MEMORANDUM

TO: University Facilities Planning Board: Joe Fedock - Chair, Walt Banziger - Vice Chair, Jim Becker, Kurt Blunck, Allyson Bristor, Jeff Butler, ASMSU President, Michael Everts, Mandy Hansen, Jeff Jacobsen, Patricia Lane, Terry Leist, Tom McCoy, Ed Mooney, Jim Rimpau, Tom Stump, Joe Thiel – ASMSU, Jim Thull, Allen Yarnell, Brenda York

FROM: Victoria Drummond, Associate Planner, Planning, Design & Construction

RE: **June 21, 2011,** meeting of the University Facilities Planning Board to be held in the **Facilities Meeting Quonset** at **3:30 pm**

ITEM No. 1 – APPROVAL OF NOTES
Approval of the draft notes from the May 24, 2011.

ITEM No. 2 – EXECUTIVE COMMITTEE REPORT
Report on any current Executive Committee actions.

ITEM No. 3 – CONSENT AGENDA - **North Linfield Hall Reroof**

ITEM No. 4 – DISCUSSION – **Review UFPB Comments of Draft Classroom Design Guidelines**
Presenter – Walt Banziger

ITEM No. 5 – INFORMATIONAL – **LED Walkway Lighting Retrofit**
Presenter – Dan Stevenson

ITEM No. 6 – INFORMATIONAL - **Iris Garden Site Plan Modification**
Presenter – Candace Mastel

HORIZON ITEMS

- **External Building Signage Policy**
- **Staging Discussion**
- **Seminar Materials**
- **Master Planning Issues**
- **Revisit and Update Policies**
- **HBO5 Amendment for lab Facility**
- **Smoking Problems**

VCD/da
PC:

President Cruzado
ASMSU President
Bonnie Ashley, Registrar
Jody Barney, College of Agriculture
Pat Chansley, Provost Office
Julie Kipfer, Communications
Victoria Drummond, Facilities PDC
Lisa Duffey, College of Agriculture
Heidi Gagnon, VP Admin & Finance
Diane Heck, Provost Office
Jennifer Joyce, Planning & CIO Office
Linda LaCrone, VP Research Office
Shari McCoy, Presidents Office
Becky McMillan, Auxiliary Services
Robert Putzke, MSU Police
JoDee Palin, Arts & Architecture
Martha Potvin, Provost Office

MEETING NOTES OF THE
UNIVERSITY FACILITES PLANNING BOARD
May 24, 2011

Members Present: Susan Agre-Kippenhan - Chair, Walt Banziger - Vice Chair, Kurt Blunck, Allyson Bristor, Jeff Butler, Michael Everts, Fedock, Mandy Hansen, Linda LaCrone for McCoy, Patricia Lane, Robert Lashaway for Leist, Jim Thull, Brenda York

Members Absent: James Becker, Ritchie Boyd/proxy, Jeff Jacobsen, Ed Mooney/proxy, Jim Rimpau, Tom Stump, Joseph Thiel – ASMSU, Allen Yarnell

Guests: Candace Mastel, Facilities Planning, Design & Construction; Heath Bradley, artist

The University Facilities Planning Board met beginning at 3:30 pm to discuss the following:

ITEM No. 1 – Approval of Meeting Notes
Bristor moved to approve the meeting notes from March 26, 2011. Butler seconded the motion. The meeting notes were approved unanimously.

Fedock moved to approve the meeting notes from May 10, 2011. Thull seconded the motion. The meeting notes were approved unanimously.

ITEM No. 2 – Executive Committee Report –
Banziger gave an update on Michael P. Malone Centennial Mall. A meeting with the Malone Committee resulted in the number of plaques to be installed; there will be three: A biography on the north wall closest to Montana Hall and one quote each on the new walls to be constructed on the south side of the plaza area.

ITEM No. 3 – Consent Agenda - None

ITEM No. 4 – Recommendation – Campus Bonfire Pit Location
Candace Mastel presented the request for approval of the F Lot as the temporary location for a campus bonfire pit, with the intent to establish the tradition and culture of a university celebrated bonfire while investigating future permanent installation locations on campus. On February 3, 2009, a last minute request came before UFPB with a request that a bonfire be permitted Saturday, February 7, 2009. An UFPB sub-committee (Butler, Stump, Hougland and Blunck) met with ASMSU Representatives and decided to postpone immediate plans for the bonfire. Snyder stated that she would work with the Alumni Association and Athletics for funding a permanent bonfire pit and that ASMSU would return to UFPB at a later date to discuss a more long term solution. The current recommendation of approval is intended to be a proactive option should a bonfire be desired for the fall of 2011.

Athletics, ASMSU, Facilities Services and Facilities Planning looked at the options for a temporary location for a bonfire pit. Their recommended location is in Lot F with the exact location to be determined. Electrical service is available on the east side of the north/south access drive. The fire would be contained in a moveable metal structure 12 feet in diameter, 42" tall and includes a lid with a pitch of 1 and 12. The fire pit will be provided by Facilities Services at a cost of approximately $8,000. Four parking spaces will be provided for the fire pit by Parking Services.

In an email written to Mastel in support of the proposal for locating a temporary bonfire pit at Lot F, Blake Bjornson, current ASMSU President, expressed his concerns:

1. The temporary location becomes the permanent location as time goes on - Bjornson later clarified his statement: He is concerned that we will use the F Lot as the temporary location, and when/if the idea sticks and we do a couple bonfires at that location, it will become the permanent location by default.
2. The discussion of finding a permanent location not be put on the backburner; he believes this bonfire concept has the potential to become an oft-utilized plaza area for myriad events throughout the year; but for this to happen there needs to be a permanent location with other permanent installations including the actual pit and seating

Fedock confirmed with the group that there has been a prior discussion by UFPB at a fundamental level conceptually that UFPB believes that the basic concept of having a bonfire, a pit and a location for doing that has been supported in the past.

Butler stated the old tradition of the huge bonfires on the ground is being replaced by a contained bonfire in a pit with safety issues being addressed. Being proactive, the tradition can start up again as a controlled event with a protocol and a policy statement similar to other policies related to student based activities. Sports Facilities will be responsible for setting up barricades and no parking signs, as well as blocking off the area ahead of a planned event. The drive that currently runs between the football practice field and the F Lot is paved and will provide ADA accessibility to the area.

Lashaway suggested the motion should challenge ASMSU to get together with the Alumni Association to begin to develop planning for a permanent location for the bonfire pit in a three to five year horizon.

Fedock expressed concern that by the very nature, a nighttime bonfire is in a different category of an event that has a history associated with alcohol use. He asked if that is what we want as a part of the campus culture.

Blunck responded that Chief Putzke was involved in the initial conversations regarding the bonfire and he also had concerns about what happens at bonfires. Current installation policy and event policy will apply to these events. There are plans on putting limits on how high you can stack the bonfire and other safety issues.

Banziger stated that the bonfire pit falls under the venue of Sports Facilities.

Lashaway moved to recommend approval of F Lot as a temporary location for the campus bonfire with intent to establish a tradition and culture of a university celebrated bonfire and that we attach the drawing of the limits of this bonfire to this recommendation and that it be part of the approval and that the recommendation also includes the stipulation of ASMSU be proactive in helping find and fund a permanent location for this with whatever partners (alumni, for example) and consider ADA access and that they can find and that the approval to use the F Lot sunsets after four years. Bristor seconded the motion; it was unanimously approved with the proxy votes of Ed Mooney and Ritchie Boyd.

ITEM No. 5 – Recommendation – Iris Garden Sculpture

Mastel presented the recommendation. The Students for Danforth Park worked with artist Heath Bradley to produce a design that meets the intent of their revitalization efforts for the Iris Garden. The student group will be funding the production costs for this piece and will be working cooperatively with artist Heath Bradley and Facilities Services to see the sculpture installed, as well as seeing other improvements made to the garden space over the next few months.

The proposed sculpture has a modern flair to it. The base of the sculpture is cast concrete with metal bracing. The proportions of the concrete forms are designed specifically to a 1:1, 1:2, and 1:3 ratio. The transparent and colored material is Koda XT color manufactured by the 3form company in Salt Lake City Utah. Each panel is 7" wide by 48" tall. The colors may change, but only slightly and will remain within the color options given by 3form in their own catalog.

Bradley stated President Cruzado spoke highly about MSU being a Land Grant Institution; therefore, it was very important to Bradley that the sculpture be tied to nature and will show the passing of time through seasons. He sees it as a tree planted and growing out in the sun. He is planning on using stainless steel so it remains the same which is consistent with a long period of time. Bradley prefers the Koda XT because it is more impact resistant, fire resistant and not affected by ultra violet light. It deals well with temperature change and he guarantees the edges.

The Public Art Committee (PAC) has approved the project and recommended approval to UFPB with the following stipulations:

1. The artist revised the sculpture in response to all the comments and concerns regarding safety and maintenance presented by Facilities Services and PAC
2. The colored material selected by the artist – Koda XT – is a tested material for durability in the elements and replaced the use of fused glass which did not have a demonstrated reliability in the proposed use and location
3. Lighting was not approved because none of MSU's art assets currently displayed in outdoor settings have designated lighting, which is intentional due to the cost of installing the light fixtures and underground infrastructure; the ongoing cost of the utilities and as a measure of sustainability by not using more than what is needed; to avoid conflicts with snow removal and in this case, according to the larger site plan presented in January 2011, the space will include two light poles (replacing the light poles currently at the site) and these will illuminate the area including the sculpture

York requested that the pathways be ADA accessible and safe, and that the edges of the sculpture and pathways will have a stopping point for the visually impaired.

Thull moved for approval, with the ultimate choice of material to be the artist's, but would like to see the plaque come back to the PAC in terms of size and language and that the pathways be ADA accessible and safe and that the edges of the sculpture and pathways will have a stopping point for the visually impaired . Bristor seconded the motion; it was unanimously approved with the proxy votes of Ed Mooney and Ritchie Boyd.

This meeting was adjourned at 4:30 p.m.

VCD/da
PC:

President Cruzado
ASMSU President
Jody Barney, College of Agriculture
Pat Chansley, Provost Office
Victoria Drummond, Facilities PDC
Heidi Gagnon, VP Admin & Finance
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Becky McMillan, Auxiliary Services
Julie Kipfer, Communications
Lisa Duffey, College of Agriculture
Robert Putzke, MSU Police
Bonnie Ashley, Registrar
JoDee Palin, Coll of Arts & Arch

UNIVERSITY FACILITIES PLANNING BOARD
June 21, 2011

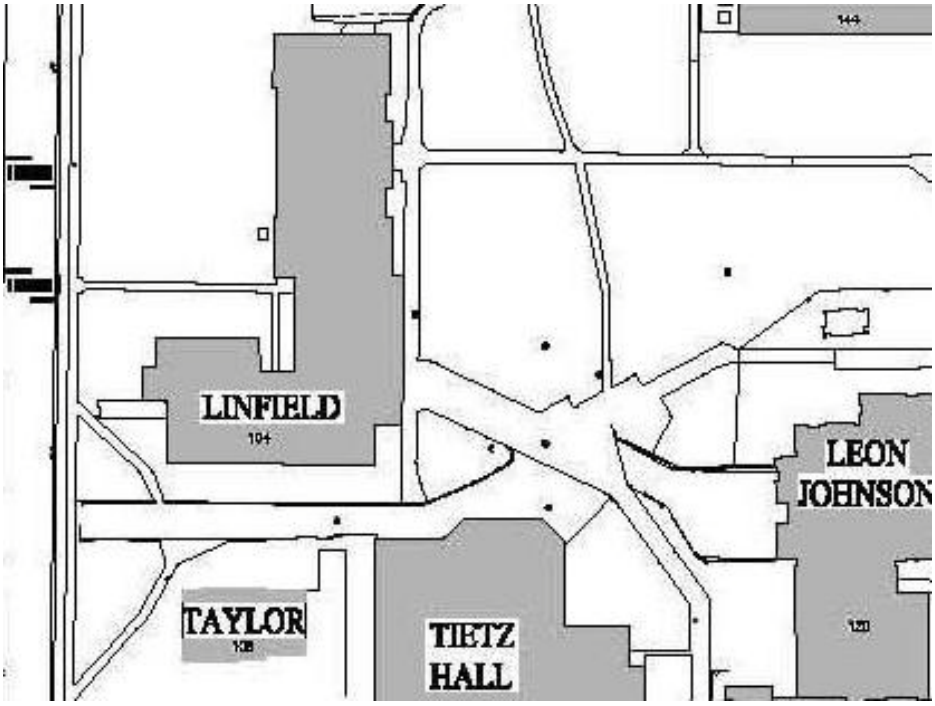
ITEM #3	**North Linfield Hall Reroof**

PRESENTERS:

Consent agenda item

PROJECT PHASE:	**PLANNING**		**SCHEMATIC**		**DESIGN DOCUMENTS**		**CONSTRUCTION DOCUMENTS**	

VICINITY MAP:



STAFF COMMENTS:

North Linfield Hall is being re-roofed due to damage from last summer's hailstorm. Money has been identified to upgrade the roof material from the current asphalt shingles to a composite slate roof that will be more sympathetic to the historic character of the building. The composite slate will be grey in color and will be quite similar to the new roof installed on Montana Hall 5 years ago. Below are pictures of the building with the current roof (top) and an approximate image of it with the new roof (bottom).

COMPLIANCE:	YES	NO
MSU POLICIES	X	
COMMITTEE OR APPROPRIATE REVIEW	X	
MASTER PLAN	X	

BOARD ACTION REQUIRED:

Approve reroof of North Linfield Hall.

Montana State University Classroom Design Guide

DRAFT

May, 2011

Acknowledgments

The Montana State University classroom committee, along with members of the campus community, dedicated many hours over to create and publish this design guide.

Other members of the campus community including faculty, staff and the student body have contributed their collective knowledge to the progressive design of our technology-rich learning spaces. To all of these individuals we express our deepest appreciation.

We would like to especially thank the College Classroom Working Group at Emory University for their permission to reproduce portions of their 2008 Design Guide.

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   E. Rationale for Using Electric Screens
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I. Introduction

This design guide is intended to provide information and a framework for the design, remodeling, construction and maintenance of classrooms and instructional spaces at Montana State University. It compiles the knowledge and experience of those responsible for day to day campus operations as well as those who plan for the future. Research on the latest trends in teaching in higher education was reviewed as well as design guides from other colleges and universities. We expect this document to continue to be refined as we learn more, grow in experience, and receive more input from those who use the spaces.

The planning and writing of this design guide was carried out by representatives from the Classroom Committee, a subcommittee of the University Facilities Planning Board of Montana State University, with input from the University's Facilities Planning Design & Construction (FPDC) department, the office of Facilities Services (FS), registrar's office, office of the Provost, MSU Information Technology Center, as well as faculty and student representatives.

A note on the Americans with Disabilities Act

Montana State University adheres to the Americans with Disabilities Act (ADA) in all of its construction and renovation projects. The Classroom Committee works closely with MSU FPDC and the Office of Disability Services to recommend accessibility design and upgrades to all instruction spaces. All remodeling and new construction of instructional space at MSU must, at minimum, meet all requirements of the currently adopted Americans with Disabilities Act Architectural Guidelines (ADAAG).

II. Planning Considerations

1. **Locations**

   Whenever possible, locate classrooms on an entrance level and as close to main traffic entry doors as possible. The next choice for location would be near major stairs and elevators on levels immediately above and below ground level, in order to isolate class change noise and high traffic functions from office and lab functions. If not on ground level, the width of stairs, depth of stair landings, and width of doors leading to stairwells must also be considered to give students enough room to transition from one space to another. Classroom locations must be accessible as per the Americans with Disabilities Act.

   Classrooms should be separated from noise generating areas such as mechanical rooms, elevators, vending, and restrooms.

2. **Hallways/Corridors**

   Hallways should be designed as an essential, thoughtful aspect of the building. Although the corridors are used to move students throughout the building and generally can be noisy, major consideration in planning and design of these spaces is integral to a successful project. Building codes are not the only criteria to consider.

Hallways should be designed to contain seating and small group gathering spaces to accommodate students waiting for classes or gathering to continue classroom discussions. Such spaces can be equipped with whiteboards to facilitate discussion and interaction. These seating/gathering spaces must be carefully designed so as to not create a disturbance for adjacent classrooms in use.

Lower portions of hallway walls should be finished with a durable surface. Floors should provide a non-skid surface and should include some type of design, pattern or color that lends interest to the space. Hallways should improve acoustics for surrounding learning spaces and create visual interest. If possible, doors should not open out directly into the hallway.

3. Informal Interaction Spaces

Hallways and corridors should be designed to provide thoughtful common spaces for social interaction. Theses spaces should be considered as networking and social areas, not just passageways. Small alcove spaces are well suited for conversations between two to four people. Larger spaces provide for interaction between groups of six or more. Along with comfortable seating it is important to provide communication devices such as:

- White boarding areas
- Network for wireless service or data drop
- Power located for convenient access
- Proper lighting for reading and use of computers
- Privacy should be designed into some areas, while others should be designed for social interaction, offering a place for individuals to "be seen".
- Provide soft seating, occasional tables, lamps and plants to make it a specific space, rather than an afterthought. Value the space.

4. Extended Learning Spaces

Extended Learning Spaces serve to expand the available square footage for active learning in both new building construction and renovations through creative use of hallways, niches, lobby space and areas near building columns/support. Space should be assigned for collaborative project-based work and group learning. Spaces like these are increasing in numbers across campus, and are in high demand by students. Successful prototypes include the EPS lobby, atrium spaces in Chemistry Research, lobby areas in Gaines Hall and Animal Bioscience.

Space Attributes:

- Inviting color and differences in floor coverings can be used to define the areas
- Flexible chairs and tables are on wheels, so students and faculty can move the furniture to best facilitate their activity.
- A small table (on wheels) to hold a laptop with paperwork, or a wireless keyboard and mouse
- A wall or pole mounted plasma (or LCD display) offers real estate for display of project-based work or for group learning before and after class
- Outlets for data and power

The visibility and high traffic in collaborative spaces make these spaces popular with building

occupants, and an important element in new construction or renovation programming.

5. **Rest Rooms/Drinking Fountains**
   Restrooms should be located near the classrooms for convenience. Under no circumstances should there be a common wall or ceiling between any classroom and restroom. Drinking fountains should be located on each floor and should comply with ADA guidelines.

6. **Signage – Wayfinding/Room signage**
   Building signage should be designed such that the user is directed to classrooms from the major entrances and circulation areas of the building, including elevator lobbies and stairwell landings. All signage must comply with current MSU signage standards.

7. **Bulletin Boards**
   Display boards should be installed near a large grouping of classrooms, each classroom does not require its own. Thoughtful design should be developed for the boards, their location, and the way in which they integrate into the larger hallway layout and design, both visually and spatially.

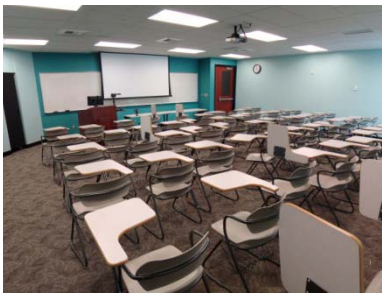
8. **Vending**
   Even with the advent of cafes throughout campus, it is still necessary to install small vending spaces in each classroom building. The spaces should be accessible but not arranged so that the faces of the machines are visible from public space. One beverage and one snack machine is usually appropriate for each vending area.

III. Classroom Types

Different pedagogical techniques require different types of learning spaces. We have defined six basic classroom types. The greatest number of current spaces fit in the "classroom" or "seminar" categories. Although we have created these definitions to be as mutually exclusive as possible, there is some overlap. A seminar may, for example, be taught in a classroom space with the chairs moved into a circle. These definitions designate the most efficient use of a space, but do not necessarily tell us what a space is being used for at a given point in time.

1. **Classroom Loose Seating**

   These are our most common learning spaces. Because they have moveable furniture, these spaces are very flexible. Furniture can be configured for lecture, seminar, group work, or anything else the instructor might require. Spaces often require more daily maintenance attention, as instructors do not always return furniture to its original location at the end of class. These rooms can be generally described as having:


- 20 to 50 seats
- Flat floors (not tiered or sloped)
- Tablet arm chairs or movable tables and chairs in rows
- Distance from the front of the room to the first row of seats shall be determined by using the recommendations and formulas contained in Item 3, Section V (The shell).
- 10 square feet for an instructor station.

2. Classroom Seminar

Seminar rooms generally accommodate smaller numbers of students seated in either a circular or rectangular format. Characteristics of these spaces include:

- 8 to 25 seats
- Face-to-face seating arrangement
- Instructor sometimes sits with students
- Movable tables and chairs on casters


3. Classroom Conference

Conference rooms sometimes serve as seminar rooms, particularly at the level of academic departments. However, they are often more formal than seminar rooms, and have the following characteristics:

- 8 to 25 seats
- One large conference table or several tables configured together into one large seating area
- Chairs on casters
- Instructor sits at table with students
- Normally need to account for the peripherals in the room: bookcases, displays, credenza tables for food when designing space.
- Space used as teaching and meeting space

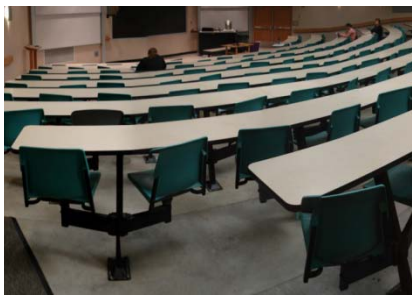
4. **Classroom Collaborative**

Collaborative space designs are becoming more popular. Collaborative learning spaces offer unique opportunities to experiment with seating and with new audio visual technologies. They are characterized by having:


- 8 to 25 seats
- Require more space per person
- Expanded instructor space to use interactive display
- Seating may be larger than standard specifications and should be easily reconfigured.
- Comfortable and movable chairs and tables

5. **Classroom Fixed Seating:**

Fixed seating classrooms have a well-defined "front" or main lecture area in the front of the room. Students tend to be more distant from the instructor due to the increased room size. Rooms are usually tiered or sloped to insure proper sightlines for both students and instructors.



- 40 or more seats
- Normally a sloped or tiered space
- Fixed table and seats or fixed table and moveable chairs or fixed tablet chairs
- Distance from the front of the room to the first row of seats shall be determined by using the recommendations and formulas contained in Item 3, Section V (The shell).

6. **Auditorium:**

The Auditorium is a space for large classes, meetings, presentations, and performances. Auditorium facilities may include assembly halls, exhibit halls, auditoriums, and theaters. As such, they tend to have wide spans and are multiple-story high in order to accommodate seating, sightline, and acoustical requirements. Raised stage floors and special lighting equipment are often required as well. Design features and characteristics that differentiate Auditorium space types from other gathering spaces include:



- 100 or more seats
- Sloped or tiered space
- Fixed seating usually with tablet arm or fixed seating with fixed tables
- Increased distance between faculty and students
- Special acoustic design including wall treatments or coverings
- Because of large size -automated room controls include lighting, shades, drapes and AV equipment
- Sound reinforcement for lecturers
- Distance from the front of the room to the first row of seats shall be determined by using the recommendations and formulas contained in Item 3, Section V (The shell).

IV. Room Sizes by Type

All teaching spaces need to be large enough to comfortably accommodate the number of students planned, type of teaching, use of audiovisual equipment and anticipated furniture. The following are standards which should be used in the Programming phase of a project. The following space guidelines should be used to estimate the total usable floor space of classrooms.

Square Feet per Student*	Maximum Capacity	Room Type	Anticipated Furnishings
27 to 33	20	Seminar	Movable Tables and Chairs
28 to 30	12-18	Conference	One Large Table and Chairs
24 to 28	45	Classroom	Tablet Arm Chairs
23 to 25	45	Classroom	Movable Tables and Chairs
25 to 27	45	Classroom	Fixed Table and Moveable Chairs
18 to 22	200	Auditorium	Auditorium Seats with Tablet Arm
25 to 30	200	Auditorium	Fixed Table with Movable Chairs

*Instructor space is included in "Square Feet per Student"

- The shape of the room, size and types of furnishings proposed, and other special design features may increase or decrease the amount of space required per student.
- Room proportions have an impact on the seating capacity, sight lines and ability for student and instructor to interact with one another.
- Avoid spaces which are too wide. They make it difficult for instructor to make eye contact. Wide spaces also have poor sightlines --especially in front rows. Wider spaces dedicate too much space to the instructor.
- Avoid spaces that are too deep. Deep spaces make it challenging for students in the last rows to communicate, hear and see the front of the room. Also, instructor space may be too narrow for screens and boards.
- Avoid creating seminar & conference rooms with long narrow tables that make it difficult for everyone to see each other. Long rooms typically make it difficult to see the projection screen and writing on boards. Rooms which are almost square or have a shape based on viewing angles are best.
- Non-traditional layouts and extra presentation screens will require more square footage per student.

V. The Shell

Classrooms should be developed from the "inside out". The conventional method of designing the room first, then filling it, usually leads to an inefficient layout, poor sightlines and reduced seating capacity. The following items should be considered when creating a new classroom:

- Determine the room type, seating capacity and teaching style.
- Determine the technology requirements, number of projection screens and whiteboards required based on the seating capacity, type of room and teaching style. Always assume that technology will change, do not tie a classroom configuration to one technological standard.
- Determine the general location, size and orientation of projection screens, whiteboards, and seating space. Screen size should be determined using the formula in item 3 of this section.
- Determine the distance from the front of the room to the first row of chairs (see item 3 in this section).
- Ensure the instructor area meets the minimum dimensions required. Generally this requires space for a podium and/or instructor table/chair.
- Consider viewing angles from each screen and ensure that all student seating falls within the viewing area.
- Determine the width and depth based on the proposed seating space guidelines. In general, rectangular classrooms should have a width to length ratio somewhere in the range of 3:4, with the instructional end on the narrower dimension.
- Determine the location and size of aisles.
- All of these elements determine the ultimate room configuration.

1. Lighting/Electrical

Proper lighting is an important, albeit complicated, element of any teaching space. Lighting needs are dependent on factors such as room size and shape, whiteboard size, AV configuration, ceiling height, and windows.

Daylighting

Students perform best in classrooms that feature uniform, diffused daylight. Ideally, daylight levels should be ample enough to reduce the initial number of fixtures in classrooms and enable electric lights to be turned off during the day, even on overcast days. Determining those optimal levels of light requires a meticulous review of building orientation and appropriate window configuration, and a recognition that classrooms receive less light for evening use than in the daytime.
Classrooms having natural daylight are to have blinds or other daylight control as well, so that light levels can be adequately controlled for electronic media presentations.

The following are general guidelines for lighting specifications:

- Either hard switches or a lighting control panel should be located near each entrance to the room, with another near the instructor's podium. If the room is equipped with lighting scene controls a campus standard Extron control for lighting scenes should be incorporated

into, or near, the podium.

- Where dimming and/or scene control switching is used, Lutron dimming and control systems are preferred due to ease of interface with Extron audio visual control systems.
- Per code, at least two lighting levels, or dimmable lighting, must be incorporated into the switching for room lighting.
- Hard switches for dimmable lights should have sliders to control dimming
- Dimmable fluorescent lights should be equipped with a quiet 1% dimming ballast
- Classroom lighting is to have override control with combination motion/sound sensors. Sensors are to shut off all lights approximately 15 minutes after no room activity is sensed. Sensors are to automatically and immediately turn on main room lights when activity or noise is sensed. Sensors are to be remote units mounted high on walls or on ceilings, not as part of wall switches.
- In rooms with a significant daylighting component, daylight sensors should be used to provide override control of artificial light sources within the daylight zone of the room.
- At computer lab classrooms lighting is to be designed so as to minimize glare and reflection on computer screens.

Lighting levels:

- Uniform light level in student seating area, at desk height, is to be 40 fc, including maintenance factor.
- Lighting level in new classrooms is to be measured prior to Substantial Completion at a minimum of 6 locations in the room (12 locations in classrooms with 50 or more seats), uniformly spaced, and if the above standard is not achieved at all locations then additional lighting will be installed at no additional cost to MSU.
- Switching is to be provided to reduce light level in the area of projection screens. Light level at projection screen is to be 10 fc.

Additional general electrical guidelines:

- All controls for moveable screens and whiteboards, tech controls, and telephones are to be located at or near the instructor's podium.
- In general classrooms, provide min. 3 convenience outlets on front (instructor) wall. If there is no built-in podium then provide two data outlets at instructor's podium location. Provide convenience outlets at min. 5 ft. on center on side walls. Provide min. 3 convenience outlets on rear wall.
- Provide power and data outlets at ceiling-mounted projector location, whether a projector is specified to be installed or not.
- At tiered classrooms with fixed desks provide power to each tier whether desks are to be wired or not.
- At computer lab classrooms MSU ITC department is to approve all power and data provisions and layouts.
- At alcoves and study areas, including those at classroom corridors, provide convenience outlets at no more than 5 ft. o.c.
- Special electrical/data/communication installations such as those for interactive video conferencing must be identified early in a project and coordinated with all parties.

- If an audio system is to be installed, either in the room enclosure or at the instructor's podium, and the room has 50 or more seats, then a campus standard Assistive Listening System is to be installed.
- In large classrooms and auditoriums an equipment rack is to be installed. The equipment rack is to be installed in a closet easily accessible from the podium location or in a wall recess near the podium location. Closely coordinate rack requirements with MSU ITC department. Conduit runs between the rack and podium must be coordinated and approved by ITC.

Lighting zones

As a rule, all classroom spaces will have lighting organized into a number of zones. These zones can be combined and switched to create a number of different lighting scenarios.

In spaces where cost concerns prohibit dimming, light fixtures should be wired for inboard/outboard switching. Where rectangular fluorescent fixtures are used they should be oriented parallel to the teaching wall where the instructor typically stands.

There are four possible lighting zones in most classrooms:

Zone 1 – Main classroom lighting (student seating area) **Zone 2** – White board **Zone 3** – Projection area **Zone 4** – Instructor Workstation

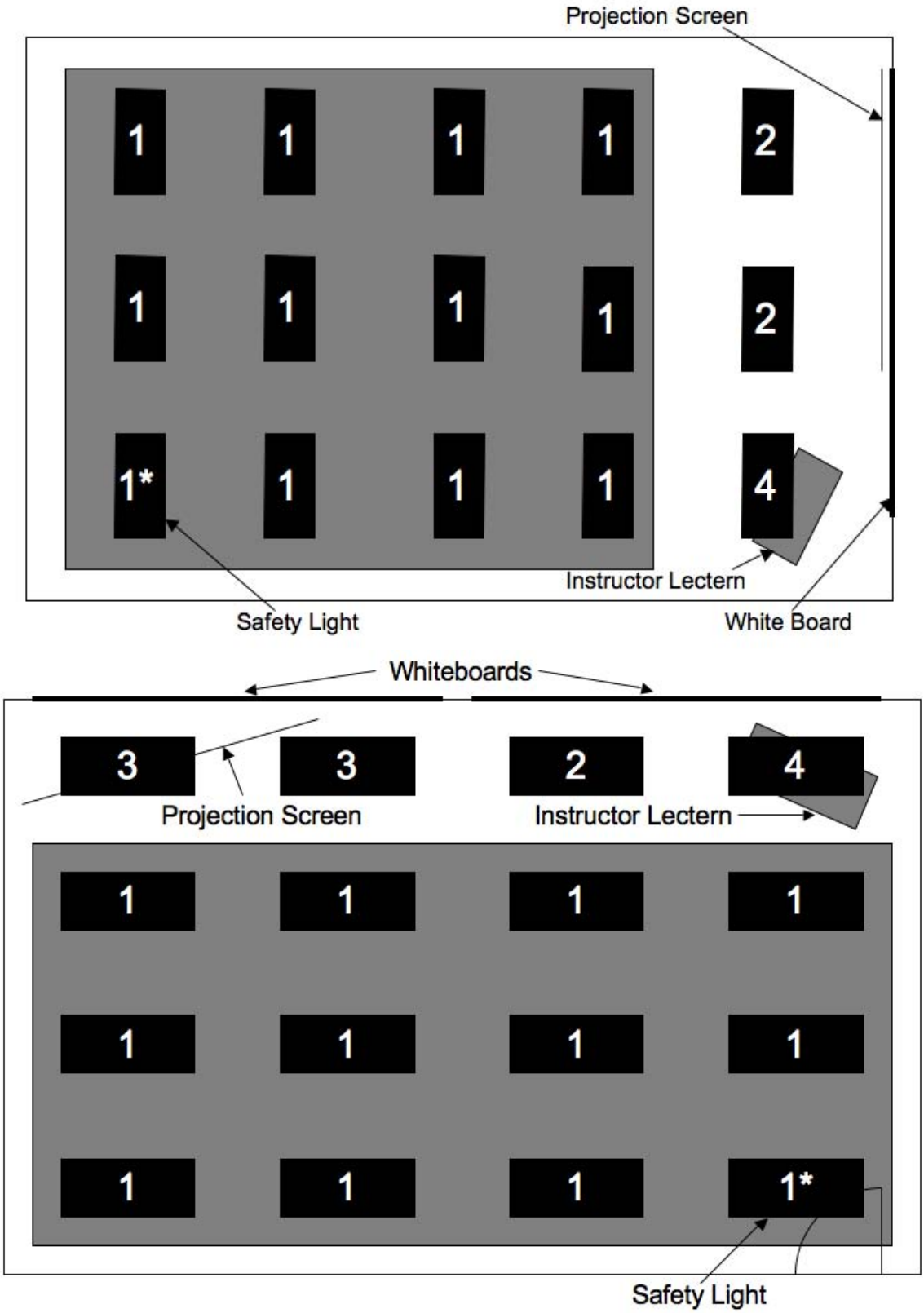
- **Zone 1** – Main Classroom Area: This zone services students and allows them to read and take notes in class.
- **Zone 2** – White Board: The first row of lights over the main white board area of the room should be switched separately from the rest of the room. These lights should be far enough away from the surface to avoid having the light trapped above the board (this sometimes occurs in the case of sliding boards). It should be close enough to allow for proper illumination of the board. Proper illumination is defined as an average of 40 lumens across the surface of the board with no area dipping below 20 lumens.
- **Zone 3** – Projection area: It is important that light not shine directly on a screen during projection. Because of this, we recommend that lights which shine directly on the screen be switched separately.
- **Zone 4** – Instructor Workstation: Light directly above the instructor workstation should be switched separately whenever possible to allow the instructor to see his/her materials while conducting a class with the rest of the lights off for projection.

Emergency Lights

Due to fire and safety codes, many classrooms must have an emergency light that stays on at all times, even when the lights are shut off. Because this can cause interference with the clarity of the projected image on screen, every effort must be made to isolate light radiation to the back of the room away from the projection screen.

Motion/Audio Sensors

Motion/Audio sensors shut off the lights in a space after a specified period of inactivity. This helps assure that the lights are off when the space is not in use. When installing sensors in classrooms, care must be exercised to avoid accidental light shutdown during relatively low-motion activities such as testing.



Sample 40 seat Classroom lighting diagrams

2. HVAC

Indoor air conditions:

The HVAC system shall be designed to maintain a temperature range of 68 to 78 degrees Fahrenheit year-round for buildings that include air conditioning. For all new and remodeled spaces the consultant shall discuss desired/achievable temperature ranges with Owner during preliminary design phase.

Typically humidity is not actively controlled for our classrooms. The indoor humidity fluctuates with the outdoor humidity. We do not employ humidifiers or control logic to actively control humidity. The Designer should consult with the Building Committee to determine if there are specific project requirements that would require more control over the relative humidity range.

Outdoor air conditions:

The summer outdoor air conditions used to determine the cooling load should be 87 degrees F dry bulb/ 60 degrees F wet bulb (or as currently specified by ASHRAE). The winter outdoor air conditions used to determine the heating load shall be -20 degrees F dry bulb (or as currently specified by ASHRAE).

Balancing dampers:

Provide balancing dampers in the supply ductwork to serve all diffusers. The dampers shall be located a minimum of 2.5 diameters upstream of the diffuser, or as required to provide desired NC ratings (see below).

Diffuser location:

Pay specific attention to the location of the diffusers in the classroom layout. Do not locate diffusers near projection screen or whiteboard; this is to avoid conflicts with the mounting of the audio/visual equipment in the ceiling. Care should be taken to avoid creating drafts on projection screens which can cause the screen to flutter.

Location of above-ceiling mechanical equipment:

Locate above-ceiling mechanical equipment needing routine service in a location outside the classroom to allow service without disrupting the class. We do understand however that conditions may dictate that the equipment be located in the classroom because no other space is available. When equipment must be installed in the classroom it should be located where it can be accessed with ladders, preferably in aisles or other areas without seating. It is very important that the above-ceiling equipment have adequate access available to service the unit. Therefore do not sacrifice access space just to get the equipment out of the classroom.

Noise:

Disruptive noise is the single most prevalent complaint made about classrooms. Careful attention must be paid to acoustics in the design of the classroom. Noise is transmitted to the classroom in many ways, including:

- Noise can be transmitted from areas adjacent to the classroom. This noise can travel though doors, lighting fixtures, return air paths, plenum spaces and return ductwork.
- Noise can be transmitted from the classroom diffusers. This noise can be air noise and

radiated noise from the HVAC equipment.

- Noise can be transmitted from adjacent HVAC equipment. This is frequently caused by the location of mechanical rooms, location of fan-powered terminal units and location of ductwork mains.

The NC (Noise Criterion) ratings for general classrooms should be NC 35 or less, or approximately 35 db in normal speech frequencies. Large lecture halls shall have a rating of NC 25 or less. Individual equipment such as fans, ductwork and diffusers shall have ratings not exceeding NC 25 throughout the load range. For rooms where video conferencing systems are installed or likely to be added in the future, background noise level should ideally be NC 25 or less. This includes both noise from technical installations (air conditioning, in particular) and outdoor traffic noise etc.

Noise from adjacent areas can be mitigated in many ways, including: doorways can have sealing hardware if appropriate to achieve noise levels, lighting openings shall take into account noise transmission, return air paths shall incorporate noise traps, walls shall be constructed of sound deadening materials or insulated with sound insulation, top and bottom wall plates shall be set in sealant, walls shall extend to the structure and openings including piping, ductwork and electrical penetrations shall be sealed.

Noise from diffusers and ductwork should be mitigated by careful selection of diffusers to limit noise ratings. Ductwork should be designed to limit noise ratings. Ductwork geometry should be designed to limit noise from connected equipment.

Noise from HVAC equipment should be mitigated by layout design and by attention to construction details. Mechanical rooms should not be located so as to share a wall or floor structure with a classroom. Main ductwork runs should be located so that duct chases are not located near a classroom and ductwork mains avoid classrooms as much as possible. This should be coordinated between Mechanical Engineer and Architect during the initial floor plan layout. If HVAC equipment and ductwork unavoidably has to be located near classroom, the Designer shall provide specific construction details to limit noise transmission. These should include ductwork stiffening, special duct hangers, separation of wall structures from support materials, design of wall for acoustic isolation, etc.

Ventilation:

Adequate outside ventilation air should be provided in accordance with current codes and ASHRAE recommendations. Large, high occupancy, rooms should have CO2 or other demand-controlled ventilation systems.

Zoning:

When designing buildings, classrooms should be placed on air handlers that are separate from air handlers that serve laboratory and other specialized HVAC systems. Large auditoriums should have their own air handlers, which will allow these areas to be controlled to save energy.

3. Screen sizing and distance to first row of seats recommendations:

Screen height should be approximately equal to 1/6 the distance from the screen to the last row of seats, allowing text to be read and detail to be seen in the projected image. Ideally, the first row of seats should be approximately two screen heights away.

The bottom of the screen should be a minimum of 4 feet above the audience floor, allowing those seated toward the rear of the audience to see the screen.

4. Networking/ITC requirements

AV Lectern Active Data

Each room will be equipped with at least four active network drops, grouped together at the instructor AV lectern location. More network drops may be needed for large lecture halls. The active drops should be grouped together near the instructor lectern in a location easily reached by the podium whip, preferably in the same 2-gang box. The wall box should be located so that data cables run from the wall to the lectern do not create a tripping hazard for the instructor. For a typical room, network drops are needed for the on-board computer, laptop connection, control panel and the control processor.

ITC Building Standards

MSU ITC has a Building Standards document available to anyone via their website. This document has in detail the required specifications for cable and fiber infrastructure to and within MSU buildings. All infrastructure specifications for buildings and building distribution should be obtained from the MSU ITC Building Standards document.

5. Doors/Room Security

Door Hardware

All classroom doors should be outfitted as follows:

- Classroom function lockset (preferred mfgr.: Best, model 93K7R15D or Schlage ND series with Rhodes design)
- Levers as opposed to knobs
- We do not recommend door closers on classroom doors. This will allow the door to remain open on its own for easy access into and out of classroom
- Concave wall bumpers at lever height for wall protection
- Door silencers to muffle the noise of the door closing
- On classrooms of greater than 100 seats, exit doors to have panic hardware (Von Duprin 99 rim device, Von Duprin 33A may be substituted on narrow stile doors)

Card access control systems may be installed on a case-by-case basis. These doors will need the following:

- Storeroom function lockset (preferred mfgr.: Best)
- Door closer (LCN 4041 series with extra duty arm)
- Electric strike (to allow key over ride when needed)
- Door contacts
- Card access system
- If an ADA electrically actuated door is required, install the following:
- Electric system
- Door closer (LCN 4640 series)
- Push buttons on inside and outside of classroom

Doors

Doors should be located at the back of the classroom so that students entering and exiting the space will not disrupt instruction. Exceptions to this rule would be large tiered classrooms and auditoriums that require multiple doors located at the front and rear of the space. The doors themselves should adhere to the following parameters:

- Minimum of three feet wide
- Door opening force, hardware, width, thresholds and maneuvering clearance should conform to ADA standards.
- It is acceptable to locate a door closer to the instructor area if required to meet fire code door separation criteria.
- Should have a small glass window panel or glass sidelights to allow viewing into and out of the room. The area of glass in the vision panel should not exceed 100 square inches. The base of the vision panel should be no higher than 42 inches above the floor, and the top of the vision panel should extend at least 62 inches above the floor.

- Sidelights that are full height or begin about three feet above floor level are preferred because they function as well for wheelchair users as for people who are standing. When sidelights are installed, blinds should be installed since there are occasions where hallway lighting can bleed into the classroom, interfering with audio/visual presentation.
- Existing classrooms with only one door near the front of the room shall be modified, if feasible, during renovation to move the door, move the instruction area or add a second door.
- When possible, doors should be recessed into the room so that the door does not swing into the hallway. If it is necessary for the door to open into the hallway, some kind of visual identification (such as the tile pattern in floor) can be used to indicate the amount of space the door will occupy when it swings open.

6. Windows

Windows should be installed in every classroom where possible. The windows should not exceed 30-40% of the exterior wall in each room and should be on the side or rear wall. In

larger rooms as well as sloped or tiered rooms, it is often desirable to install motorized shades and blinds. Be certain to design in sufficient depth the window and wall to allow for motorized installations.

- Tinted, "Low-E" rated glass is preferred for all windows.
- Window coverings can be manual if they are easily accessible. If windows are too high to reach and/or are too numerous, the window treatments should be motorized and capable of being controlled by the AV control system. This will allow ease of use for instructors to control the lighting from the windows. Motorized shades are recommended. Use of light diffusing shades on a roller is recommended, however a combination of horizontal blinds and shades can be used. All window treatments should have a non-reflective matt finish.

7. Flooring

In classrooms a multi-colored or patterned carpet should be used - no solid color should be installed. Carpet tiles can be considered where appropriate. Four to six inch cove base should also be installed. If carpet cannot be installed under seats in fixed classrooms due to maintenance, then the concrete floors should be free of cracks and defects and should be sealed.
In laboratories floors are to be sealed concrete, free from cracks and defects.
In hallways that lead to large classrooms directly from the exterior of the building, hard surface floors should be installed.

8. Walls, Ceilings and Chair Rails

Walls

- Walls should extend to structure above ceiling to provide sound isolation
- Folding or moveable walls should be avoided
- Walls in lecture halls should not be parallel and should have a finish and/or configuration to disperse sound.
- The rear wall should have an acoustically absorbent finish.

Ceilings

- Ceilings in small classrooms (with less than 50 students) may be entirely acoustical ceiling.
- Minimum ceiling height for classrooms is 9 feet, 10 feet for classrooms of 50 or more seats and will depend on the size of screen required. In large, sloped or tiered classrooms, the ceiling height is directly related to the distance to the last row of seats.
- The surface of the ceiling must be designed to accommodate the required acoustical properties of the room. The ceiling should include significant amounts of hard surface material coupled with acoustical tile.
- The area of the ceiling that should be covered with acoustical tile is directly related to the ceiling height. Ceilings above 10 feet should have 50-60% acoustical ceiling tile.

- The ceiling should act as a sound mirror, reflecting sound downward to blend with direct sound.
- Ceilings in small lecture halls should be at least 15 feet high at the front of the room and 9 feet high at the rear. Larger lecture halls should be at least 20 feet in front and 10 feet at the rear. An angled ceiling at the front can deliver better sound to the rear.

Chair Rails (where used)

- Rails should match the architectural design of the room.
- Chair Rail material should be wide enough to work with tables and chairs of varying height and mounted at a height that will prevent damage to wall surfaces: typically a minimum of 6 inches, with the bottom edge approximately 25 inches above the finished floor.
- In rooms with movable furniture, chair rails must be installed on the side and rear walls.
- Recommended product – InPro Corporation, .06 thick, applied with #53 InPro Bond Adhesive.

9. Colors/ Finishes

- Walls should be painted in a light color in an eggshell finish. A darker contrasting shade of color is acceptable on the front teaching wall. Focus walls in spaces where distance learning takes place should be light blue or grey in color. No vinyl wall covering should be used. Paint colors should match existing colors in adjacent rooms or should be chosen from MSU standard color palettes (consult with MSU FPDC).
- No-VOC paints should always be used.
- Colors for furnishings and audio-visual components shall be coordinated with finish colors used in the room and in the same building.

10. Reflectance Values

The Engineering Society of North America recommends the following reflectance values for finish materials. Be sure to coordinate floor and paint finishes to achieve reflectance values without increasing lighting.

- Ceilings: 80% or higher
- Walls: between 50% and 70%
- Floors: between 20% and 40%
- Desktops: between 24% and 45%

11. Acoustics

- Walls in the classroom should have a minimum sound transmission class (STC) of 50.
- The rear wall of any large classroom (over 75) should have an acoustically absorbent finish.
- Side walls in large lecture halls should not be parallel. Walls should be designed to disperse sound, should be a mix of reflecting and absorbing materials, and they should have a rough or textured surface. Noise levels should not exceed NC 25-30.

12. Closets

There is often a need in large classrooms for a small storage room for classroom supplies separate from audiovisual space. Room should be up to 40 square feet to store board supplies, movable lecterns and additional chairs. This space requires lighting, a lockable door, conditioned air, power and a few shelving units for small supplies and no window. It should be equipped with a storeroom function lock.

VI. Furniture and Equipment

1. Student Chairs

Student seats should comfortably accommodate the tallest and smallest persons. They should provide good ergonomics and have backs that allow for articulating movement.

Recommended Seat Spacing

Moveable tables and chairs

- Moveable seats placed a minimum of 28” on center
- Tables should be 36 inches apart to allow access between rows

Continuous work surfaces with moveable chairs

- 36” apart for rows with up to 20 seats
- 38” apart for rows with 21-24 seats

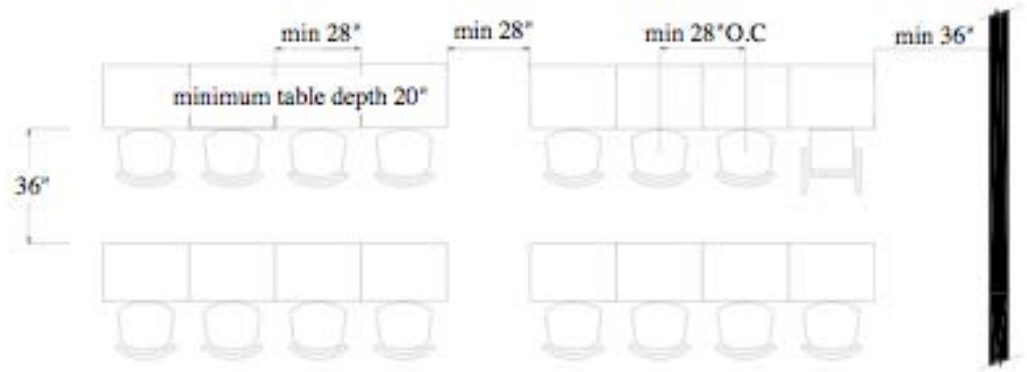
Large auditoriums with tablet arm seats

- Seats spaced a minimum of 24” on center
- Minimum 21” clearance between tablet arm supports
- Minimum 12” clearance between tablet arms in-use and seat backs (with seats fully reclined)

Access Aisles

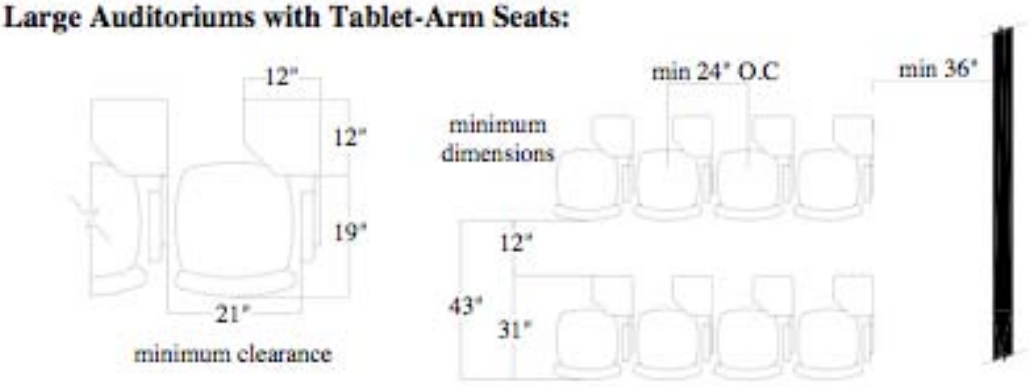
Provide a minimum 36” wide aisle leading to front of room.

Movable Tables and Chairs:



Continuous Work Surfaces with Movable Chairs:

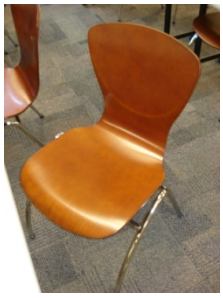
Large Auditoriums with Tablet-Arm Seats:



-from University of Cincinnati's "Design Guidance: Learning Environments", p. 27

Moveable Chairs

- Seat cushion should be a minimum of 17” wide and 18 ½ “ deep.
- They should have casters
- Depending on the application, they can either have arms or be armless
- They should be stackable to at least 5 high



Movable Tablet Arm Chairs

- Seat should be minimum of 22” wide.
- Tablet arm tablets should be at least 130 square inches.
- 20% of the seats should be left-handed.
- The back of the chair should have some flex
- They should not have casters. Sliders are acceptable.
- A tablet that can fold off to the side is desirable, but there are few products that can accomplish this while still being study and durable. Take care in selecting a product if this feature is desired.

Auditorium seating

- Seats should spaced a minimum of 24” on center
- Stagger seats to allow clear viewing
- Fixed seating should allow for comfortable seating for the person in the seat as well as the person behind the seat. Avoid rear panels and chair heights that don’t allow for proper legroom and foot space.

- Flip-up seats allow for easier passage between rows. Self lifting upholstered seats are desirable. (Need to consider ability to exit a row of seats during exams without disrupting students in other seats.)
- Aisle panel to be determined by project
- Tablet arms should flip down.
- 20% should be left-handed.
- Tablet should be oversize with laminate top
- At this time data and power are only necessary for students who need a hearing accommodation.
- Provide 36 inch wide accessible workstations for students in wheelchairs as follows: 4 workstations for rooms with 49 to 300 seats, 6 workstations for rooms with 301 to 500 seats
- For each accessible workstation, provide the same number of moveable chairs as per the requirements for moveable seating listed above.

2. Student Tables

Movable tables allow the class to rearrange seating into smaller groups if needed and should:

- Have casters with a locking mechanism or be small enough to move easily
- Have depth of 18 to 20 inches and a width of 28 to 30 inches per person.
- Provide a workspace of about 4 square feet minimum
- Can seat more than one student (seating for two works well)
- Provide unobstructed knee clearance under the table that is at least 22 inches wide and at least 27 inches high

3. Conference Tables

Conference tables should allow eye contact between the students on both sides of the table. There should be an unobstructed view of the instructor, projection screen, and white board. Use of a boat shaped table or movable tables is desired. Special care is required to ensure proper legroom around and near table legs. Design seating space with adequate room for each student.

4. Instructor Furniture

- Typical instructor station requires minimum 10 square feet.
- If an AV lectern is installed the instructor can use that for their teaching space. The lectern must be at least 48 inches from the front wall and 48 inches from the side wall for ADA

accessibility.

- If no AV lectern is installed, provide a small sturdy table with modesty panel and a tabletop podium.
- Space should be provided in case an instructor requires a table in addition to the AV lectern.

5. Special Rooms

In classrooms or labs where chemicals or art supplies are used, provide moveable chairs or stools that do not need foam pads and upholstery to provide comfort. Use chairs with adjustable height seats and backs and back tension that adjust automatically to weight.

6. ADA Tables

Each moveable classroom, whether it has tablet arm chairs or moveable tables, should be equipped with a table to allow for wheelchair access. In areas where there are a large number of classrooms, heavier tables are desirable to discourage people from removing them from the rooms. Lightweight tables are easier to maneuver in the classroom, but are prone to being removed without permission for reasons other than an accommodation.

7. Types of furniture to avoid

- Pedestal seats bolted to the floor.
- Moveable student desks with seats attached.
- Pivot arm seats that do not comfortably accommodate large or small students.
- Movable tablet arm chairs with tablets that are not durable.

8. Whiteboards/Tack boards

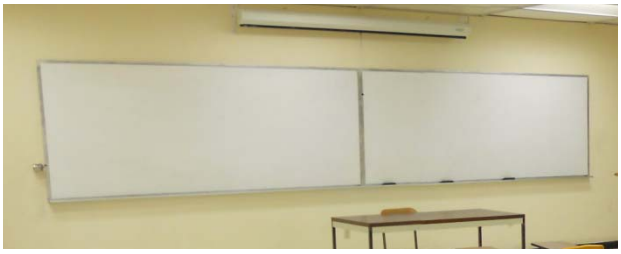
Provide white boards in classrooms as follows:

- Fixed-height white boards should be mounted with the top of the chalk tray 36-inches above the floor
- Have a low-gloss white porcelain enamel steel surface that is easy to clean.
- Be illuminated by lights on a separate switch that do not spill over onto screens, other white boards, or the wall behind them.
- Have a continuous marker tray below the marker board surface and a wall-mounted holder nearby that is large enough for six markers and an eraser.
- In classrooms with white boards, provide tack board strips and clips along the top of the boards so that display materials can be hung without being damaged.

Provide tack boards as follows:

- Outside classrooms, provide a tack board display in a central hallway or gathering area. It is desirable to position these near computer email/kiosk stations.

- Large display boards are not desired in other areas because they attract notices of events and advertisements that detract from room and building appearance. The exception to this is in the area of departmental offices where departmental notices are frequently appropriate.




9. Clocks, Trash and Recycling

Clocks

Clocks should be provided in each classroom, should be large and easy to read. The clock should be seen easily by the instructor and students and placed on either a side wall or the back wall if necessary. Never locate the clock at the front of the classroom. If a battery clock is selected it must be "noise free". Clocks should be decorative in nature and appropriate for each space.

Trash and Recycling

All classrooms must be equipped with proper *trash/recycling* containers that are conducive to the décor of the area. Trash and paper recycling should be located near the exit door of each classroom. Additional trash, paper recycling and plastic/aluminum recycling should be provided in lobby, vending and student common areas. Special design consideration should be considered for location, design and use for each building. Off-the shelf style containers may not always be appropriate.

10. Artwork

Artwork is recommended for installation in classrooms for its aesthetic added value. Inexpensive choices are best, to reduce the liability of theft. Artwork which is themed for specific departmental or building areas of concentration should be chosen.

VII. Audio-Visual Technologies

1. General Conditions

Audio-visual systems in classrooms should be designed for the most commonly used conventional and electronic media --whiteboards, projection screens, VHS tapes, DVDs, compact disks, document cameras, computer-generated media, audio inputs. The following sections provide applicable guidance for each of these media.

2. Classroom AV Tiers

MSU ITC has developed a system for room design and scheduling which designates a classroom in terms of room AV Tiers. This classification (Tier 1 through Tier 3) defines the type and kind of dedicated AV equipment that exists in a classroom. (Level 3 being the highest level of AV and Level 1 the lowest.) Below is a snapshot of the AV equipment at each of the three levels. **NOTE: Check with MSU ITC for current AV equipment and control specifications.**

Tier 1:

- Ceiling mounted projector – WXGA resolution, 4000 lumen minimum
- Single manual screen with controlled screen release sized to room, 16:10 format; (motorized screen optional with low voltage controller)
- Network jack for laptop use
- Laptop connection
  - Config 1: Wall shelf with Extron Polevault system, wall jack; Extron MLC 104 controller – network control; VCR/DVD player; audio w/ceiling speakers
  - Config 2: 30" podium furniture with above equipment plus an Extron Cable Cubby

Tier 2:

- Ceiling mounted projector – WXGA resolution, 4000 lumen minimum
- Single manual screen with controlled screen release sized to room, 16:10 format; (motorized screen optional with low voltage controller)
- Podium furniture w/accessible rack space & no user access to cable connections
- Dedicated networked computer
- VCR/DVD player
- Wireless mouse
- Extron control system for audio visual equipment
- Laptop connection box (Extron Cable Cubby 600)
  - VGA cable
  - Two power plug ins
  - Two USB connections
  - 3.5mm mini audio connection
  - Network connection (DHCP off second NIC in dedicated computer or wireless if available)
- Sound w/installed speakers
- Wolfvision document camera
- Assistive listening installed in classroom with 50 or more seats
- Wireless microphone (Revolabs w/base station charging unit)

Optional equipment:

- 17" or larger LCD annotation panel & display (Smart Technologies)

Tier 3:

- Dual ceiling mounted projectors, 16:10 format, brightness depends on room
- Dual electric screens or fixed screens depending on room design
  - Automated screen control if electric screens
- Podium furniture w/accessible rack space & no user access to cable connections
- Dedicated networked computer
- VCR/DVD player
- Wireless mouse
- Extron touch panel controller
- 17" or larger LCD annotation panel & display (Smart Technologies)
- Laptop connection box (Extron Cable Cubby 600)
  - VGA cable
  - Two power plug ins
  - Two USB connection for thumb drive use
  - 3.5mm mini audio connection
  - Network connection (DHCP off second NIC in dedicated computer or wireless if available)
- Sound w/installed speakers
- Lighting controls
- Wireless microphone (Revolabs w/base station charging unit)
- Document camera (Wolfvision)

Video Conferencing Option:

- This could be a Tier 2 or Tier 3 classroom that has the necessary equipment added in the room to do audio & video conferencing.

3. Instructor Lectern

Technology-rich classrooms should include an instructor AV Lectern designed to accommodate audio-visual systems, presentation computer and other commonly used audio-visual components and control devices.

Most "off-the-shelf" lectern furniture does not meet our needs. MSU ITC has worked closely with a State millwork vendor to develop custom designs that meet our goals and standardize workstation and user interface design for each classroom. This standardization simplifies ease of use and minimizes instructor training. Refinements to custom-designed instructor workstations are made periodically. **Architects and Consultants should obtain electronic copies of drawings for the appropriate current design(s) from MSU ITC.**

Floor plans and cross sections that show the lectern must be included in design submissions. Floor plans and sections must show the location of the following:

- Instructor AV Lectern drawn to scale
- Other portable media projectors and carts (if proposed)
- Locations of wall or floor junction boxes for power/data/audiovisual system wiring to serve the lectern

A typical instructor AV lectern is illustrated below in two styles.

Computer and Laptop Combination AV Lecterns:




Laptop Connection AV Wall Shelf or AV Podium:


A. Instructor Lectern: Key Design Features and Considerations

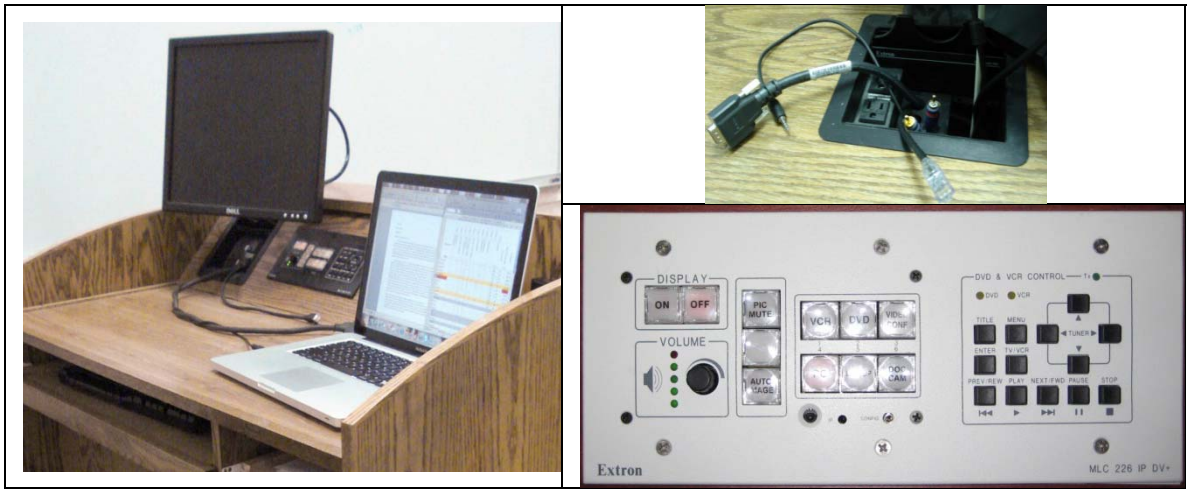
- Lecterns shall be oriented to allow instructors to maintain eye contact with students while using keyboards and allow students to see projected media.
- In rooms with one screen, an instructor podium located on the side opposite the doorways, marker boards across the front of the classroom, and a screen in the side opposite the podium. The need exists to maximize available white board space when the projection screen is in use and still maintain adequate viewing angles for students.
- In large rooms with multiple screens, a lectern located opposite the doorways, near the marker board usually works well, but a more central location may be preferable in some rooms. Tables used for instructor notes or references may also be needed.
- Lectern audio-visual components shall not block views of screens and marker boards**:**
  - 42 inches above floor–maximum height of work surfaces
  - 48 inches above floor–maximum height of monitors/task lights/other components (currently difficult to do unless we use a monitor or Sympodium recessed or mounted under the work surface).
- Lectern accessibility
  - Provide accessible route to workstations
  - PC keyboard/mouse/controls within easy reach of instructors
  - Control panel for A/V system in easy reach of instructors
  - Height of instructor's seat easily adjusted -19 to 27 inches above floor
- Lectern Security
  - Security of lectern components will be enhanced by using exterior room door locks – either electronic or keyed. Facilities Services will designate a lock style in order to standardize for locking/unlocking.
  - User access to the inside of the podium will be restricted by a secure rack such that the user can't access or modify cables and equipment. Rack to be specified by ITC.
  - Door access shall be provided in lectern back for technician access to computer and audiovisual components for maintenance – lectern key lock (or electronic locking code) to be determined by ITC.
  - Security cables to tether computer, computer monitor, and document camera equipment to a solid support structure within the lectern.
  - Instructor AV lectern shall provide space for the following:
    - Instructor's references and handouts
    - AV controls
    - Computer monitor
    - Document camera
    - Cable cubby (see specification for cable cubby components)
    - Laptop placement on podium surface
    - Space for iClicker student response base station, wireless mouse, wireless microphone base charging station
    - Small task light with shade, focused on usable lectern work surface, is an optional addition that may be considered
    - Audio-visual components installed in standard racks

B. Interface (Extron)

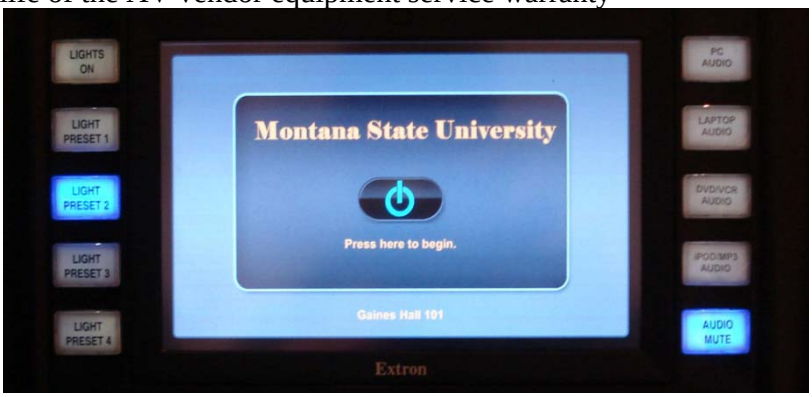
Control systems for electronic components will have the capability of controlling all of the components identified above as well as projection screens, room lights, and shades operated by electric motors. Contact **ITC** for detailed specifications.

Currently all control systems must:

- Be Extron manufactured controls
- Be programmable and capable of being re-programmed
- Interface properly with controls for AV equipment, screens, lights, and shades and other selected programmable devices
- Have a touch panel or push button controller on the instructor workstation with easy-to-read, simple menu choices or button configurations which mirror the MSU chosen standard design. Design samples will be supplied by MSU ITC.



- All source codes, compiled codes, and access passwords shall be provided to the University at acceptance and become University property.
- If an AV integrator is used, integrator will provide updates to existing code and firmware during the life of the AV vendor equipment service warranty

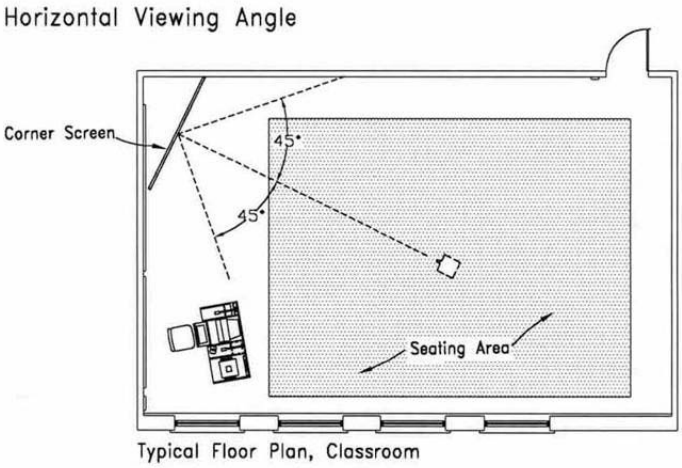


7" Touch Panel Interface

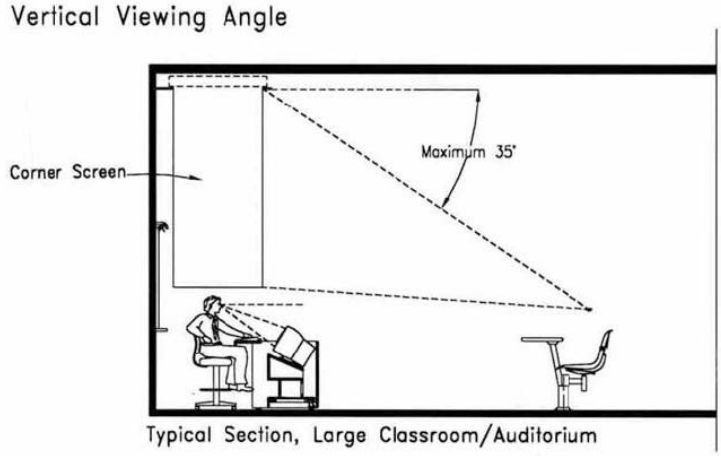
For the components that are to be integrated into the podium, check with MSU ITC for current specifications.

C. Viewing Angles

Provide an unobstructed view of the entire image on all screens from all seats within the viewing angles (cones of vision) described below:
Maximum 45-degree horizontal angle from the perpendicular to the center of screens
Maximum 35-degree vertical angle from the perpendicular to the top of each screen



Typical Floor Plan, Classroom



Typical Section, Large Classroom/Auditorium

D. Screen Type

- Matte white with gain of about 1.0 (30 Lamberts per square foot of screen area)
- Black border
- Electrically operated whenever possible
- Tab tensioned screens are preferred for electric screen installations
- Mounted above the suspended ceiling with opening in ceiling

- Stop point at least four feet above the floor
- Manual screens will be considered only in rooms designed primarily for interactive discussion and the project budget precludes the use of ceiling-mounted data projectors and other audiovisual components that are installed permanently.
- Manual screens should be wall-mounted above the suspended ceiling whenever possible and shall have a controlled screen release function.
- Screens mounted below the ceiling with exposed brackets are not desirable.

E. Rationale for Using Electric Screens

Screens operated by electric motors represent less than 10% of the cost of an electronic audio-visual system. Installing them after rooms are built can be very costly if ductwork or lights must be moved and new wiring circuits added. Most manual screens are not very flat, distort projected images, are hard to raise and lower, and can be easily damaged. Students in rear rows cannot see the bottom half of projected images if manual screens are mounted just above the whiteboard.
Manual screens should therefore be considered only as a last resort in rooms where projected images are only needed infrequently.

F. Dual Screens

Certain teaching styles lend themselves to the use of two projected images at once. For example, an instructor may wish to show PowerPoint presentation on one screen and create a video on another screen. At this time, MSU has only a few examples on campus, but the technology is becoming more in demand. This best allows for single-projection instruction while providing the option of going to dual screen.

G. Audio Systems

Accurate sound reproduction for sound and moving image playback is important for the teaching spaces where playback is routinely done. For spaces without permanent installations a portable sound system may suffice.
While some data/video projectors have built-in speakers the sound reproduction has proven inadequate in permanent installs. Besides general classrooms consideration should be given to the specific amplification needs for the teaching of film studies and music with input from the respective faculties. In larger classrooms there may be a need for voice amplification using a fixed lectern microphone and/or a wireless Revolabs microphone. Revolabs wireless microphones are also being installed in smaller rooms to facilitate classroom lecture capture.

H. Standards

- Playback sound amplification should be present when a data/video projector is designed

into the room.

- Specific speaker types and locations will be determined by ceiling configuration
  - Wall mounted speakers should be mounted in front of the room where instruction usually takes place
  - Ceiling mounted speakers
- Department faculty should be consulted about their specific needs.

I. Overhead Projectors

The instructional process usually employs the projection of text and static images. The traditional method has been to use overhead projectors on carts for the showing of text and images rendered onto transparencies. The overhead projector sits on a wheeled AV cart. In classrooms that do not have data/image projectors with document cameras the usual method of image projection is using an overhead projector with transparencies. The cart allows the overhead projector to be moved out of the way or better positioned for projection as necessary. Rooms with data/image projectors and document cameras do not have overhead projectors as standard equipment.

Standards:

The 3M Overhead Projector Model 1780 type is preferred with its sharper image and two lamps for switching in case of lamp failure.

The AV cart should be wheeled, color black, plastic, with power cord.

Height of cart depends on placement of the projection screen. Typically 30" and 42" carts are used.

VIII. Future Additions to the Guidelines

- Emerging Technologies -Special AV Designs
- Special Needs Accommodations (Hearing impaired, sight impaired)
- Computer Classrooms
- Teaching Labs
- Best Practices for Working with AV Consultants and Vendors
- Process

Thank you for taking the time to review this document. Montana State University is committed to updating this document as new lessons are learned and as our classroom spaces evolve. Please help us to continue improving our classroom design process. Suggestions can be made by sending an e-mail to matthew.hume@montana.edu or by calling 406/994-4213.

Last Published Version: xxxxx

LED Surface Area Lighting - Phase One *Walkways*

Background

Montana State University's Bozeman campus is lit by approximately 1,100 pole mounted parking, roadway, and walkway lamps. These high pressure sodium lamps operate approximately 4,100 hours annually, consume approximately 700,000 kwh annually with a 2010 value of $42,000. Empirical evidence suggests that these lamps have an average life of 18,000 hours and ballast failures occur on a frequent basis. At any time it is estimated that between 5% and 10% of this lighting system is experiencing a failure mode (ballast or lamp) leaving pedestrian and vehicular circulation surfaces unlit, reducing security and increasing liability.

Since the Fall of 2010, MSU has been engaged in a pilot program to find lighting technology that will meet illumination standards set forth by the Illumination Engineers Society (IES) while substantially reducing the energy and maintenance requirement. Specifically, MSU has investigated LED products available for these applications. LED retrofit kits that will fit in the Kim Archetype fixture (campus standard) have been evaluated and the first phase of implementation is planned for Summer 2011.

Project Description

Based on the pilot information acquired to date, the most successful retrofit appears to be the conversion of walkway fixtures. A first phase of system retrofit is being developed for this walkway lighting. The walkway retrofit would involve the removal of the existing lighting components and replacement with an LED retrofit kit. This retrofit delivers a multitude of benefits:

Increased service life

LED technology is commonly expected, and guaranteed, to last for a minimum of 50,000 hours with many manufacturers extending claims of lives beyond 100,000 hours. Although LED technology has been well established in many industries, surface lighting products are fairly new and product lifecycle data is still being developed. At the minimum life estimates, an LED is estimated to increase mean time between failure by 3-4 times. Reduced failure rates translate to improved security and reduced maintenance costs.

Energy Savings

Energy savings are estimated to be approximately 50%. For the first phase of retrofit, the annual savings are estimated at 141,000 kwh and $9,300 annually.

Lighting Distribution

LED exterior lighting systems have substantially better lighting distribution than conventional sources, such as high pressure sodium lighting. One measure of the quality of distribution is the max/min ratio (a measure of the evenness of light level). Photometric analysis indicates that LED retrofit kits are capable of achieving a max/min of 2.6 where the existing lighting has a ratio of about 7. A lower max/min indicates more even light distribution.

Light Quality

The ability to see well and discern color in artificial lighting is highly dependent upon the quality of the light produced. Light quality is measured by Color Rendition Index (CRI). Pure sunlight has a CRI of 100. A decreasing number indicates a reduction of an artificial source's emulation of natural light. High pressure sodium has a CRI of low to mid 20's. LED retrofits can have a CRI in excess of 80. The quality of the light is very important to the human eye's ability to see well in artificial light conditions.

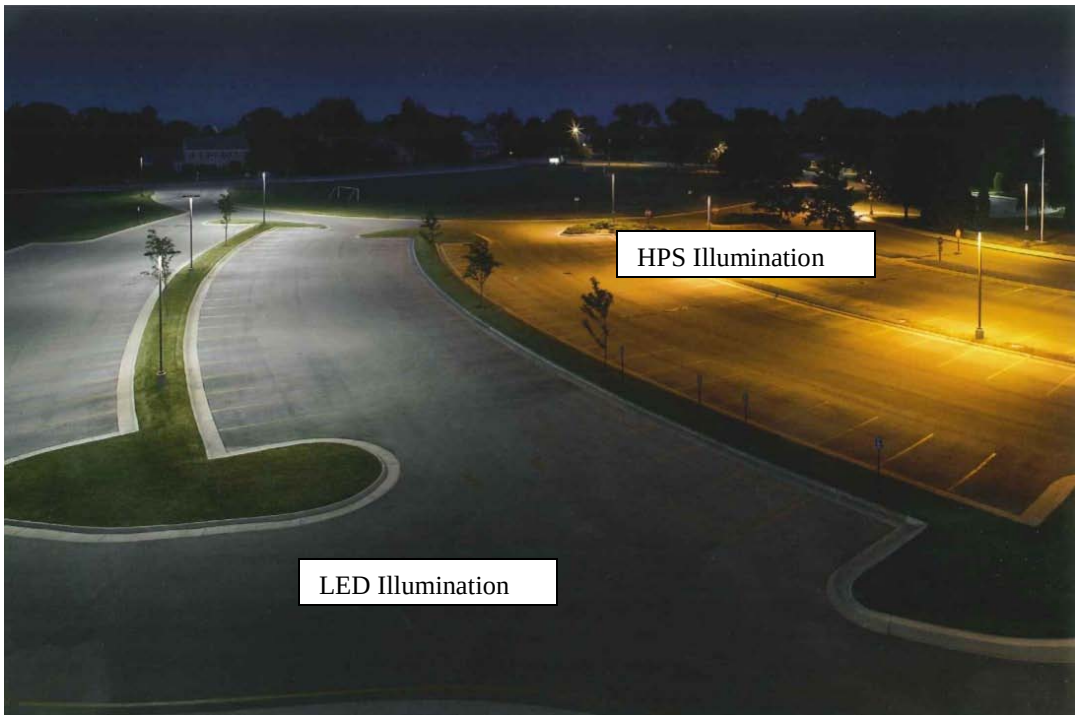
Dark Sky

The reduction of light pollution of the night sky is an important factor in the selection of exterior lighting sources. While the dark sky capabilities of MSU's existing light fixtures is quite good, the LED pilot has resulted in visibly lower horizontal light escape from the LED retrofits. Some concern exists that LED lighting emits additional blue-rich light that can be of greater pollution potential than conventional sources. MSU has researched available product and attempted to manage the light output of the specified retrofit product to mitigate blue-rich white light pollution. The LED's specified are of a much warmer color than the extremely blue LED lights of primary concern. Also, the lumen output of the installed product will be only 35-40% of the existing sources, dramatically reducing the volume of light possibly reflected.

Project Implementation Summary

Phase One Estimated Cost: $375,000 (short breakdown)
Phase One Schedule: Issue solicitation: May 1, 2011
Installation: June 1, 2011-Octover 1, 2011 by MSU WCC

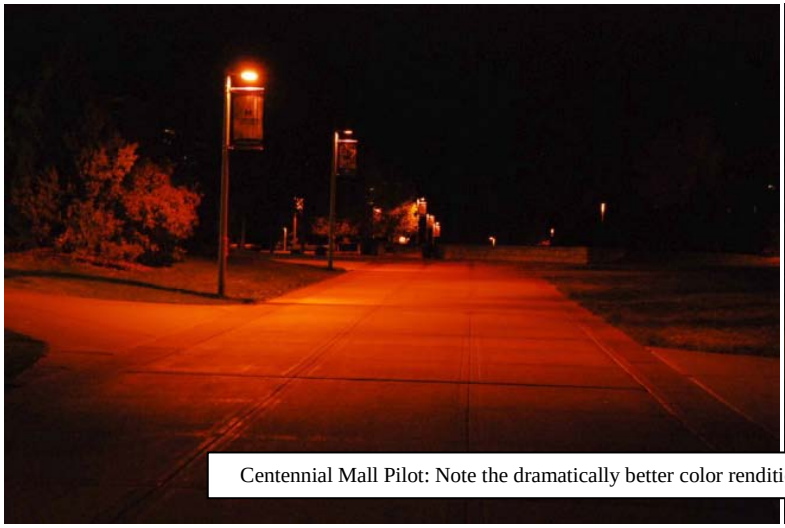
Lifecycle Analysis - Walkway Lighting LED Retrofit					12/16/2010
Year	Capital Investment	Energy Savings	Maintenance Savings	Annual Cashflow	Cumulative Cashflow
0	$ (375,000)	0	0	$ (375,000.00)	$ (375,000.00)
1		$ 9,390	$ 32,071	$ 41,461.51	$ (333,538.49)
2		$ 9,578	$ 32,873	$ 42,451.09	$ (291,087.40)
3	$ -	$ 9,770	$ 33,695	$ 43,464.48	$ (247,622.92)
4	$ -	$ 9,965	$ 34,537	$ 44,502.24	$ (203,120.67)
5	$ -	$ 10,164	$ 35,401	$ 45,564.97	$ (157,555.70)
6	$ -	$ 10,368	$ 36,286	$ 46,653.28	$ (110,902.42)
7	$ -	$ 10,575	$ 37,193	$ 47,767.77	$ (63,134.65)
8	$ -	$ 10,787	$ 38,122	$ 48,909.09	$ (14,225.56)
9	$ -	$ 11,002	$ 39,076	$ 50,077.88	$ 35,852.32
10	$ -	$ 11,222	$ 40,052	$ 51,274.82	$ 87,127.14
11	$ -	$ 11,447	$ 41,054	$ 52,500.58	$ 139,627.71
12	$ -	$ 11,676	$ 42,080	$ 53,755.86	$ 193,383.57
13	$ -	$ 11,909	$ 43,132	$ 55,041.37	$ 248,424.94
14	$ -	$ 12,147	$ 44,210	$ 56,357.86	$ 304,782.80
15	$ -	$ 12,390	$ 45,316	$ 57,706.07	$ 362,488.87
16	$ -	$ 12,638	$ 46,449	$ 59,086.77	$ 421,575.64
17	$ -	$ 12,891	$ 47,610	$ 60,500.75	$ 482,076.39
18	$ -	$ 13,149	$ 48,800	$ 61,948.81	$ 544,025.20
19	$ -	$ 13,412	$ 50,020	$ 63,431.79	$ 607,456.99
20	$ -	$ 13,680	$ 51,270	$ 64,950.52	$ 672,407.52



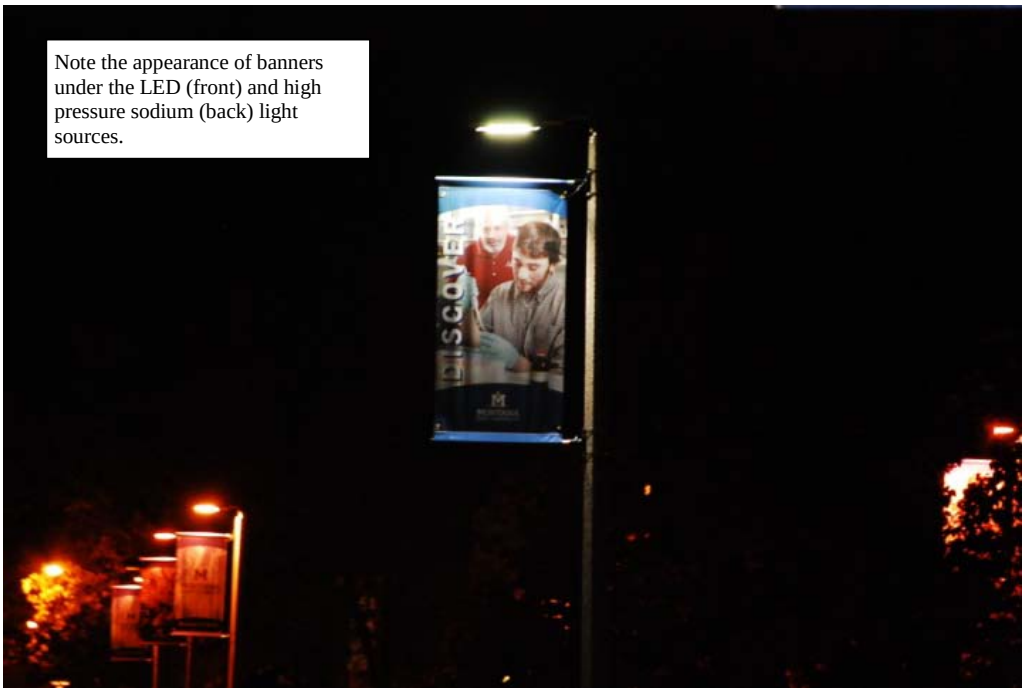
MONTANA STATE UNIVERSITY

Under conventional high pressure sodium lighting, colors are hard to distinguish and light is delivered in a “blob” below the fixture, quickly diminishing with distance.

Note the increased color rendition and more even light distribution



Centennial Mall Pilot: Note the dramatically better color rendition and perceived brightness, specifically the grass and banners.



Note the appearance of banners under the LED (front) and high pressure sodium (back) light sources.

UNIVERSITY FACILITIES PLANNING BOARD
June 21, 2011

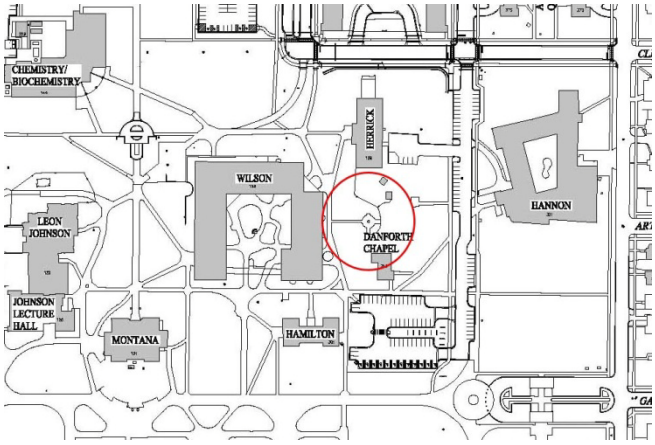
ITEM # 6	**Iris Garden Site Plan Modifications – Information Only**

PRESENTERS:

Candace Mastel, Assistant Planner

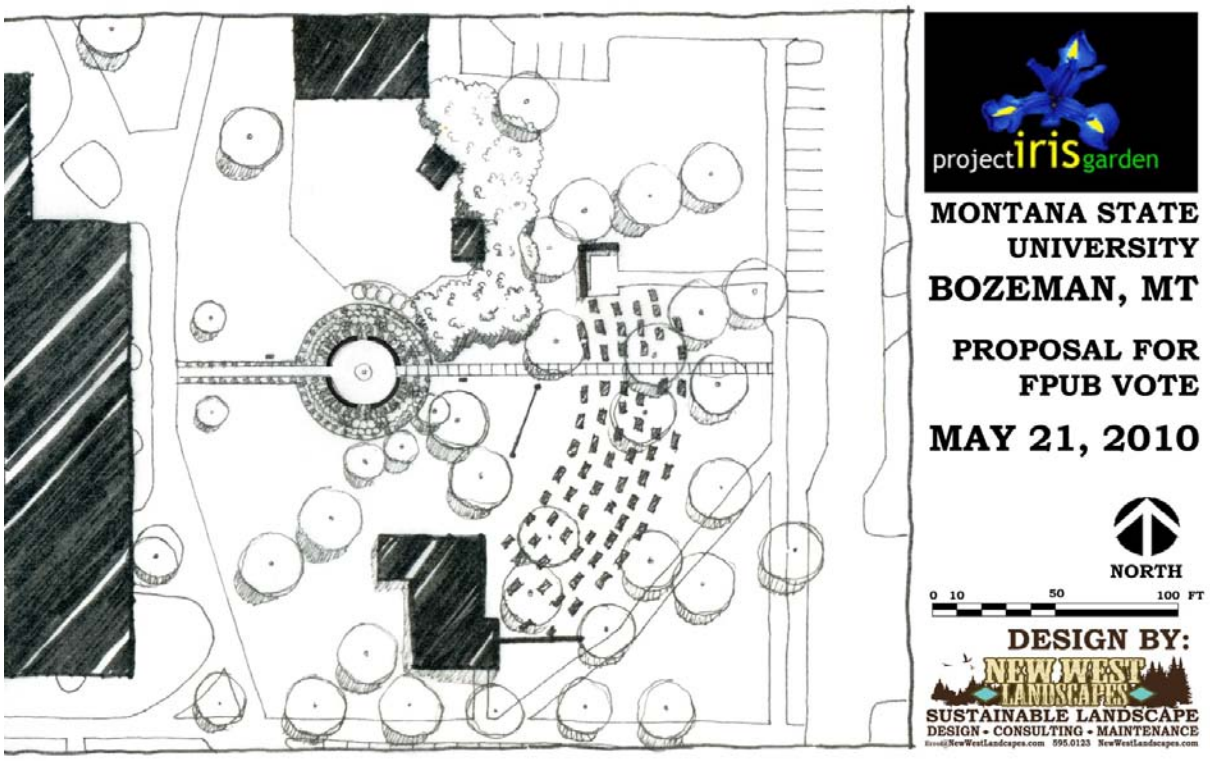
PROJECT PHASE:	PLANNING	X	SCHEMATIC		DESIGN DOCUMENTS		CONSTRUCTION DOCUMENTS	

VICINITY MAP:



STAFF COMMENTS:

On May 25, 2010, UFPB approved the site plan for the Iris Garden that is shown below. During the meeting it was expressed that the project should phase in accessible sidewalks to the garden. Then, on July 20, 2010 Facilities Planning came back to UFPB to give them an update that due to internal discussions it was decided to address the accessibility issue in the short term. At this time funding and phasing were also discussed. During the last few months, the site plan has been modified slightly to accommodate UFPB's requests from the May meeting and provide a more meaningful space that responded to modern use demands as well as preserving the integrity of the location and the significance of the space. Please see the revised site plan below. This agenda item is for information only.



Original Plan – Approved by UFPB on 5/25/10

Modified Plan – June 21, 2011

COMPLIANCE:	**YES**	**NO**
MSU POLICIES	**X**	
COMMITTEE OR APPROPRIATE REVIEW	**X**	
MASTER PLAN	**X**	
BOARD ACTION REQUIRED:		
Information only.		
RECOMMENDATION OUTCOME:		