume hood • Infusion with Vacuum • Autoclave for pre-preg • Small chest freezer	
4.5	**Electronics Area** (EEE, MEE, BME, ECE) Could be shared with all disciplines. ECE would like it to be part of the assembly area and not a separate room since projects are left in place. • Workstation with soldering and snorkel • Testing equipment • 3D printing • Print circuitboards locally – pcb printer	
4.6	**Booths that don't need a separate room**	
4.6.1	Spray booth (MEE, BME) Rarely used but needed. Need to keep separate from welding. Facilities offered they can accommodate larger projects when needed.	
4.6.2	Welding booth (MEE, BME)	
4.7	**Wet lab** (BME) Not thinking of this as Tissue Culture. Not currently BSLII (no containment	

#	Item	Action
	required) but should design for future use. Would also be used for clubs. • Used for flow trials for POC diagnostics. • Bench with sink and cupboards for simple chemicals • Mixing nanoparticles with nanobodies • Salts (?) • Glassware storage and drying • Fume Hood and Biosafety Cabinet	
4.8	**Tools and Parts**	
4.8.1	Materials storage area. Would be managed at College of Engineering level.	
4.8.2	Need to inventory and have a way to control. Either a person in a "crib" or an automated system such as vending machines for small fasteners or machine tools. Currently have Fastenal vending machines elsewhere on campus.	
4.8.3	At sites visited in early January, these spaces always had staff controlled lockers and tools. Professional lab manager with potentially more staff, definitely student assistants. Lab manager should be actively engaged in organization and upkeep to give the feel of the space.	
4.8.4	Sustainability: Would also like a way to recycle the inventory/re-use materials. Bring this in as a theme. What do we do with last year's projects? Bringing LCA into thinking, as a theme. Rewarding projects for this. Maybe clubs do disassembly.	
4.9	**Rapid Prototyping** (all) 3D printing and laser cutters	
4.10	**Project Storage** (all)	
4.10.1	Marquette glass-fronted storage cabinets were good because you can see if they are storing something they shouldn't. Different sizes are useful.	
4.10.2	Idea floated for the lockers to be publicly visible, with labels for the projects, so visitors can see what is going on. It was noted this is informative but not photogenic.	
4.10.3	Don't need storage for all teams. ECE will not use lockers since their work will stay on benches, and a percentage of MEE projects will be too large for any locker or difficult to put away. Both MIT and UW didn't use carts but BU did. Plan for 6 large projects to have fixed spots. Cleanliness becomes a culture and management issue.	
5.0	**Next Steps**	
5.1	**Schedule:** Next meeting to occur on February 26th or 27th. Final round of programming meetings the last week of March. Time and location to be confirmed.	WBRC/UM
5.2	Determine what equipment is moving and what is new. If new, need to know if that is coming out of building project budget.	UM

#	Item	Action
5.3	Deliverables for next meeting: • First draft program • Draft room diagrams Dana has a donor visit for the naming rights for this space at the beginning of March and he would like something to show them. Note they will understand it's preliminary.	WBRC/ Ellenzweig
5.4	Information will be posted to Google Group when available. Provide AF with any files for upload.	AF

Meeting Minutes

Project: **University of Maine**
Engineering Education & Design Center
Meeting Date: **February 26, 2018**

Topic: **Project Lab – Programming**   Meeting Number **2**

Attendees:		
University of Maine Project Lab Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Carolyn McDonough	CM	Director, Capital Planning and Project Management
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Peter Schilling	PS	Innovation in Teaching and Learning
Andy Goupee	AG	Assistant Professor, Mechanical Engineering
Caitlin Howell	CH	Assistant Professor, Chemical and Bioengineering
Jim McClymer	JM	Associate Professor, Physics and Astronomy
Will Manion	WM	Associate Professor, School of Engineering Technology
Yifeng Zhu	YZ	Professor, Electrical and Computer Engineering
Edwin Nagy	EN	Lecturer, Civil and Environmental Engineering
Ellenzweig:		
Michael Lauber	ML	Principal in Charge/Programming Architect
Carolyn Day	CED	Lab Architect
WBRC:		
Kris Kowal	KK	Project Manager

#	Item	Action
1.0	**Discussion of Program Area**	
1.1	Assembly area: • Currently, including vehicle areas, MEE has about 2,600sf • Projects are stationary • Don't need one sided tables. What is drawn will work. • Projector for occasional public demos • Engineering Technology will assemble in their own area • Dedicate half of assembly area to in place projects and the other half to movable	

1.2	Missing:
	• Does this area need a dark room for optics?
	• Electronics area
	• Demonstration space
	  o Could move aside tables and use center of assembly space
	  o Mechanical Engineering will continue to have demos outside or in an athletic facility
	  o ECE to figure out how large an area they need
	• Capstone Lab Manager office/desk but not in tool crib - Dana would like this person in an office somewhere in the middle with a lot of glass into safety critical functions (wood, metal, assembly)
		UM to evaluate
		
		ECE to evaluate

1.3	Recycling - bottom of priorities list (Nice to have) • Open to everyone and disassemble as students go. Point is to foster reuse of materials • New materials storage is more controlled – this area has a separate	

#	Item	Action
	mission	
1.4	Rooms to get rid of: • Paint - Add a hood to the vehicle space	
1.5	Teaming Space: • Fewer enclosed rooms, more open areas to work • Some negative reaction to having a collaboration space as a shared classroom – change name to something other than classroom • Use and availability to be controlled by scheduling, not physical layout • Prefer areas open to corridor instead of all enclosed rooms • Would like a plan for future to make these larger, perhaps with demountable partitions • Some concern that MEE students will work on projects in the enclosed rooms since they are directly across from assembly space • ChemE and Civil want spaces for computational work • Clump in groups so it is easier to find an empty room	ML EZ to revise adjacencies
1.6	BME Lab • Need a screen to collectively view materials • Desire to accommodate 15 club members at a time	
2.0	**Discussion of Suite**	
2.1	Like the concept of support spaces around the assembly areas	
2.2	Need access to some rooms from outside assembly area • Rapid prototyping – doesn't have to be off the assembly area • Testing • Composites • Biomed – keep out of main area for access and cleanliness	
2.3	Visibility from outside of building and/or public areas • Rapid prototyping • Assembly room	
2.4	Plan adjustments • Move material storage adjacent to wood and metal shop • Wood and Metal shop are separate from shop training	
2.5	Bottleneck will be central space – logistics of what gets stored vs stays on tables. University to discuss how this is controlled.	
3.0	**Next Steps**	
3.1	Next meeting to occur on March 27th or 28th. Time and location to be confirmed.	WBRC/UM

Topic: **Project Lab – Programming**

Meeting Number **3**

Attendees:		
University of Maine Project Lab Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Carolyn McDonough	CM	Director, Capital Planning and Project Management
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Peter Schilling	PS	Innovation in Teaching and Learning
Andy Goupee	AG	Assistant Professor, Mechanical Engineering
Caitlin Howell	CH	Assistant Professor, Chemical and Bioengineering
Will Manion	WM	Associate Professor, School of Engineering Technology
Brett Ellis	BE	Assistant Professor, Mechanical Engineering Technology
Ellenzweig:		
Michael Lauber	ML	Principal in Charge/Programming Architect
Carolyn Day	CED	Lab Architect
WBRC:		
Kris Kowal	KK	Project Manager
Jen		

#	Item	Action
1.0	**Review of Suite Layout**	
1.1	Plotter does not need its own area. Move to rapid prototyping and get rid of wasted space	
1.2	Testing • C&Ms, hardness, etc • Load frame • Heat treating at other labs in AMC	AF and BE provide list
1.3	Wood and Sanding shop • Composites is using sanding area • Most used space right now, so needs to grow in area • Need room for all equipment • Adjacent to Composites • CET capstone uses mostly wood shops • 4x8 CNC mill for foam cutting and mold making	AF and AG to provide layout/list
1.4	Clubs • Construction club: Would need to be near wood shop • Vehicle clubs: needs to be near vehicle space • Overall these would need space in addition to capstone space to set up year-long projects • Formula SAE is in spring, Baja is in April	
1.5	Tool Storage • Needed for CET off-site projects • Currently have two small trailers • Can this be built into tool crib?	

#	Item	Action
1.6	Manager's Office • Adjacent to tool crib	
1.7	Rapid Prototyping • Looks large • Need to review what is going in here	AF, CH, and BE to supply equipment list
1.8	Auto • Metal work • Engine dino neds a spot next to the wall • Adjacent to electronics	
1.9	BME • Rename project space • Adjacent to rapid prototyping • Small testing equipment goes into project space • Adjacent to electronics	CH to provide equipment list
1.10	Electronics • Soldering is done at the benches at projects • Early prototypes maybe • Could just be a bench/rolling workstation that travels around the room – lives on the walls • Do need some instrumentation • MEE currently is just arduino based, not new circuitboards • Specialized infrastructure is already available elsewhere for large power or in vehicle bay • Need a workstation for large computational modeling • Need a couple of printers and move plotter here • Move as a cart(s) that are kept in tool crib? BME needs a fixed spot external to project room that is clean – larger and more complicated, MET and MEE need a cart	
2.0	**Discussion of Activity**	
2.1	What happens in the fall? • BME electives • Manufacturing classes • Composites classes • Freshman "cornerstone" projects – would need the storage space. CET 228 already does builds • 3D beam competition in fall • CET capstone is in fall – 50 students	
2.2	Scale • Does this want to be smaller rooms for teaching? • Is the scale appropriate for uses? • Do we want this as two spaces with lots of circulation? • Noise level?	

#	Item	Action
	• Still want to be able to see everything – glass wall	
2.3	AV • Large displays for video, but not a real display area. This is a workspace	
2.4	Access • Outdoor direct access from assembly - difficult to navigate through vehicle bay. • Forklift access in vehicle bay	
2.5	Equipment needs • Add equipment from excel list • Include tool bender in metal shop	UM to pull together full list CD to add items to metal shop
2.6	Storage • Under table is better • Capstone on table • Small projects for classes and student club projects do need storage cabinet – one section of wall with glass-fronted smaller cabinets – bigger than a breadbox. Similar to Marquette sizes • 40ish spots	
3.0	**Next Steps**	
3.1	Next phase is Schematic Design. Committee needs and meeting schedule to be determined	WBRC/UM

Meeting Minutes

Project: **University of Maine**
Engineering Education & Design Center
Meeting Date: **January 30, 2018**

Topic: **Classroom - Programming**

Meeting Number **1**

Attendees:		
University of Maine Classroom Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Dana Humphrey	DH	Dean, College of Engineering
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Peter Schilling	PS	Innovation in Teaching and Learning
Nuri Emanetoglu	NE	Professor, Electrical and Computer Engineering
Jean MacRae	JM	Associate Professor, Civil and Environmental Engineering
Olivier Putzeys	OP	Lecturer, Mechanical Engineering
Sara Walton	SW	Lecturer, Chemical and Biomechanical Engineering
Ellenzweig:		
Michael Lauber	ML	Principal in Charge/Programming Architect
Carolyn Day	CED	Lab Architect
WBRC:		
Kris Kowal	KK	Project Manager
Jenifer Richard	JR	Interior Designer

#	Item	Action
1.0	**Introductions**	
1.1	Paul Villeneuve and MacKenzie Stetzer were unable to attend the meeting	
2.0	**Departmental Needs**	
2.1	**Mechanical Engineering (MEE)** • Dictated by projected incoming mechanical class. Currently in the 90s but will grow to 180-200 lectures • Aiming for 40/50 for section sizes. Could be 2 sections of 75 or 4 of 50 • Upper class sizes are usually around 20	ALL
2.2	**Electrical and Computer Engineering (ECE)** • Sweet spot is 25 • 50 person for larger classes • Active learning would be easy for them to implement	
2.3	**Civil and Environmental Engineering (CEE)** • Projected classes in the 100 person range (currently 75) • Upper class sizes between 20-50	
2.4	**Chemical Engineering (CHE) and Biomedical Engineering (BME)** • 80-85 students per semester with multiple majors • 50 for smaller classes	

#	Item	Action
2.5	**Discussion of desired sizes:** Flat floor could all be active learning. Preference to not have more than 75 as active learning • (1) 100 person • (1) 50 person • A couple in the 24-30 range	UM-DH
3.0	**Classroom Types**	
3.1	**Seminar/Conference Rooms**	
3.1.1	Typically 15 person rooms	
3.1.2	Currently use department meeting rooms and this has worked. It could also be possible to share with club rooms.	
3.1.3	No need to have separate classrooms of this size	
3.2	**Large Tiered Rooms**	
3.2.1	University lexicon is tiered rooms are auditorium and flat floor is lecture	
3.2.2	Pedagogy Philosophy vs throughput • Ability to a larger classroom into two spaces • Acoustic issues, which peak at the same time creating a great deal of noise • Limited in ability to predict 15 years out, but likely need 150-200 person classroom	
3.2.3	Difficult to change early classes (statics/dynamics) to active learning so these types of rooms will continue to be required.	
3.2.4	Concern is that faculty can't get into middle of the row if tables are long while students are working in groups, though they typically don't need that level of engagement in the auditorium setting	
3.2.5	Desire for natural light and that these rooms aren't buried	
3.3	**Adaptive** 50-60 person can switch from lecture to active learning set-up	
3.3.1	Installing infrastructure allows for future switch of some rooms to adaptive learning at a later date	
3.3.2	Floor boxes can be problematic. Hard to keep clean, tend to break, furniture gets caught, etc. Imperfect solution but don't want overhead because of need to maintain sightlines.	
3.3.3	Desire to move to Active Learning and away from lecture only so it should be part of design if the project can afford the cost	
3.4	**Active Learning**	
3.4.1	Current Model • Discuss in a 10-15 minute lecture then work in groups. Use TV and document camera and then students do exercise. Don't need a central teaching podium, though do need a control station. • Groups look at the laptops together and monitor is used to distribute to the rest of class. They do not typically use the monitor for group work.	

#	Item	Action
	• Lots of whiteboard discussion. One student does computation, one collects data, and one does graphic. Whiteboard is for group thinking. • Do they envision active learning lab/lecture? Electronics classes already do some basic measurements in classrooms.	
3.4.2	90 person active learning classroom in Esterbrook has 100% utilization. Large desire for another one on campus. • Some feel this is ideal others feel that size is not manageable • Departments have asked for 120 person active learning with lecturer and 2 Teaching Assistants. • Location is far from engineering district	
3.4.3	Other current Active Learning locations: • Scheibel 202 – tables of 6, capacity of 47 • Boardman has two medium 65 rooms. Only one 35 seat. One 20 seat room.	
3.4.4	Missing large class sizes	
3.4.5	Preference for 6 person groups instead of 9	
3.4.6	Once instructors transition to this model, they need to be able to schedule a room because they can't teach material elsewhere. This means several have been reluctant to change courses. Some instructors are doing one class active learning and one lecture.	
3.4.7	Space Use • Teaching methods vary from use of monitors for some groups while others use whiteboards more • Nice to have a larger screen near control section. This way all students can face the lecturer. • Mini lecture – use TV and document camera and then students do exercise. Don't need a central teaching podium, though do need a control station. • Option for microphone. Some use them some don't	
3.4.8	Control of electronic media • Focus on students – they are already distracted. • Need ability to turn off the screens so students can work together sitting at the table and facing each other • Have a studio elsewhere to pre-record	
4.0	**Other Issues**	
4.1	**Distance Learning**	
4.1.1	Desire to make it easier for professionals to take all levels of courses. Real time with smart boards. Trick is that it works for both the folks in the class and remote.	
4.1.2	Prefer technology built into room instead of bringing it from elsewhere. Some instructors have difficulty getting technology up and running.	
4.1.3	Sharing upper level classes with USM so there are more electives available	UM

#	Item	Action
	to upperclassmen at both universities. Don't yet know if these are scheduled or on-demand. Need to ask what the people in southern part of the state would like to have.	
4.1.4	Suggestion for a TA who can switch between the content for distance learning.	
4.1.5	Size of classroom changes what technology would be required. 30 students can be properly lit for video and be heard on microphone	
4.1.6	Currently teaching Dynamics with 30 in the classroom and 20 remote. Difficult to have live discussion at this large size.	
4.2	**Tiered Media Structure** for rooms that are not Active Learning • First is traditional lecture – whiteboards and worksheets • Second has some media, perhaps web/video conference. • Third is for live capture for future use also synchronous learning	
5.0	**Next Steps**	
5.1	Next meeting to occur on February 26th or 27th. Time and location to be confirmed.	WBRC/UM
5.2	**Deliverables for next meeting:**	
5.2.1	Current and future classroom demand for Engineering	UM-DH (see 2.5)
5.2.2	Existing classrooms on campus with sizes	UM-JA
5.2.3	First draft program with space sizes Draft room diagrams and adjacency diagrams	Ellenzweig
5.3	Information will be posted to Google Group when available. Provide AF with any files for upload.	AF
5.4	Comments go through Jeff between meetings.	All

Topic: **Classroom - Programming** Meeting Number **2**

Attendees:		
University of Maine Classroom Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Carolyn McDonough	CM	Director, Capital Planning and Project Management
Dana Humphrey	DH	Dean, College of Engineering
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Peter Schilling	PS	Innovation in Teaching and Learning
Nuri Emanetoglu	NE	Professor, Electrical and Computer Engineering
Jean MacRae	JM	Associate Professor, Civil and Environmental Engineering
Olivier Putzeys	OP	Lecturer, Mechanical Engineering
Sara Walton	SW	Lecturer, Chemical and Biomechanical Engineering
Ellenzweig:		
Michael Lauber	ML	Principal in Charge/Programming Architect
Carolyn Day	CED	Lab Architect
WBRC:		
Kris Kowal	KK	Project Manager

#	Item	Action
1.0	**Program Discussion**	
1.1	Sizes are all for active learning, which is larger than traditional layout. • Discussion on preference – continue to budget for active learning • A room similar to the 60 person room is being built this summer	
1.2	Capstone collaborative space to be considered collaborative classroom? Or adjacent that can be scheduled for capstone classes. Capstone size is 2 sections of 75 so need an 80-90 person. Also good as a outreach space?	

1.3	Reduce number of classrooms from 9 to 5. What are appropriate capacities?
	• Have had preliminary meeting about campus's vs and Engineering's classroom needs
	• Tendency on campus is for smaller classes, which isn't the direction Engineering is going
	• Greatest need is very large and small rooms. See DH analysis attached.
	• Large lecture halls are for pre-requisites but how many do they need for engineering?
	  o BME is already looking for rooms with greater than 100 person capacity
	  o MEE total class size would be 150 for capstone but this could be split in two
	  o Group to discuss offline if they need a 200 person auditorium style room (*Note: This item was resolved just after meeting. This classroom is not required)*
		DH to pull uses
		
		JA to pull campus numbers
		
		UM

#	Item	Action

1.4	Layouts
	• Round vs rectangular tables:
	  o Some opinion that round tables are better for collaboration and makes for less dead space in corner
	  o Estabrook has round tables with a longer ratio
	  o Rectangular tables allow for more configurations
	  o Some were thrown off a little by big open space in center when rectangular tables are at the wall
	• Debate about floor boxes vs plugging in at wall – no conclusion, though JA noted facilities does not like floor boxes
		UM to decide

1.5	Small classroom/seminar rooms • Most grad classes are less than 20 • Can do double-duty as conference rooms but do want dedicated one just for teaching • Do not count the conference room as one of these seminar rooms • At least one room should have video conferencing available	
1.6	Tech support office – dedicated person for all building IT • Engineering will not support a full time person so UM to discuss if this is required or they will just call media services • Co-locate racks with tech support instead of in-room • Discussion with IT later about if the tel/data room is the same space • 200 sf of at least some storage space co-located with classrooms	UM to review
2.0	**Next Steps**	
2.1	Next meeting to occur on March 27th or 28th. Time and location to be confirmed.	WBRC/UM

Room Size Analysis
Dana Humphrey

				Engineering Only		Campus-wide	
Size	Engineering Class Enrollment Undergraduate Only			Classroom Capacity	Capacity/ Enrollment*	Classroom Capacity	Capacity/ Enrollment*
	Fall'17	Spring'17	Average				
1-4	8	5	6.5	---	---	---	---
5-20	42	32	37	0	0.00	11	0.30
21-30	27	27	27	10	0.37	29	1.07
31-40	19	19	19	1	0.05	18	0.95
41-50	29	17	23	2	0.09	12	0.52
51-60	12	15	13.5	1	0.07	6	0.44
61-70	5	5	5	2	0.40	5	1.00
71-80	4	5	4.5	1	0.22	4	0.89
81-90	1	2	1.5	0	0.00	1	0.67
91-100	0	1	0.5	0	0.00	4	8.00
101-200	1	0	0.5	0	0.00	4	8.00
201-300	0	0	0	0	---	2	---
301+	0	0	0	0	---	2	---
TOTAL	148	128	138	17		98	

*Low ratio means demand for this classroom size is high relative to availablity

31 January 2018

Meeting Minutes

Project: **University of Maine**
Engineering Education & Design Center
Meeting Date: **March 27, 2018**

Topic: **Classrooms - Programming**

Meeting Number **3**

Attendees:		
University of Maine Mechanical Engineering Teaching Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Peter Schilling	PS	Innovation in Teaching and Learning
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Roberta Hussey	RH	Administrative and Fiscal Manager, Student Records
Nuri Emanetoglu	NE	Professor, Electrical and Computer Engineering
Jean MacRae	JM	Associate Professor, Civil and Environmental Engineering
Olivier Putzeys	OP	Lecturer, Mechanical Engineering
Sara Walton	SW	Lecturer, Chemical and Biomechanical Engineering
Karen Horton	KH	Professor, Mechanical Engineering Technology
Ellenzweig:		
Carolyn Day	CED	Lab Architect
Michael Lauber	ML	Programming Architect
WBRC:		
Kris Kowal	KK	Project Manager
Jenifer Richard	JR	Interior Designer

#	Item	Action
1.0	**Program review**	
1.1	Dana passed around his assessment with current program and alternate program at same square footage with smaller classrooms. • Highest ratio means that it does not have as much demand. Chart shows there is not a high demand for 61-70 • Programmed (1) 30-40, (1) 50-60, (1) 60-70, (1) 100 • Proposed (1) 20, (1) 31-40, (2) 41-50, (1), 51-60, (1) 100 • Analysis does not take into account future growth • Decided (1) 20, (1) 31-40, (1) 41-50, (2) 51-60, (1) 100	
1.2	Diagrams • Showed versions of active learning classrooms with alternate configurations for traditional lecture setting • 100 person active classroom raises question of how the center gets powered o Is room flexible or have static center layout? o Facilities does not like floor boxes, favoring static layout o Discussion if room should be less flexible so it's more efficient. Could be longer, but not a great faculty-student connection • In 60 or 40 person rooms, a central aisle with tables against walls	
1.3	Active Learning • Have a 90 person active learning classroom on campus if lecturers need to see how this works • MET likes to walk around tables in active learning/computer rooms	

#	Item	Action
	• Some of the larger rooms are freeing up the schedule with newer software, allowing for other active learning classrooms on campus to be used more often	
1.4	Support spaces • Will be a lab manager, may be a building manager • No dedicated IT manager, but keep a media control room	
1.5	40 person room • This one will have higher finishes • Suggestion for glass walls as whiteboards because easiest to clean • Will be room for MEE meetings, guest lectures, and graduate seminars	
1.6	Request for room as focused computer lab for MET	

Meeting Minutes

Project: **University of Maine Engineering Education & Design Center**
Meeting Date: **January 29, 2018**

Topic: **Office Space – Programming**

Meeting Number **1**

Attendees:		
University of Maine Administration and Faculty Office Space Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Carolyn McDonough	CM	Director, Capital Planning and Project Management
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Peter Schilling	PS	Innovation in Teaching and Learning
Masoud Rais-Rohani	MR	Chair, Mechanical Engineering
Hemant Pendse	HP	Chair, Chemical and Biomedical Engineering
Karen Fogarty	KF	Administrative Specialist, Mechanical Engineering
Cathy Dunn	CD	Administrative Specialist, Chemical and Biomedical Engineering
Paul Millard	PM	Associate Professor, Chemical and Biomedical Engineering
Ellenzweig:		
Carolyn Day	CED	Lab Architect
Michael Lauber	ML	Programming Architect
WBRC:		
Kris Kowal	KK	Project Manager
Jenifer Richard	JR	Interior Designer

#	Item	Action
1.0	**Introductions**	
1.1	Justin Lapp, Associate Professor in Mechanical Engineering, was unable to attend the meeting.	
2.0	**Faculty and Administrative Offices**	
2.1	**Mechanical Engineering**	
2.1.1	18 faculty members currently, with projection to 30 in next decade. All the offices should be in the new building.	
2.1.2	3 administrative staff members. Ideally in offices for privacy.	
2.1.3	Chair office	
2.2	**Biomedical Engineering**	
2.2.1	6 faculty members, with growth target of 10/11 – all faculty in this building	
2.2.2	2 administrative staff members	
2.2.3	Chair office	
3.0	**Shared Administrative Resources**	
3.1	**Administrative Area**	
3.1.1	Discussion of shared administrative area and staff. Push-back on idea of shared staff due to foot traffic.	
3.1.2	Chair offices should be off of reception and waiting area, not hallway, to ensure people can't walk right into chairs' offices.	
3.2	**Support Space**	
3.2.1	Copy rooms/etc in the suite • Redundancy would be helpful • Enough volume to need multiple copiers	

#	Item	Action
3.2.2	Conference room is major need • Generally agreed to provide at least 2 conference rooms for the building, one with a capacity of 35, one with a capacity of 15-20; these would be a shared resource and could also see dual use as seminar rooms • BME has difficulty scheduling meetings with just 2 conference rooms already Primary MEE research space will remain in Crosby so it does not need to be in the new building.	
3.2.3	Mailboxes should be in departmental office.	
3.2.4	Faculty lounge • Don't combine with office because noisy • Microwave and refrigerator • Eating in a communal fashion shared between departments	
3.3	**IT Support**	
3.3.1	Mostly central on campus but Business has a dedicated person. Media management services both IT and AV.	
3.3.2	Most likely one person or shared office with 2 stations. Don't have one in Engineering right now but there is a growing need universitywide.	
3.3.3	Some facilitators could be students to handle technology to get a room/professor set up for distance-learning classes. One committee member noted that at a university they were previously at, there was a dedicated student in back switching between cameras or smart board during class.	
4.0	**Organization and Adjacencies**	
4.1	**Office Location**	
4.1.1	Keep faculty together, at least on same floor, regardless if they are doing research. Want to have faculty discussions – foster collaboration. Could be a suite or off a corridor. Don't necessarily want grad students out where conversations could be overheard.	
4.1.2	Suites off the corridor create more community. • 10-15 offices in each suite is ideal group, 30 would be too many. • AF noted that Boston University life sciences research had a good layout. Grad students were a little bit separated but still accessible.	
4.1.3	Offices should not be in the direct path of undergrads – could have space to meet in a corner for informal meetings. Not near the classrooms or "you end up with students asking for staplers".	
4.1.4	Centrally located grad students, offices have windows – adjacencies are discussed in BME research meeting	
4.2	**Office Requirements**	
4.2.1	• Current offices are between 120sf and 160sf, but an odd configuration. JA noted that Facilities uses 100sf for planning	

#	Item	Action
	• Aspect ratio is very important as it affects furniture. Currently rooms are long and narrow. "Don't want to be sitting on crunchy salt in the winter". • Offices should be enclosed for privacy • Bookcase and file storage will be needed. • Desire for a whiteboard in the room.	
4.2.2	Faculty-student meeting areas • Would like room for 2-3 students to meet so you don't have to go out to meeting room. • Also, small breakout spaces (2-3) intermingled with offices could be for shared use. • Often need to share a screen with the students so will rotate towards them. • Whiteboards in all meeting area for discussions.	
4.2.3	Glass walls and doors • AF would like privacy in the office so no clear glass walls. Other theory is to be able to see inside to avoid situation where faculty are alone unobserved with a student. Currently most faculty members leave doors open. Desire to avoid "stuff" plastered on walls. There is currently no campus policy on this.	
4.3	**Student Researchers**	

4.3.1	Graduate Students
	• BME currently has 2 cubicle office areas.
	  o Would like them near research labs.
	  o Growing to 50 grad students (4 per researcher).
	• MEE looking at 100 grad students in the future. Right now have 40
	  o Most are just doing computational modeling and about 20% are experimentalists.
	  o Some number of them will stay adjacent to labs in Crosby.
	  o Plan for 80 in new building.
	  o Right now they get a 5ft long desk with some walking space around it.
	• Large interaction spaces.
	• Plan for 35-50 sf per student. No need for separate rooms, could be partitions.
	• Large flexible model with access to faculty is preferred
	• Coffee maker in the corner is essential.	

4.3.2	Undergraduate Students in BME Labs • Need to be near labs. • Bullpen space is ideal. • Each one is only working in the lab for 1 or 2 semesters so it is not their personal space.	
4.3.3	Post-docs	

#	Item	Action
	• Space preferred is 2 post-docs per office or double the cube size of graduate students • 6 BME maximum • 5:1 grad to post-doc ratio in MEE so potentially 20	
5.0	**Next Steps**	
5.1	Next meeting to occur on February 26th or 27th. Time and location to be confirmed.	WBRC/UM
5.2	Deliverables for next meeting: • First draft program with space sizes • Draft room diagrams • Room layout and adjacency diagrams	Ellenzweig
5.3	Information will be posted to Google Group when available. Provide AF with any files for upload.	AF

Meeting Minutes

Project: **University of Maine**
Engineering Education & Design Center
Meeting Date: **February 26, 2018**

Topic: **Office Space – Programming**

Meeting Number **2**

Attendees:		
University of Maine Administration and Faculty Office Space Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Carolyn McDonough	CM	Director, Capital Planning and Project Management
Dana Humphrey	DH	Dean, College of Engineering
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Cathy Dunn	CD	Administrative Specialist, Chemical and Biomedical Engineering
Justin Lapp	JL	Associate Professor, Mechanical Engineering
Karen Fogarty	KF	Admin Assistant, Mechanical Engineering
Ellenzweig:		
Carolyn Day	CED	Lab Architect
Michael Lauber	ML	Programming Architect
WBRC:		
Kris Kowal	KK	Project Manager

#	Item	Action
1.0	**Program Discussion**	
1.1	Dean – have to have offices for all of the faculty that will be hired so that number is an immovable target.	
1.2	Change nomenclature so anything that isn't enclosed is "area" not "office"	ML
1.3	Grad Students: • MEE is more flexible due to all the places they work, research would be elsewhere. BME should all be in this building • Need to know what proportion of BME grad students need to be near wet labs and what aren't and should be in a bullpen • Justin would prefer MEE sit near professors. 20 outside/80 inside since they are computational	
1.4	Change of Sizes vs Number of offices • Campus standard is 100-120 square feet per office • Collaborative space outside of the office cluster	
1.5	Meeting rooms • MEE Department needs room for whole department to meet once every two weeks but ideally not a "classroom" • Currently at 17 faculty members • Heart of the department currently but this would become faculty lounge • Dual-purpose room that could be scheduled for classes controlled by department • Grad student defenses/seminars are larger than 15 but this could be done elsewhere on campus • 20-30 people meetings will be less frequent • Clubs may meet in this room as well, as they currently do Decision:	

#	Item	Action
	• Use a 30 person classroom and keep 15/20 person room as department identity • College to schedule classroom with block that is always available for meetings • Upgrade finishes for this dedicated room so it's not a vanilla classroom • Room will also be good for guest lecturers and talks	
1.6	Need a place with departmental identity • Wall decoration and trophies • Storage for department thesis collection • Use for graduate classes that meet 2x a week with appropriate technology	
1.7	Long discussion on how to work with vacant space on day one. • Possibly one classroom that is converted to grad space later • Some may need to serve as swing space for Phase 3 renovations	
1.8	Administrative offices co-located • Common area for both • 2 admin assistants for each department in same space as buffer for Department Chairs • Each Chair gets their own office (not currently programmed – 29+1 where 1 is larger) • The accounts manager will be shared and have their own office • 5 total admin is comfortable number	ML to update
1.9	Distribute printing locations so they are convenient for more offices and labs and separate from student copiers.	
1.10	Discuss trade-offs with steering committee. • Plan A is everyone in building, Plan B is not • Site at Crosby is positive programmatic flexibility	
1.11	Homework assignment to discuss how they will teach classes with increase in student body. Do they need the 200 person classroom? (see item 1.3 from Classroom Programming Meeting 2)	MEE / Classroom Committee
1.12	Arrangement: • Prefer suite of rooms over corridor • Where do students wait? • Haven't accounted for huddle rooms here – commons, team rooms, vacant offices, etc. • Haven't accounted for area in a suite model – Example of UMD setback seems appropriate for not being directly on corridor	ML to update
2.0	**Next Steps**	
2.1	Next meeting to occur on March 27th or 28th. Time and location to be confirmed.	WBRC/UM

Meeting Minutes

Project: **University of Maine**
Engineering Education & Design Center
Meeting Date: **March 27, 2018**

Topic: **Office Space – Programming**

Meeting Number **3**

Attendees:		
University of Maine Administration and Faculty Office Space Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Carolyn McDonough	CM	Director, Capital Planning and Project Management
Dana Humphrey	DH	Dean, College of Engineering
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Cathy Dunn	CD	Administrative Specialist, Chemical and Biomedical Engineering
Justin Lapp	JL	Associate Professor, Mechanical Engineering
Karen Fogarty	KF	Admin Assistant, Mechanical Engineering
Ellenzweig:		
Carolyn Day	CED	Lab Architect
Michael Lauber	ML	Programming Architect
WBRC:		
Kris Kowal	KK	Project Manager

#	Item	Action
1.0	**Program Discussion**	
1.1	Need room for record storage: (9) 4 drawer vertical file cabinets	
1.2	General discussion regarding faculty-student interaction • An interaction area has not been included in the program • Collaborative space is outside of the office cluster	
2.0	**Review of Diagrams**	
2.1	Offices • Will use one "long" wall for bookcases • The quantity of offices has been fixed	
2.2	Change of Sizes vs Number of offices • Campus standard is 100-120 square feet per office • Note that average areas of Boardman offices is 145sf but they are a long and skinny shape which is less flexible than planned area • It was noted that for all offices to increase from 120sf to 145sf it would cost the project approximately $650,000	
3.0	**Next Steps**	
3.1	Ellenzweig to create diagram of office suites	EZ
3.2	Schematic Design phase will begin in May. Committee requirements and schedule to be determined	WBRC/UM

Meeting Minutes

Project: **University of Maine**
Engineering Education & Design Center
Meeting Date: **January 29, 2018**

Topic: **Student Space – Programming** Meeting Number **1**

Attendees:		
University of Maine Student Space Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Dana Humphrey	DH	Dean, College of Engineering
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Meredith Kirkmann	MK	Assistant Professor, School of Engineering Technology
Melissa Landon	ML	Associate Professor, Civil and Environmental Engineering
Sheila Edalatpour	SE	Assistant Professor, Mechanical Engineering
Erin Ballew	EB	Student, Electrical and Computer Engineering
Andrew Manzi	AM	Student, Civil and Environmental Engineering
Sean Morris	SM	Student, Chemical and Biomedical Engineering
Ellenzweig:		
Michael Lauber	ML	Principal in Charge/Programming Architect
Carolyn Day	CED	Lab Architect
WBRC:		
Kris Kowal	KK	Project Manager
Jenifer Richard	JR	Interior Designer

#	Item	Action
1.0	**Introductions**	
2.0	**Desired Spaces**	
2.1	**Building Commons**	
2.1.1	Shared Rowan and Rutgers as contrasting types. One looks into other areas in the building and the other is off of the circulation zone. Reaction to Rutgers is a feeling of being watched. Committee seems to prefer Rowan. Rutgers • Introverted but with spaces – like a coffee shop with high and low surfaces, corners, touchdown areas • “Satellite social spaces” Rowan • Furniture choices with high backs/enclosed • Smaller spaces where you can’t hear everyone, maybe just off the coffee shop	
2.1.2	High and low spaces? Don’t focus on a “huge” space because that’s not welcoming	
2.1.3	Scale • Like two full stories of open window space so it feels grand yet also want it cozy • Like more open spaces, 2-story “wow factor” “feel good about yourself for being there	
2.1.4	Café with food and coffee	
2.1.5	Do you want to see internal workings of the building or is it a destination?	

#	Item	Action
2.1.6	Lots of natural light • Very nice to have that sunny outside view in the winter. • Solar control does become an issue (Alex) • Hard to go to work and come home in the dark	
2.1.7	Space Qualities: • Goal of an active space with energy when people come to visit. • Should be a welcoming place • Want more of a static inhabitable space	
2.2	**Study Spaces**	
2.2.1	Dedicated Group Study • Don't want pass throughs in the middle of any of the study rooms • What is the balance between closed and open areas? • Space to spread out laptops and notes • One of the civil project teams grabbed a full room with whiteboards that they took over for the whole semester	
2.2.2	ECE "rent out" benches and stay there the whole time. This would be used for study space.	
2.2.3	Do need meeting rooms. One capstone semester is all paperwork. • Typical capstone project teams are 4-6, with smallest being ECE projects are only 2 people • MEE currently get together at tables in an old computer lab • Size one for 10	
2.2.4	Don't really need individual study spaces. People who need that tend to find a corner to call their own and they don't have other uses. Students tend to put on headphones if they need to tune out.	
2.3	**Graduate Student Space**	
2.3.1	Need their own space to have fun. For example at another university graduate students have a ping pong table in a separate lounge.	
2.3.2	Mechanical could get to 80 grad students but that's aspirational	
2.3.3	MEE and BME need dedicated space so they are close to the faculty (including MEE)	
2.3.4	Need to decide which building(s) these students go – are they near faculty or lab for MEE? BME will be all in this new building	
2.4	**Parenting Room**	
2.4.1	Requires a sink and a microwave	
2.4.2	Private and lockable	
2.4.3	Did not discuss if this room would be scheduled or not	
2.5	**Club Space** for 18-24 total clubs	
2.5.1	Shared work room for 15-20 person meetings – may need two • One comfortable/private/noisy, one more of a conference setup • Both will need whiteboards and monitors/projectors	
2.5.2	Do need enclosed space for private discussion or meetings. For example Tau	

#	Item	Action
	Beta Pi is members only. Could be accomplished by scheduling spaces.	
2.5.3	Trophy display area – limited to just a few items each so the departments can also have items to display, such as older years.	
2.5.4	Cubbies for snowy boots and bags	
2.5.5	Storage: Some clubs need more and others none; for example: • SWE sells logowear so needs a small closet that has a higher level of security • Tau Beta Pi only needs a compact storage locker • Chi Epsilon needs no storage Note: Dean has seen department secretary's locked desk pried open for items of little monetary value	UM to confirm list/needs
2.6	**"Dirty" Hangout Space**	
2.6.1	Desire to have a space, like "the chez", where students can let loose and not worry about faculty or staff supervision. This would be a place where students can be "loud and messy".	
2.6.2	Have to create an open culture, lower classes don't go to "the chez" because they feel they need to be invited. Design should encourage/support openness of the culture.	
2.6.3	Could be combined with club space	
2.6.4	Desired amenities • Microwave • Refrigerator (who makes sure it's clean) • Television • Couch • Small lockers • Sink	
2.7	**Other Spaces**	
2.7.1	**Lobby**: Separate school bus/public entry from campus entry.	
2.7.2	**Breakout Areas**: Informal collaboration space "feels like good study space"	
2.7.3	**Exterior Student Space:** Connected to public student space. Would like both seating and lawn area.	
2.8	**Spaces Not Required**	
2.8.1	Showers and changing rooms	
2.8.2	No general lockers. Can be broken into and are inconvenient.	
3.0	**Desired Amenities**	
3.1	**General**	
3.1.1	Maximize whiteboards	
3.1.2	Power access • Place for "emergency charge" before class • Power strips in study and breakout areas to plug in laptops to work	
3.1.3	Facilities prefers TVs and Monitors over projectors and screens	

#	Item	Action
3.1.4	Indoor Vegetation • Campus doesn't have a lot of vegetation so interior plantings would be a nice amenity • Trees are for healthy environment, not for acoustics. • Also think of green walls on a vertical surface. Doesn't take up the volume.	
3.1.5	Printers are in high demand. 11x17 is sufficient for general use.	
3.1.6	Desire for lots of little corners to hang out to make building populated. Varying sizes and furnishings.	
3.1.7	Students would like a lot of "comfy" chairs. Faculty want to make sure students do not sleep in them.	
3.1.8	Snow and Rain Mitigation • Climate needs 25-30 feet of walk-off • Facilities does not like recessed foot grills, they prefer walkoff tiles which are easily replaced • Need to be able to get salt, not just snow, off of boots • Boardman rugs are soaked by 8am • Material choices are important: Boardman stairs were replaced twice in 30 years because of the rust	
3.2	**Inclusive Design**	
3.2.1	Intent to promote peer behaviors and opportunities to underrepresented groups. This is for social and cultural issues as well as accessibility	
3.2.2	Physical Environment • Consider use of texture and volume as cues for low-vision • Use physical transparency to avoid dark or hidden spaces • Gender neutral restrooms	
3.2.3	Refer to memo from faculty uploaded to Google Drive on 01/25/2018 for further information	
4.0	**Next Steps**	
4.1	Next meeting to occur on February 26th or 27th. Time and location to be confirmed.	WBRC/UM
4.2	**Deliverables for next meeting:**	
4.2.1	First draft program with space sizes Draft room diagrams and adjacency diagrams	Ellenzweig
4.2.2	Photographs of spaces students like to be on campus	UM
4.2.3	Add students to Google Group	UM-PS or AF
4.3	Information will be posted to Google Group when available. Provide AF with any files for upload.	AF
4.4	Comments go through Jeff between meetings.	All

Meeting Minutes

Project: **University of Maine Engineering Education & Design Center**
Meeting Date: **February 26, 2018**

Topic: **Student Space – Programming** Meeting Number **2**

Attendees:		
University of Maine Student Space Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Dana Humphrey	DH	Dean, College of Engineering
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Meredith Kirkmann	MK	Assistant Professor, School of Engineering Technology
Melissa Landon	ML	Associate Professor, Civil and Environmental Engineering
Sheila Edalatpour	SE	Assistant Professor, Mechanical Engineering
Erin Ballew	EB	Student, Electrical and Computer Engineering
Andrew Manzi	AM	Student, Civil and Environmental Engineering
Sean Morris	SM	Student, Chemical and Biomedical Engineering
Ellenzweig:		
Michael Lauber	ML	Principal in Charge/Programming Architect
Carolyn Day	CED	Lab Architect
WBRC:		
Kris Kowal	KK	Project Manager
Jenifer Richard	JR	Interior Designer

#	Item	Action
1.0	**Program Area Discussion**	
1.1	Team meeting rooms • Keep a couple of rooms larger if we need to lose any - Adjust program to 3 rooms at 200 sf and remainder at 125sf • Often a team of 6 plus 2 faculty members and/or a client, but this is the exception • Civil groups will use these rooms if they are available for project design • Need to have administrative approach to scheduling • Place in small clusters instead of larger groupings • Do like glass for visibility, but frosting at a band would be nice to avoid "fishbowl" feeling • Variation in furnishings for flexibility • Mark some as quiet organically – not at day one	ML
1.2	Commons • Rowan is about 2,600 sf • Intent is a “living room” for students to feel comfortable in, not an atrium • Like the feel of the break-out area in Rowan for the coffee area • Shops on campus close very early so would like a vending area and food after hours	EZ to review

#	Item	Action
1.3	Presentation Rooms • Need to be able to move furniture to practice presentations next to the display – enough space to the right or left of display • Ideally practice in room you are presenting in but realize this is unrealistic • Would like some rooms with flip-top nesting tables • Final capstone presentations for some departments are in a classroom – use the "nicer" classroom for these • Upper bounds is MEE class, but decision made to stick with 30-40 person room	

1.4	Club Space
	• Meeting rooms
	    o Original program is almost half as much area for club space as team meeting rooms
	    o Give up one meeting room in favor of a student lounge
	• Storage
	    o Likely need to reduce this but need confirmation
	    o What size storage do different clubs need?
		DH to confirm with Student Leadership Council

1.5	Student Lounge • Will use for practice and student teams in addition to developing a culture over the years as a space • Chez has two rooms, one you can close the door and the other is always open • Put social space adjacent to club space • Multi-department, not one department • Organize with club space so this is can double as a meeting space and/or connected room for larger gatherings	
1.6	Add parenting room into spreadsheet	ML
1.7	Break-Out Areas • Variety of sizes • Larger areas are sprinkled about so each can have an identity for a department or student group – especially if they are in a "protected" corner • Some are smaller and transitory, some are remote to encourage quiet • Want more comfortable like a coffee shop, less like a pass-through • Position a couple of meeting rooms at each break-out so you can wait for one to open up	
1.0	**Next Steps**	
1.1	Next meeting to occur on March 27^{th} or 28^{th}. Time and location to be confirmed.	WBRC/UM

Meeting Minutes

Project: **University of Maine**
Engineering Education & Design Center
Meeting Date: **March 27, 2018**

Topic: **Student Space – Programming** Meeting Number **3**

Attendees:		
University of Maine Student Space Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Dana Humphrey	DH	Dean, College of Engineering
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Meredith Kirkmann	MK	Assistant Professor, School of Engineering Technology
Melissa Landon	ML	Associate Professor, Civil and Environmental Engineering
Sheila Edalatpour	SE	Assistant Professor, Mechanical Engineering
Erin Ballew	EB	Student, Electrical and Computer Engineering
Andrew Manzi	AM	Student, Civil and Environmental Engineering
Sean Morris	SM	Student, Chemical and Biomedical Engineering
Ellenzweig:		
Michael Lauber	ML	Principal in Charge/Programming Architect
Carolyn Day	CED	Lab Architect
WBRC:		
Kris Kowal	KK	Project Manager
Jenifer Richard	JR	Interior Designer

#	Item	Action
1.0	**Program Area Discussion**	
1.1	Program Review • Revise team meeting room sizes per previous meeting	ML
1.2	Commons • All furniture is movable • Microwave available for everyone	

1.3	Club/Lounge area
	• Dual use adjacency works well
	• Connected but separated works well
	• Storage in both rooms is fine – prevents people from setting up "turf"
	• Need to decide if diagram or program is correct for storage space. Diagram looks about right. May just be cabinets for most.
	  o SWE needs room for 4-5 totes plus some storage boxes
	  o Dana to call a student leaders meeting to discuss on storage needs and if it is in the EEDC
	• No refrigerator or microwave
	• Flat screens in both rooms
	• Whiteboards in both rooms
		DH

1.4	Vending • Need to be visible so they get filled • Need to be somewhere off a hall to avoid noise of machines • Near commons but out of the way	

#	Item	Action
2.0	**Next Steps**	
2.1	The next project phase is Schematic Design. Committee needs and schedule to be determined.	WBRC/EZ

Meeting Minutes

Project: **University of Maine**
Engineering Education & Design Center
Meeting Date: **January 29, 2018**

Topic: **Outreach - Programming**

Meeting Number **1**

Attendees:		
University of Maine Building Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Dana Humphrey	DH	Dean, College of Engineering
Peter		
Per Garder	PG	Professor, Civil and Environmental Engineering
Laura Wilson	LW	4-H Science Professional, Cooperative Extension
Shawn Laatsch	SL	Director of Emera Astronomy Center, Physics and Astronomy
Chris Richards	CR	Director of Recruitment, Admissions
Ellenzweig:		
Carolyn Day	CED	Lab Architect
Michael Lauber	ML	Programming Architect
WBRC:		
Kris Kowal	KK	Project Manager
Jenifer Richard	JR	Interior Designer

#	Item	Action
1.0	**Introductions**	
1.1	Stephen Abbadessa, Laboratory Manager for Mechanical Engineering, was unable to attend the meeting.	
1.2	Dana had “epiphany or bad idea” that we shouldn’t just focus on engineering and this is the right spot right in the middle of campus for a greater outreach effort. • Greet people with a “wow” factor	
2.0	**Programs**	
2.1	**Central Campus Welcome Center**	
2.1.1	University Outreach gives about 1,000 tours per year and current location isn’t ideal. All tours come through including busses and families in cars High school groups are a component but many groups include younger students. Admissions target audience is different from the younger, broader group; admissions groups include candidates and families	
2.1.2	Space for one staff person is needed. Admission offices will stay at current location in far corner of campus.	
2.1.3	Admissions is currently renovating 2nd floor of Heritage House but would like a more central location for this activity.	
2.2	**Engineering Uses**	
2.2.1	Evening activities include: • Donor meetings • Projections • Parties • Industry meetings	

#	Item	Action
2.2.2	Possible use for engineering education course(s) during the summer	
2.2.3	Every Friday is the "enhanced engineering tour" for tours of engineering facilities. Currently meet outside the engineering core. Usually includes Juniors and Seniors who are thinking about engineering. • School vacation weeks can see 200 at a time (broken into 4) • Rest of the time it might just be a few families of 4 • Summer groups can reach 150 or so	
2.3	**K-12 Outreach**	
2.3.1	Experiential Learning for Middle School Next fall break there is: • Children's Water Festival – hundreds of students • Expanding Horizons – middle school girls	
2.3.2	Camp use in summer • Engineering camp • Electrical Engineering NASA girl's group • Planning on expanding these offerings	
2.3.3	Faculty and staff work with the students • Need a single classroom for 25-30 4-12 graders • Larger groups break up across campus	
3.0	**Potential Uses**	
3.1	**Central campus tour location**	
3.1.1	Could have 200 visitors at a time. They would go to a large lecture hall and then split up for tours. A large lecture hall in the building may have high utilization for courses so this may pose scheduling difficulties. What is the total throughput?	UM
3.1.2	March-April, leading up to May 1st, is high traffic time	
3.1.3	Want one place that all tours start from • Currently the tours are all broken up and not cross-disciplinary • One Welcome Center space would work • Could utilize adjacent project lab for hands-on activities • Marquette is a good example with capstone area just off lobby	
3.1.4	Tour Organization: • Admissions has 3 tours a day • Staff is there 15 minutes before tour starts. • Watch a 20 minute video in groups of 80, give a short presentation, and then go out. Large groups get broken up but mill about • Cap tours at 85 or would need to get a larger room on campus. • Potentially need milling space for 100 or so people in March and April. Larger groups tend to be on Friday because they are combined with engineering groups	
3.2	**"Showcase" Space**	

#	Item	Action
3.2.1	Engineering is “Achievable & Inspirational” Display benefit of engineering to society – like biomed. Show off projects that are big ideas that get younger students excited that they too can do it.	
3.2.2	View into active student club activities. Video feeds to places public doesn’t have access to with appropriate reading-level material. Trend towards admissions centers often have a video wall for this type of visual.	
3.2.3	Capstone could spill into this space for meetings, presentations, and other associated activities.	
3.2.4	Welcome Center: • Could display formula cars • Video showcase of engineering in Maine • Showcase work – enrolled students aren’t as interested • Overlook capstone area • 100 person size would be good	
3.3	**Hands-on for 4-12**	
3.3.1	Capstone area not used during the summer so could double for camp uses.	
3.3.2	Whatever they are given access to, it can’t be things they are prohibited from touching. Middle schoolers need the hands-on learning and will be tempted to use “hands off” equipment.	
3.3.3	Need power and water	
4.0	**Issues and Ideas**	
4.1	**Student/Visitor Interaction** Be careful about visitors disrupting students hanging out in commons – Alex very concerned about this. Main coffee area shouldn’t be overlap.	
4.1.1	Magic if middle schooler meets a college student or sees what college students are doing. High schoolers are more cynical – break up into smaller sizes.	
4.1.2	How can these two ideas be reconciled?	
4.1.3	Manage flow between visitors and students to block/control access to coffee shop • Most days tours are only 18 people so that’s not a big deal • Sensitive to larger groups • Middle schoolers are corralled by teachers • Atrium could be separator	
4.2	**Weekend and After-Hour Access**	
4.2.1	Dana would support 1st floor lobby open to public on weekends and everywhere else is keycard access.	
4.2.2	More weekend tours could lower weekday demand	
4.2.3	Multiple control points so there could be vertical control for larger events	
4.3	**Size and Scheduling**	
4.3.1	Basic need is for one space that can accommodate 100 people at one time. The space should provide presentation media for this size group. Need	

#	Item	Action
	additional restroom facilities	
4.3.2	Admissions can accommodate engineering uses, though admissions and 4-H should get "first dibs." The rest of the time it's free game for other activity for Engineering use	
4.4	**Vehicular Circulation and Parking**	
4.4.1	Cars: CR noted they currently don't have parking for visitors and already send them out so remote parking is OK. Only have 6 spots right now.	
4.4.2	Buses: • Bring school busses right to building 1 bus at a time – they could drop off and park elsewhere on campus. • JA suggests combining with loading dock; DH wants to make sure there is still a handsome entrance. • Currently no place on campus that works well for this function. Right now they park near astronomy center or CCA and they walk wherever because there isn't space in any building to meet.	
5.0	**Next Steps**	
5.1	Next meeting to occur on February 26th or 27th. Time and location to be confirmed.	WBRC/UM
5.2	Deliverables for next meeting: • First draft program with space sizes • Draft room diagrams • Adjacency diagrams	Ellenzweig
5.3	Information will be posted to Google Group when available. Provide AF with any files for upload.	AF
5.4	Comments go through Jeff between meetings.	

Meeting Minutes

Project: **University of Maine**
Engineering Education & Design Center
Meeting Date: **February 27, 2018**

Topic: **Outreach - Programming**

Meeting Number **2**

Attendees:		
University of Maine Building Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Per Garder	PG	Professor, Civil and Environmental Engineering
Laura Wilson	LW	4-H Science Professional, Cooperative Extension
Chris Richards	CR	Director of Recruitment, Admissions
Ellenzweig:		
Carolyn Day	CED	Lab Architect
Michael Lauber	ML	Programming Architect
WBRC:		
Kris Kowal	KK	Project Manager
Jenifer Richard	JR	Interior Designer

#	Item	Action
1.0	**Discussion of Program Area**	
1.1	Reduction in space for lobby but the rest stay the same	
2.0	**Admissions Needs**	
2.1	Crowd size • Usually 3-6 is normal group size • Ideal is 100 person cap at peak season – February vacation to May – classroom would work well to gather this larger group	
2.2	Group arrival • Arrival is usually families in a car and they walk up to welcome center • 30 minutes total per group • 3 tours/day at 10, 11, and 1 Monday-Thursday	
2.3	Activities • Sit for a bit and get coffee before welcome • 10-15 minutes for a welcome video and introduction to tour guide • Building does need to be able to welcome good size groups on a tour even if it's not a starting point • Tour size of 20-25 per guide but not always logistically possible so it is sometimes larger	
2.4	Classroom availability • Capstone meetings are in the afternoon so a dedicated classroom could share this function only if this time could be blocked out • Ideal for engineering is that they can use the lobby • School vacation days and UMaine schedule don't line up so scheduling is difficult • Project lab is usually more available in the morning	
3.0	**Outreach Needs**	

#	Item	Action

3.1	Arrival
	• Landing place before they go across campus
	• Under 100 but occasionally that high – usually just a classroom size
	• Most often arrive by bus or small group vans.
	  o Right now drop off near EAC and then walk to where they want to go
	  o This does have a lobby for 100 built in 2014 designed precisely for this use but groups must pay to use this function
	• Still need a general purpose drop off and engineering because 80% of groups want engineering
		UM to clarify

3.2	Types of engineering activities • Activity in Bennett and Barrows; Tours of Composites Center and Jenness; sometimes in classrooms in Corbett as gathering area • Every group wants something specific so difficult to predict • Will go into and use project lab • Tours typically walk by but smaller group may go into a class	
3.3	Summer everything would be available for outreach needs and tour needs	
3.4	Visibility • From lobby areas to capstone areas or other lab areas • Make sure the message is students are doing this work • Display areas MUST be incorporated for coolest capstone projects • Best if incorporated in lab area or in the lobby • Rotating display stations – make it a target for capstone projects to compete to be on display; best with video story behind it	
3.5	Outdoor assembly area for brief intros. Academic introductions in this area. Alex wants an outdoor classroom.	
4.0	**Next Steps**	
4.1	Next meeting to occur on March 27th or 28th. Time and location to be confirmed.	WBRC/UM

Meeting Minutes

Project: **University of Maine Engineering Education & Design Center**
Meeting Date: **March 27, 2018**

Topic: **Outreach - Programming**

Meeting Number **3**

Attendees:		
University of Maine Building Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Carolyn McDonough	CM	Director, Capital Planning and Project Management
Per Garder	PG	Professor, Civil and Environmental Engineering
Chris Richards	CR	Director of Recruitment, Admissions
Shawn Latsch	SL	Director of Emera Astronomy Center, Physics and Astronomy
Ellenzweig:		
Carolyn Day	CED	Lab Architect
Michael Lauber	ML	Programming Architect
WBRC:		
Kris Kowal	KK	Project Manager
Jenifer Richard	JR	Interior Designer

#	Item	Action
1.0	**Discussion**	
1.1	Revise name to "Welcome and STEM Outreach Center"	
1.2	Add furniture storage to program allocation	
1.3	Activity review • Most tours are 80 people are less, only a few are 100 • Visitors show up 20 minutes before a tour • 10k visitors in a year	
2.0	**Organization**	
2.1	• Outreach just to one side of the entrance from the road so that visitors don't have to go through building to enter and others aren't going through outreach to get to rest of building • Good A/V: Rolling slide show(s), music playing, etc • Capstone Display area could be just outside general purpose room in circulation zone • Plan for video wall – 2x3 screens that can be divided for different programs	
2.2	100 person room • General purpose space • Dana reacted well to sliding doors that open up to public area • Function room for engineering use • Like glass but need room darkening • Projection screens should parallel to hall instead of perpendicular so that overflow can be in hallway • Would like a counter with a sink at one end for Extension programs • Layout space for T-shirts given to campus visitors. Storage in the offices or elsewhere is fine	

#	Item	Action
2.3	2 Outreach offices: One for recruitment and one for cooperative extension co-located with welcome center. • Recruitment can have someone at a desk on street entrance that acts as building greeter, as they currently have at Heritage House • Do have one spinner for fact sheets to display in office area or just outside • Offices do need to be closed for private conversations with "disgruntled" student or parent	
2.4	May need to accommodate branding for a corporate gift, but visitors must also know they are at the University of Maine and not "just anywhere" Example is the Composites lobby, which has a strong UMaine presence. • Company branding is going into room and possibly a full back wall with name and poster display. Company technology may want to be displayed here. • Local operation is trying to convince corporate headquarters for gift	WBRC/EZ to provide rendering

Topic: **MET Teaching Committee - Programming** Meeting Number **1**

Attendees:		
University of Maine Mechanical Engineering Technology Teaching Commitee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Arthur Bottie	AB	Project Manager, Facilities Management
Dana Humphrey	DH	Dean, College of Engineering
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Karen Horton	KH	Professor, Mechanical Engineering Technology
Joel Anderson	JA	Lecturer, Mechanical Engineering Technology
Keith Berube	KB	Assistant Professor, Mechanical Engineering Technology
Scott Dunning	SD	Director, School of Engineering Technology
Ellenzweig:		
Michael Lauber	ML	Principal in Charge/Programming Architect
Carolyn Day	CED	Lab Architect
WBRC:		
Kris Kowal	KK	Project Manager

#	Item	Action
1.0	**Introductions**	
1.1	The purpose of this committee is to determine what is required for MET teaching requirements. This is to accommodate the program in the new Engineering Education and Design Center in the event that it is chosen to be on the site of the existing Machine Tool Lab.	
1.2	KH prepared a functional program document in advance of the meeting. See attached.	
2.0	**Background**	
2.1	**Program Distinctives** KH outlined several "distinctives" that define the Mechanical Engineering Technology degree program. These begin on page 2 of her attached outline.	
2.1.1	Prepares students for professional practice • Practical application of engineering. Program is not research oriented and is not geared towards graduate studies. • The MET program has spent several years cultivating a community identity • Students and faculty work together outside of course time on a regular basis, currently in room 107 • Ideal is SET student hub with adjacent faculty offices	
2.1.2	Grounding in Manufacturing Engineering processes • Focus is design for manufacturing • Design-build-test methodology • Project types vary from CAD/CAM to CNC programming to fabrication and occur throughout curriculum	
2.1.3	Apply sound engineering principles to mechanical design	

#	Item	Action
2.1.4	Design thermal systems including fluid power systems	
2.2	**Current Space Strengths** • Large windows and natural light in MTL 102 and MTL 106 • Flexible furnishings in classrooms • Smart-boards for distance learning	
2.3	**Current Space Deficiencies** • Inflexible layouts • MTL 102 does not have adequate space around the machines • Often run out of room in MTL 106 (seats 48) when having presentations or guest lectures • Bandwidth issues in classrooms for CPUs and laptops	
3.0	**Space Needs**	
3.1	**Machine Tool Lab** Currently in MTL 102 • Teaching laboratory. Only students who have taken MET and working on capstone, or students in active classes are allowed use of lab. • In use up to 40 hours a week: 12-15 hours for courses, 10 for student projects, and 12 supervised open lab in evenings • Controlled access required • Flexibility of layout. Consider both square and rectangular room. Would prefer drops over wall boxes so machines could be moved from semester to semester and for future program changes. • Current size does not provide enough room around machines. Need room to get a floor polisher between them. Consider room for student and instructor at a machine. • Currently have 12 mills and 7 lathes. Up to 15 students in a lab at a given time. • Willing to share the Machine Lab adjacent to the EEDC capstone space, however worried MET students will monopolize the space	**EZ** to investigate two room ratios **JA** to provide list of machines and required footprints, including clearance
3.1.1	Prep room • Tables and chairs for 15 students • Space for coat and bag storage • Projector or monitor to watch instructional video • Could be used as a scheduled classroom	
3.1.2	QA/QC room • Testing equipment • Needs line-of-sight from shop	
3.1.3	Tool Crib • Space for attendant • Line of sight to machines in MTL	
3.1.4	MTL should have access to: Handwash sink, Flammable liquids cabinet, Stock storage, Metal recycling, Welding, Metrology, Equipment storage	

<table>
<tr><th>#</th><th>Item</th><th>Action</th></tr>
<tr><td>3.2</td><td>Capstone Project Lab
38- 54 students in teams of 3-5, typically 9-15 teams but up to 17 teams
Some projects are done off-site so do not need room for all projects
Components of off-site projects are often worked on at UM and assembled on site.
Mostly used 2nd semester but may be used in fall for a lab course
Needs flexibility for large projects, with heavy but movable tables
208 power
Small hand tools, chop saws, drill press, pipe bender, etc – large equipment is only in MTL
Need to be able to bring heavy projects in and out on forklift
No need for gantry, floor hoist is sufficient
Can foresee using shared lab but have concerns about limits of space and allowing all students to have access at all times.
Need lockable space for projects
Interested in access to rooms dedicated to plastics, composites, and welding.</td><td></td></tr>
<tr><td>3.3</td><td>Fluid Power Lab
Students require access for project work so it needs dedicated project time
Could share a flexible lab with another program</td><td></td></tr>
<tr><td>3.4</td><td>MET Hub
Ideal is suite with faculty offices and student work space
Need acoustic separation between these spaces and MTL</td><td></td></tr>
<tr><td>3.5</td><td>Classrooms
Currently have 2, one 48 person computer lab and one 36 person computer lab. They also use another space to host 15 students to watch videos before going into MTL.
Prep Room could be used as 15 person classroom and combined with lab for one section</td><td></td></tr>
<tr><td>3.5.1</td><td>48 Person Classroom
Students bring laptops to CAD class
Movable tables
Could be used for smaller classes
Acoustic separation from MTL, but adjacent
Larger size would be ideal; up to 60 students
MTL holds a 1hr demonstration lecture each week which requires equipment to either be wheeled from the MTL into the classroom or in room/adjacent storage</td><td>DH/KH to confirm classroom capacity</td></tr>
</table>

#	Item	Action
3.5.2	36 Person Classroom • CAD class • Could give up if Prep Room doubles as classroom	**DH/KH** to confirm
4.0	**Next Steps**	
4.1	Next round of programming meetings is March 27th and 28th. This group will meet again then. We are not expecting an interim call or meeting.	**All**
4.2	Ellenzweig will develop a space program based on this discussion for the next meeting.	**EZ**

Meeting Minutes

Project: **University of Maine Engineering Education & Design Center**
Meeting Date: **March 27, 2018**

Topic: **Mechanical Engineering Technology Teaching - Programming** Meeting Number **2**

Attendees:		
University of Maine Mechanical Engineering Teaching Committee:		
Jeff Aceto	JA	Assistant Director, Capital Planning and Project Management
Peter Schilling	PS	Executive Director, Division of Lifelong Learning
Carolyn McDonough	CM	Director, Capital Planning and Project Management
Alex Freiss	AF	Associate Professor, Mechanical Engineering
Brett Ellis	BE	Assistant Professor, Mechanical Engineering Technology
Karen Horton	KH	Professor, Mechanical Engineering Technology
Dana Humphrey	DH	Dean, College of Engineering
Keith Berube	KB	Assistant Professor, Mechanical Engineering Technology
Scott Dunning	SD	Director, School of Engineering Technology
Joel Anderson	JA	Lecturer, Mechanical Engineering Technology
David		
Ellenzweig:		
Carolyn Day	CED	Lab Architect
Michael Lauber	ML	Programming Architect
WBRC:		
Kris Kowal	KK	Project Manager
Jenifer Richard	JR	Interior Designer

#	Item	Action
1.0	**Program review**	
1.1	Option 1 – Crosby addition, Option 2 – included in EEDC	
1.2	Note that item 9.6, Classrooms, will need to have storage added	

1.3	What's missing/needs clarification (from Karen)
	• Tool crib is about 360sf now, but have equipment stored elsewhere as well so will need more space for actual equipment
	• Will need offices in the space
	    o Need multiple responsible people in the building to cover safety
	    o Currently store their own equipment in offices for items they are working on, could have a common faculty project space
	• CAD/CAM classes need to be adjacent to CNC tools – 36 person room	

1.4	What's missing/needs clarification (from Keith) • Always someone in and out and interacting with tool lab so need adjacent to offices • See fluid power lab as a distinctive to program • Would like room to grow/flexible space so there is room to change as program changes	
1.5	Capstone Format • Work quite a bit with the other capstone programs so would like	

#	Item	Action
	MET to be incorporated with larger capstone space regardless of where they are • One or two capstone groups per year have a great deal of machining so would need some adjacent capstone space – they are in there a lot of days continually and can monopolize machines if it's shared • Alex said MEE students are not machining as much, so MET students could take lead on interdisciplinary projects	
2.0	**Room Requirements**	
2.1	Capstone • MET has 9-10 teams per year. Had 11 last year. Decent number that work outside projects room because they are working at industry site. • 6 to 8 tables is probably reasonable for now. • Would like lockable storage of open metal below tables • MET to inventory number of projects and their average size • Get photos of what Marquette's capstone lab looks like now	MET faculty ELZ to contact Marquette
2.2	CAD/CAM Classes • Flexible, smart computer lab – active learning would work well • Adjacent to CNC machining to walk to machine • All laptops, no desktops • Similar need in MEE for CAD, discussing manufacturing need with same link • Two courses with solidworks two with surfcam – shared licensing on the network • Shiebles 202 has worked for MEE for layout • Fair amount of lecture so layout is all facing one direction	
2.3	Video Classroom • MET and EET do video recording in current CAD/CAM classes	
2.4	Tool Lab • Lathes and Mills used at the same time so need to be side by side. Need short distance between one end to the other. • Only one student at a time at benches • Need benches at each machine - 2x12 for every pair of back-to-back mills • CMCC just got a large grant and has a new space • How does Pratt and Whitney set up machines? • Need external delivery access • Hand tool boxes/student tools could be a different system where each machine has its own supply of tools instead of storing in crib	CD to follow up with Joel to tour current and sample labs
2.5	Tool Crib • One large location for all tools that students use • Have quite a bit that was donated – a cage directly behind the tool crib with overflow stock would be readily accessible • Ease of	

#	Item	Action
2.6	Instructor Work Room • Need space where faculty can develop and learn new equipment before bringing into classroom • Equipment work for consulting • Could also accommodate storage/work room for 1 or 2 capstone projects that need storage	
3.0	**General Needs**	
3.1	Safety in tool Lab • There will be a technician/professional position with oversight of project. Question of if it is a faculty member or a technician's responsibility • Dana suggested that many offices and support activities could be in Boardman if there is someone managing the tool lab and capstone lab • Always students and faculty circulating through • All positions: 3 faculty, +1 future faculty, +1 grad student, +1 adjunct office	
3.2	Culture • Caring culture is Karen's main concern, built with faculty walking through hub constantly • Like a space with students and faculty constantly interacting • Important part of functionality of community and community identity that helps with recruiting • Important part of community building • Worked hard for this community – would love if this community to spread to other departments. Does not need to be MET branded, but have MET and other faculty walking through. • Dana supports having a good community of lab users	
3.3	Growth • Fluid Power Lab – mfg process automation. Need a space that controls several courses with hardware needs for pneumatics and hydraulics • MEE will not be using both labs all the time. Fluids lab is water experiments and air flow • Pneumatic trainers and generator sets can be wheeled around • EET labs have process automation that could be shared with MET	