Space Planning Guidelines

Updated July 17, 2009

[Contact information]

[Website link]
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1. Introduction

Campus physical plant space use is a significant system wide asset and the operations of this physical plant represents approximately 16% of all campus operating costs. Savings in physical plant issues can be spent for improvement in facilities or betterment of the academic programs.

Stewardship of real estate and space is the responsibility of many. This ranges from fixing a leaky roof to strategically monitoring and managing room, student and faculty spaces. Each campus institution, individually and collaboratively, proactively manage their own spaces. The importance of ‘Space Management’ ranges from retaining professional facilities staff (consultant’s or in-house) to manage individual campus facilities to introducing centralized system tools for tracking, monitoring and benchmarking various metrics.

Proactive finance and facilities personnel understand the importance of space management.

**Strong, proactive space management is important to:**

- Operating facilities with optimum efficiency and utilization.
- Recruiting efforts in an increasingly competitive environment.
- Providing flexibility in order to better respond to program needs.
- Better understanding space needs in order to plan for future projects.
- Establishing appropriate teaching, research and community service resources.
- Providing a platform for innovative educational program delivery.
- Reflecting the value system of the campus.

One area that that has not been directly addressed until now is space guidelines. Design experts with a specialty in higher education facilities often guide the process in the design of classroom and in-classroom space. The result may be great spaces but, as a system and individual campus, there has not been a thoughtful process in developing consistent, fair, equitable and uniform spaces across campuses. Campuses, as part of the facilities master planning process, may decide to create their own Guidelines.

The introduction of this basic space guidelines is intended to provide a resource for campuses to analyze, advocate and create;

1. General space assessment or inventory of their spaces,
2. Analyze and resolve specific space issues and concerns.
3. Develop master plans that facilitate future design, construction and renovation avenues to enhance overall utilization of the campus, and
4. Developing related specific campus policies that will improve individual space usage.
1. Introduction

HERDSA’s (Higher Education Research and Development) guiding principles for the development of teaching and learning facilities (HERDSA, Volume 19, Number 2, July 2000 pp 221-237) exemplify that wise campuses should strive for: “student centered, flexible learning resulting in facilities which are less prescribed and function-specific that is presently the case”.

Principle 1: Design space for multiple uses concurrently and consecutively.

Principle 2: Design to maximize the inherent flexibility with each space.

Principle 3: Design to make use of the vertical dimension in facilities.

Principle 4: Design to integrate previously discrete campus functions.

Principle 5: Design features and functions to maximize teacher and student control.

Principle 6: Design to maximize alignment of different curricula activities.

Principle 7: Design to maximize student access to, and use and ownership of, the learning environment.
2. Guideline Methodology

The Space Guidelines have been developed based on a number of comprehensive principles, practices and assumptions. The Paulien Study, 2000-2001, was the first space utilization study, based on space modeling (which was an algorithm using FYE and square footage). This was a useful first time benchmarking tool in understanding overall system space dynamics. Currently, the space use data is captured from actual student and room use in the ISRS system. BRIO reports are created and distributed to the campuses. However, these studies are data points and the Guidelines herein are created to assist in the understanding of overall program, approximate sizes and space best practices. Each campus is encouraged to review and adopt their own space ‘best practice policies’.

The attached Guidelines are to reflect the design principles;

**The 2006 – 2010 MnSCU System Strategic Plan:**

1. Increase access and opportunity
2. Promote and measure high-quality learning programs and service
3. Provide programs and services integral to state and regional economic needs
4. Innovate to meet current and future educational needs efficiently

The need to more effectively utilize space across the campuses:

1. Promote a target classroom occupancy of 100% or 32 hours week.
2. Increase student seat occupancy at each campus.
3. Manage aggressively class scheduling to optimum utilization.
4. Better matching class size to room size; better matching seat quantity to room size.
5. Alignment of appropriate building spaces to academic scheduling.
6. Create multi-disciplinary teaching spaces, laboratories and research facilities.
7. Design the management of “single” use classrooms or labs. These spaces may have to be single use, but there are specific instances where additional storage or accommodations can be made to utilize ‘typical’ single use classrooms into multiple use classrooms.
8. Pursuing collaborative ventures and partnerships to share space and facilities.
9. Developing partnerships with other mission compatible groups, institutions and organizations to leverage underutilized facilities
10. Sharing, eliminating or redesigning underutilized or obsolete spaces – “right sizing”.
11. Evaluating academic/administrative office space use.
12. Increasing the diversity of the types of spaces for Administration and Student Services.
13. Employing technology to increase access and provide alternative learning options.

Desire to create space consistencies across campuses based on:

1. Program type or purpose.
2. Classroom type and function.
3. Number of students.
4. Innovative program delivery.
5. Technological advancements.
3. Space Terminology

The following key terms are defined by the U.S. Department of Education Research and Improvement in the publication “Postsecondary Education Facilities Inventory and classification Manual”.

**Gross Square Footage (GSF):** The sum of all areas of a building included within the outside faces of its exterior walls, including floor penetration areas.

**Net Square Footage (NSF):** The sum of all areas in a building Assigned for a specific room use and areas necessary for the general operation (non assignable) of a building. Area taken up by structural building features should not be included in the calculation for Net Useable Area.

**Assignable Square Footage (ASF):** The sum of all areas of a building that are assigned, or are available, to an occupant or specific use. Building services, circulation, mechanical, and structural are excluded.
3. Space Terminology

**Note:** Glossary of Facilities Terms is on [www.facilities.mnsu.edu](http://www.facilities.mnsu.edu)

**Assignable Square Footage (ASF):** The sum of all areas of a building that are assigned, or are available, to an occupant or specific use. Building services, circulation, mechanical, and structural are excluded.

**Building Efficiency:** The ratio of total assignable square footage to total gross square footage of a building.

**Building Service Area:** The sum of all areas of a building used to support the operations of the building. Includes public restrooms, custodial closets/storage.

**Circulation Area:** The sum of all areas of a building required for physical access to space. Includes public corridors, elevators and elevator lobbies, tunnels, bridges, enclosed receiving areas and loading docks.

**Classroom 110:** Coding for a room classified as a classroom

**Classroom 210:** Coding for a room classified as a classroom lab space (either technical, science or applied)

**Gross Square Footage (GSF):** The sum of all areas of a building included within the outside faces of its exterior walls, including floor penetration areas.

**Hours Usage:** Number of hours in 110 and 210 rooms used in regularly scheduled for-credit instruction; divided by the number of 110 and 210 rooms multiplied by 32. For instance, 540 hours of use recorded in 20 rooms = 540/(20x32) = 540/640 = 84%

**Mechanical Areas:** The sum of all areas designed to house mechanical equipment, utility services and shaft areas.

**Net Usable Area or Net Square Feet (NSF):** The sum of all areas of a building that are not assignable but are necessary for general operation of a building. Includes building service, circulation, mechanical toilets, but does not include structural.

**Seats Capacity:** Number of chairs or student stations in a particular classroom or laboratory.

**Seat Usage:** Number of seats in 110 and 210 rooms used in regularly scheduled for-credit instruction; divided by the room capacity multiplied by 32. For instance, 12,000 seats used in 20 rooms with a capacity of 30 seats each = 12,000/(20 rooms x 30 seats x 32) = 2,000/19,200 or a 62.5% seat usage

**Seats Used:** Number of students enrolled in a regularly scheduled, for-credit course in a particular classroom; that is the number of seats occupied for the hours of use.

**Space Utilization:** Proportion of time an assignable space is actually used for the intended purpose, as well as proportion of seating capacity when assignable space is a classroom.

“**Right Sizing**: Space or room size that logically fits the number of students or program square footage requirements. When used as a verb, the term means to evaluate and confirm that the spaces are appropriately sized for the program and the amount of users in that space.

**X-25:** Software program that interface with resource 25 graphically display data for classrooms and scheduling.
3. Space Type Terminology

New Construction and Renovation

Consistently applying one set of space guidelines across a campus of pre-existing structurally diverse buildings can present a challenge for campuses. Add the fact that most physical changes entail renovation rather than new construction; it becomes clear that campus leadership responsible for space may regularly confront space related challenges.

Literally applying space guidelines may not always be possible; however, adopting and adhering to a logical set of ideas about space supports an intent to improve space management through a set of consistently applied policies and procedures.

New Construction:
From the inception of building design it is critical to be aware of key design factors that affect the final interior functions. Consider, for example, column spacing, building core dimensions, building orientation, shape and layout. All can have a major impact in the final functionality and flexibility of space. Although incorporating total flexibility is sometimes infeasible and may be cost prohibitive, building for optimal functionality is critical.

Understanding and incorporating space guidelines in the very early stages of new construction programming can enhance the final product.

Renovation:
Effective and efficient reuse of buildings is the most cost effective management of our physical resources. It is primary to the sustainable guidelines of “Reduce, Reuse and Recycle”. By reusing and recycling buildings, there are actual material and improved structural savings. However, due to existing building configurations, many standards or dimensional modules can not be applied. Sensitive and creative design modifications should occur to maximize overall space utilization and create exciting learning spaces.
4. Space Utilization Report

“As campuses work to increase their efficiency, improving space utilization has gained importance as a key facility planning activity. Increasing classroom utilization has long been under the microscope as a target for improving the use of campus space.” (Ira Fink, APPA Facilities Manager, Vol. 22, Jan/Feb. 2006).

Definitions and Assumptions

Minnesota State Colleges and Universities facilities and their related costs, are a system wide asset that represents approximate 16% of the campus operating costs.

Stewardship, and efficient use of spaces, is as much about space utilization as it is about fixing a leaky roof! Analysis, review, and on-going enhanced utilization of your campus improve many aspects: financial, facilities, critical synergy in creating campus attitude, and much more!

There are different ways to measure utilization and efficiency. None of these methods are rigorous defining statements or should be used to create divisions. The measures used are indicators - and are not hard decision making points or lines. However, they are useful indicators for the Office of Chancellor and for the campus to evaluate, analyze and proactively plan to improve spaces:

Simple gross square feet per full-time equivalent student (GSF/FYE) measure. This is not a solid measure as the programs at each campus require different sizes. A Technical College with large diesel or automotive needs may be correctly sized at 300 GSF/FYE whereas a campus that has technical programs consistent of small electronics repair and other small space requirements might be similar to a community college at 170 GSF/FYE.

Credit hour production per classroom or lab. These macro-measures are normalized and useful for system level policy decisions, but are inadequate for micro-level policy decisions at the campus.

Individual Campus Space Utilization reports created from the Integrated Student Record System (ISRS) records information. Facilities has worked with Data management using Brio and the ISRS system to create individualized space utilization reports at the institution and campus level. This information is created and ‘owned’ by the campus. These ISRS Space Utilization reports for each individual campus have been distributed at the last three CFFO conferences.

To gain maximum utility from these more detailed space utilization reports at the system level, the definitions and usage must be standardized. Below are the terms, explanation of the base assumptions behind the ISRS space utilization reports, identification of data entry problems at the campuses, and outline some procedures campuses could institute to make the reports more useful and standardized. Note that in each one of these categories, the campus has the option to change and alter all of these fields to better accurately describe the campus data.
4. Space Utilization Report

<table>
<thead>
<tr>
<th>Space Utilization (efficiency of utilization)</th>
<th>Proportion of time an assignable space is actually used for the intended purpose, as well as proportion of seating capacity when assignable space is a classroom.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Classroom</strong></td>
<td>PSEFI Classification <strong>Code 110</strong>. A room used for classes, or regularly scheduled academic instruction.</td>
</tr>
<tr>
<td><strong>Laboratory</strong></td>
<td>PSEFI Classification <strong>Code 210</strong>. A room used for regularly scheduled classes that require special purpose equipment for student experimentation or practice in an academic discipline. This can be an applied technical lab or a science lab.</td>
</tr>
<tr>
<td><strong>Open Laboratory</strong></td>
<td>PSEFI Classification <strong>Code 220</strong>. A laboratory used primarily for individual or group instruction in a particular discipline that is informally scheduled, e.g. music practice rooms, CAD labs, etc. 220 rooms are not included in ISRS reports.</td>
</tr>
<tr>
<td><strong>Study Room</strong></td>
<td>PSEFI Classification <strong>Code 410</strong>. A room used by individuals to study at their convenience, which is not restricted to a particular discipline, e.g. computer labs, library classrooms, etc.</td>
</tr>
<tr>
<td><strong>Number of Rooms Used; Room Count</strong></td>
<td>Number of rooms meeting classifications 110 and 210 that enrolled at least one student taking at least one for-credit course during the semester</td>
</tr>
<tr>
<td><strong>Hours of Use</strong></td>
<td>Hours in a week that a classroom is regularly scheduled in for-credit instruction. Must have an identified course number attached and more than 1 student enrolled.</td>
</tr>
<tr>
<td><strong>Seats Used</strong></td>
<td>Number of students enrolled in a regularly scheduled, for-credit course in a particular classroom; that is the number of seats occupied for the hours of use.</td>
</tr>
<tr>
<td><strong>Seat Capacity</strong></td>
<td>Number of chairs or student stations in a particular classroom or laboratory. Capacity indicated by FCR means the number of seats was entered into ISRS FC_ROOMS by an authorized person at the campus. Capacity indicated by ENR means the number of seats field was blank and was calculated from enrollment data. ENR data is suspect; the best way to fix it is to enter the actual seat capacity in ISRS screen FC_ROOMS. Seat capacity is not faculty preferred capacity; it is a simple count of the number of chairs, desks, or student stations in the room.</td>
</tr>
<tr>
<td><strong>Building Code</strong></td>
<td>Building Code, used in this context of the ISRS and Brio Reporting, is the abbreviation for the Building Name.</td>
</tr>
<tr>
<td><strong>4. Space Utilization Report</strong></td>
<td></td>
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<tr>
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</tr>
<tr>
<td><strong>Enrollment</strong></td>
<td>At least one student taking at least one for-credit course</td>
</tr>
<tr>
<td><strong>Begin Time</strong></td>
<td>Time a course starts, e.g. 8:00 am, 10:30 am</td>
</tr>
<tr>
<td><strong>Block enrollment</strong></td>
<td>A registration practice which results in the same student being simultaneously enrolled in two, three, or four courses all occurring in the same room at the same time. This practice leads to over-counting of hour and seat use and creates a problem in accuracy. Individual campus issues on Block Enrollment need to be corrected with Data Management to better accurately reflect the number of students in the rooms.</td>
</tr>
<tr>
<td><strong>Hours Usage %</strong></td>
<td>Number of hours in 110 and 210 rooms used in regularly scheduled for-credit instruction; divided by the number of 110 and 210 rooms multiplied by 32. For instance, 540 hours of use recorded in 20 rooms = (\frac{540}{20 \times 32} = \frac{540}{640} = 84%)</td>
</tr>
<tr>
<td><strong>200% Hours Usage</strong></td>
<td>If this is indicated on the reports, then it is clearly inaccurate and is a data integrity issue. 200% usage equates to a room being used 64 hours per week, and that is not possible. Utilizing one room for 11 hours per day (in use from 8 am thru 7 pm) for 5 days per week = 55 hours or equates to an hour usage of 172%. It is highly unlikely rooms are used at that level of intensity; but if the room is in use then the data will capture that.</td>
</tr>
<tr>
<td><strong>Seat Usage %</strong></td>
<td>Number of seats in 110 and 210 rooms used in regularly scheduled for-credit instruction; divided by the room capacity multiplied by 32. For instance, 12,000 seats used in 20 rooms with a capacity of 30 seats each = (\frac{12,000}{20 \times 30 \times 32} = \frac{12,000}{19,200} = 62.5%) seat usage.</td>
</tr>
<tr>
<td><strong>Leased ownership code</strong></td>
<td>Space off campus that is leased in, or space on another MnSCU campus that is leased in, to offer regularly scheduled, for-credit instruction</td>
</tr>
<tr>
<td><strong>Capital Lease</strong></td>
<td>Lease of off-campus facility where there is an expectation that the leased property will transfer to MnSCU at the end of the lease or there is an option to purchase in the lease.</td>
</tr>
</tbody>
</table>
4. Space Utilization Report

Base Assumptions in ISRS Space Utilization Report:

1. **Full utilization of classroom space (100% utilization) as used in the ISRS Space Utilization Reports is based on 32 hours per week.** This is a fairly wide-spread “hours of use” standard applied in higher education nationwide. A facilities survey was undertaken via phone and email by Facilities Planning in October 2004. Several higher education systems around the country were polled and the results reported a low of 30 hours, an average of 34 hours and a high of 40 hours of classroom use being defined as full utilization.

2. **Facilities do not choose a particular 32-hour to create this report.** The full week is included in the nominator in the equation. If a campus uses all of its classrooms 32 hours; then it’s utilization is a full 100%. If a campus uses classrooms above 32 hours (i.e. a full 8 hour day or nights and weekends) then its usage is above 100%. The 32 hours is applied in the denominator. For instance, if 20 rooms were in use for 32 hours then the denominator would be 640. If classes in 20 rooms were held 540 hours recorded use than the equation would be 540/(20 rooms x 32 hours ) divided by 640 or 540/640 or a utilization rate of 84%. The effect of this formulation is that Friday, or a 40 hour week, evening, and week-end classes give a campus “bonus points” in calculating the hours of use percent. This was a deliberate attempt to incentivize use for as much of the full time day or of non-traditional class times. It is understood within the system office that nighttime uses in rural areas with significant commute distances for students is unlikely. Thus; it is expected that few rural campuses will be above the 100% utilization mark (however, we can dream!).

3. **Maximizing seat utilization in classrooms is also a goal.** Ultimately, this is ‘right-sizing’ where you have rooms at different sizes to match the need. The seat usage is directly related to the number of seats ‘sold’ versus the number of seats available. If a campus has a room coded for 32 seats but routinely only has 28 seats in that room; then the campus should correct the data in the ISRS system to reflect the accuracy of that data field. This indicator is one that many campuses can use to assist in ‘right sizing’. For example, if a campus has 6 rooms that all hold 32-40 seats, but these classrooms consistently have only 24 students in a class; it may be reasonable to plan a renovation that maintains one or two large classrooms and build four 24-seat classrooms with smaller rooms for conference seminars or offices. Correct sizing of classes programmed into the correctly sized room is not possible on a regular basis; but by evaluating the overall seat usage for trends; a campus may begin the process of ‘right-sizing’. This is also a fairly wide-spread “seat used” standard in higher education. Facilities planning staff conducted an email and phone survey undertaken in October of 2004 of several higher education systems around the country found seat usage with a low of 60%, average of 65.5% and a high of 75%.
4. **Space Utilization Report**

4. **Only regularly scheduled for-credit instruction is counted for the report.** For-credit instruction is MnSCU’s core business. There are other non-credit instruction and short courses, but these are the “extras” and not the core business. It is hoped that these non-credit courses should be scheduled to fit around for-credit instruction, or, if not, then they should charge adequately to allow for funding of the full amount for leased space.

5. **The date chosen to run the reports is randomly created with a series of evaluations to assure maximum integrity.** To eliminate multiple student counts, a particular random date past the 15 day time frame is chosen when regular students or not prone to drop or add courses. All courses not in session the week of that random date are excluded. There are some colleges that offer accelerated courses that meet for a longer day over a shorter length of weeks. If two or three such classes are offered in the same classroom at the same time, it cannot be said that the utilization of the room is double or triple. The standard was set that counted the number of students in a particular room at any one time over the full 15 week semester. We asked the question: if a person walked into that classroom on any given day, would he or she find double or triple the students there or only one set of students there? The report was designed to count one set of students over the full length of the day.

6. **Block scheduling does not accurately reflect the room use, and, as such is a significant data integrity issue in reviewing Space Utilization Reports.** Facilities has worked with ISRS staff to lessen the natural over-count from block scheduling. This is a labor-intensive effort from the ISRS staff, who do not always have a lot of free labor time. Campuses contemplating capital projects have been prioritized for this manual correction for block scheduling. Other campuses not contemplating capital projects have had a “short cut” method used to correct for block scheduling. The “short cut” method is applied to any utilization over 200%, which would be more than 11 hours per day for 5 ½ days per week.

7. **Only recognized campus “owned space” is included in the ISRS Space Utilization report.** Ownership vs. leasing is identified via the “Univ. Own Code” in the Facilities Module. Reports generated typically only include buildings identified “O” for owned. Reports can, however, be generated to include leased space data if the campus has identified it in their ISRS Facilities Module. Facilities Planning has experimented with generating reports that include leased space but, with the exception of Metropolitan State University, it appears that the inclusion of leased space typically decreases utilization numbers rather than increasing them. Call Ken or Pat for help if you need a leased space utilization report.

8. **Leased space at other campuses: other institutions utilizing your home campus space may be an issue to verify and correct to fully have your home campus utilization indicated.** There is a growing amount of inter-institution collaboration within MnSCU. This is a positive development, but presents some space utilization report challenges. Usually the campus at which the instruction actually takes place should receive credit for the use of its classrooms and/or labs by a sister institution. Facilities can accommodate this request on a separate spreadsheet derived from the ISRS
4. Space Utilization Report

8. **Space Utilization reports.** This is accomplished by reporting leased-in space reported by the sister institution providing the course content and instructor. This is where difficulties arise. Some campuses are very good at identifying where their off-campus or off-site instruction is occurring. Some are not.

For example, if Lake MS College is offering an AA degree at Lake State University in Lake SU’s Business Building, the facilities director at Lake SU would like to include MS College’s use of three classrooms for four days a week. This works well if MS College registrars identify the location of this for-credit instruction as leased space at Lake SU in the Business Building. It does not work at all if MS College registrars prefer to lump all their off-campus instruction under a campus and building labeled “Off-Campus” or “Off Site”. It would be most helpful to the continued good-will exhibited in these collaborative ventures if the sponsoring institution would register its students identifying their sister institution as providing leased space, and including the building code and/or building name and the start time of the course.

9. **ISRS cannot find and therefore cannot report on any classrooms or laboratories where not one single student enrolled in not one single for-credit course during the semester.** Credits must be greater than 0. This is just a limitation of the program that was designed to track students and cannot be altered. This may be one reason that the number of classrooms and labs (Room Count) on your campus fluctuates from semester to semester.

10. **If ISRS cannot locate a room in a building, it also cannot compute that error.** This happens when there is no Building Code or Building Name entered into ISRS by the registrar. If the building code or building name field is left blank, the computer program cannot make decisions where to put the data and so it kicks it out as “undecipherable”. This also happens when there is no start time given for a course. The printed report depends upon each course being entered with a start time and an end time. Apparently, our computer programmers have figured out how to correct for no end time (even though it may not be the best solution for the campus), but cannot guess as to start time. If there are a lot of students on your campus being enrolled in courses with no building codes and no start times, that may be an area for improvement in your reported space utilization.

**Additional Data Entry Problems that cause errors in reflecting accurate space/seat usage:**

1. No building code or building name.
2. No begin time (or end time).
3. No capacity in FC-ROOMS database (rooms coded ENR have this problem).
4. Block scheduling (recognize that this is probably not fixable).
5. Accelerated courses (recognize that this is probably not fixable).
6. Leased space at other campuses not clearly identified.
7. Instruction offered in spaces with capital leases not clearly identified.
General Guidelines:

Classroom styles have evolved to include:
- Traditional/Lecture Style
- Collaborative/Team Style
- Discussion/Conversation Style

It is essential to create flexible classroom environments in order to accommodate the evolution of teaching styles. There are various avenues and opportunities to change inflexible classrooms but it is easiest to make changes at the time of renovation or construction.

Design Considerations:

Classroom Size:
- Small Classroom: 500 square feet; 24 student capacity
- Medium Classroom: 850 square feet; 40 student capacity
- Large Classroom: 1200 – 1400 square feet; 72 student capacity

Classroom Configuration:
- Room shape: Slightly longer than wider (ratio of 1:1.5) provides the best viewing angles for the greatest number of students in a lecture style configuration. Furniture Configuration: Modular furniture that can be broken into various configurations should be evaluated. Fan style furniture arrangements provide best viewing angles for the greatest number of students and may encourage stronger student to student interaction.

Ceiling Height:
- Small Classroom: 8’ minimum
- Medium Classroom: 8’ minimum, 9’ – 10’ preferred
- Large Classroom: 12’ preferred
General Guidelines

Design Considerations:

Codes:
Exiting: > 1,000 square feet and/or > 50 occupants = 2 means of egress
Door Swing: > 50 occupants = door swings out

Technology: Four levels of technology are recognized as a system-wide standard:
Level 1: Basic AV/TV Classroom
Level 2: Smart PLUG-&-SHOW Presentation Classroom
Level 3: Interactive Computer Classroom
Level 4: Two-way video classroom

Note: Dimensions indicated throughout document are approximate and should be used only as a general guide. Specific room purpose, programs, furniture, equipment, mechanical and electrical infrastructure and other issues may increase or decrease these dimensions.
5.1a Classrooms

- Capacity to accommodate 24 students.

- Approximately 500 SF.

- Small does not mean inflexible. Four furniture configurations in a small classroom each accommodate 16 – 24 students in varying configurations.

- The more modular and flexible the furniture, the greater the opportunity for reconfiguration.

- These classrooms are indicated with one door, but adding two doors may benefit overall program usability of the space and ease student circulation and congestion.

- Add sidelight or window in door to allow for visual security.
5.1a Classrooms

- Capacity to accommodate up to 40 students.
- Approximately 850 SF
- Three furniture configurations in a medium classroom each accommodate 40 students.

Considerations:
- 18” x 60” freestanding work surfaces accommodate 2 students with laptops.
- provide two means of egress (for ease of entering and exiting)
5.1a Classrooms

- Capacity to accommodate 72 students.
- Approximately 1200 - 1400 SF.

Considerations:
- Provide two means of egress (for ease of entering and exiting)
5.1a Classrooms

Renovating or building new classroom space is not always a solution for improvement. Other factors can effectively enhance a classroom, improving capacity, aesthetic, and functionality.

- Capacity to accommodate 40 students.

Furniture:
Adding flexible, modular furniture may provide additional space: increase capacity with more efficiently sized furniture; increase configuration options with more versatile furniture (tables vs. tablet arm).

The Fan Configuration classroom proposed at Maxwell Hall provides an optimal combination of capacity, circulation and good visual sight lines.
5.1a Classrooms

- Capacity to accommodate 24 students.

**Lighting:** Are existing lighting levels adequate?

50 foot candles are recommended at the work surface. The preferred source of primary lighting is indirect and is ideally arranged perpendicular to seating.

Provide variable switching for lights for the greatest flexibility.

**Finishes:** Assess the aesthetic and acoustic qualities of ceiling, wall and floor coverings. Adding photos, paint or other items that relate to the program, workforce, or enlightening the mind and expanding the universe also assists in improving a space.

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Small Classroom

*WSU, Maxwell Hall Renovation – Proposed Classroom*
5.1a Classrooms

- Capacity to accommodate 40 students.

The horseshoe classroom lends itself well to both lecture and student interaction.

This kind of ‘seminar’ room allows for students to be more participatory in the actual learning process.
5.1a Classrooms

- Capacity to accommodate 40 students.

Great example of a recently converted classroom at the renovated Business Center at Centennial Hall in St. Cloud State University into a horseshoe shaped classroom that allows more student interaction.

Medium Classroom

St. Cloud State University – Centennial Hall
Active Learning Spaces are designed to foster interactive, flexible, student-centered learning experiences and operate using central teaching stations and student-provided laptops.

- Typical round tables to facilitate interactions
- White boards around the room and/or for each group
- Teacher station near the center of the room
- Networked laptop computers
5.4 Classrooms

New carpet, paint and furniture transfigure a tired classroom

Note: Flexible tables can be set up ‘lecture’ style or brought together for circle conversation
5.1b Classroom Technology

Predefined MnSCU standards for Classroom Technology:

- **Level One**: Basic AV/TV Classroom
- **Level Two**: Smart PLUG-&-SHOW Presentation Classroom
- **Level Three**: Interactive Computer Classroom
- **Level Four**: Two-way video classroom

**Level One: Basic AV/TV Classroom**

- Videotape player
- TV set or Video projector
- Screens
- Slide projector
- Overhead projector
Level Two
Smart Plug- &-Show Presentation Classroom

Presentation Classroom
• Videotape player
• Video/Data projector
• Recessed media panel and lectern
• Presenter can display computer output on a large screen
• Slide projector and overhead projector

Level 2 provides an adequate level of technology for the majority of classrooms with the flexibility to accommodate various teaching styles and technology tools.
5.1b Classroom Technology

Level Three:
Interactive Computer Classroom

- Computers at each student work station
- Master computer teaching station
- Ability to display student computers on large screen & send a selected image to all student computers
- Videotape player
- Video/data projector
- Recessed media panel and lectern
- Slide projector
- Overhead projector
Level Four: Two-Way Video Classroom

- TV cameras
- Microphones coded for video compression
- Videotape player
- Video/data projector
- Recessed media panel and lectern
- Presenter can display computer output on a large screen
- Slide projector
- Overhead projector
General Guidelines

- Design labs to maximize programmatic options. A lab that can be used effectively for anatomy, physiology, biology, chemistry, and perhaps even physics is ideal.
- Labs should be designed to accommodate laboratory space with some discussion area that can also be used as part of the lab space: note: do not have classroom space that is part of the lab that cannot be used when the lab is in operation.
- Design general labs, used only part time for instruction, to accommodate other compatible academic or program activities.
- Design labs with direct access to shared preparatory spaces in order to provide greater safety, flexibility and space utilization. Note the examples of this in the various designs.
- Verify the chemical storage requirements and analyze the life cycle costs of separate rooms or self contained units.
- Design laboratories in as modular and flexible a manner as possible, particularly in terms of HVAC design, specialized systems and structural loading capacity.
- Design of lab spaces and the number of fume hoods has a significant impact on overall operation cost. Each fume hood will add $5,000 - $10,000 a year in operational cost depending on existing fume hood conditions and overall efficiency of related systems. Campus should carefully assess fume hood requirements.
- Create laboratory “zones” which enable flexibility and ease of operations.
- Provide adequate internet access in laboratories
- Individual student workspaces and surfaces should be adequately sized in depth and width to accommodate a student laptop.
- Provide a minimum of 6 desktop computer stations in each lab for specialized work.
- Include adequate space for an instruction demonstration bench and an audio-visual control station with a demonstration computer.
Design Considerations

1. Design labs to accommodate 24 students for optimal flexibility and space utilization. 25 student stations is recognized as the threshold for safe supervision. Note: some programs may have less than 24 students enrolled; but there should be the option to have 24 students enrolled.

2. Based on laboratory space for 24 students, the following design guidelines apply:
   a. Size a laboratory at 1,000 to 1,200 assignable square feet.
   b. Size the room width at 30 feet.
   c. Provide a minimum of 30 square feet of lab space per student.
   d. Provide a minimum of 3 lineal feet of bench space per student for introductory courses.

3. Fume Hood Quality - see Section 5.2b
   a. The most common sizes of fume hoods are 4’, 5’ and 6’ long, but larger sizes are also available
   b. When planning different types of lab spaces, each lab/program/pedagogy should be evaluated individually to determine the number and type of hoods that will be required in a given lab.
   c. Fume hoods are expensive initially and also in on-going operations so balance of need with budget and operating cost is important.

5.2a Laboratories

1.1. Traditional: Single Sided

- 24 student capacity
- Island bench accommodates 6 students
- Computer stations along the wall
- ADA station along the wall
- Instructor demo bench at front of room
5.2a Laboratories

1.2. Traditional: Double Sided

- 24 student capacity

- Double sided island benches can be designed to accommodate 4 - 8 students per bench

- Computer stations and ADA station along the wall. Instructor bench at front of room

Typical Configurations
5.2a Laboratories

1.2. Traditional: Double Sided

- 6 Island benches accommodate 4 students per bench
- 2 means of egress
- Doors to adjoining Prep and Storage Rooms are in close proximity to instructor area which enhances security
- Overhead projector located in center of room
- Instructor demo bench located at front of room
- Good circulation around perimeter of room for working at fume hoods and benches
- Shared Prep and Storage Rooms eliminate cross-hall travel, provide more effective space utilization and increase security

Typical Configurations  
St. Cloud State University - Wick Science Labs
1.2. Traditional: Double Sided

New Construction – Contrast and Compare:

- The Biology Lab is designed in the traditional double-sided manner to accommodate 24 students. Primary circulation occurs around the room perimeter with benches and learning activity toward the center.

- The Chemistry Labs are also double sided and accommodate 24 students but benches and learning activity occur around the room perimeter with primary circulation at the room core.

Both layouts function for their specific teaching purposes.

- This linear Prep Room actually serves 7 labs; making it a very efficient space for staffing and for shared use of equipment.
5.2a Laboratories

1.2. Traditional: Double Sided

- 6 Island benches accommodate 4 students per bench
- 2 means of egress per lab.
- Adjoining shared Prep and Storage Rooms.

Typical Configurations
Inver Hills Community College – Heritage Hall
5.2a Laboratories

1.2. Traditional: Double Sided

- Using examples from other campuses to assist in decision making
- Evaluate the operational implications: staffing, timing to set up experiments, overlapping schedules, etc
5.2a Laboratories

2.1. Cluster: Island

- 24 student capacity
- Each island cluster bench accommodates 6 students
- Computer stations along the wall
- ADA station along the wall or at a bench
- Instructor demo bench at front of room
Typical Configurations

Ridgewater Community College: renovation in 2005

5.2a Laboratories

2.1. Cluster - Island

- Room comfortably accommodates 24 students with a 6 student per island cluster configuration.

- The island configuration provides a very dynamic and interactive lab environment.

- 2 means of egress.

- Access to the storage/prep area is located in close proximity to the instructor station and away from the main entry doors enhancing security.
3.1. Pod - Peninsula

- 24 student capacity
- Each peninsula pod bench accommodate 4 students with additional support work surface on room perimeter
- Computer stations are located in center island or on perimeter surfaces
- Instructor demo bench at front
5.2a Laboratories

3.2. Pod - Floating

- 24 student capacity

- Octagonal island pod bench accommodates 4 students per bench

- Computer stations on benches or along wall

- ADA station in center island

- Instructor demo bench at front
5.2a Laboratories

3.2. Pod - Floating

Renovation – Contrast and Compare:
• A square verses rectangular room can dictate design with both spaces functioning effectively.

• Both labs have adjoining shared prep/storage areas.

MnWest Community Technical – Granite Falls

Typical Configurations
From the 2002 Capital Budget Science Initiatives

MnWest at Canby:
Remodel Dental Assistant Lab
The current dental assistant lab was designed for a single purpose, and has not been upgraded since original building construction. An updated laboratory would allow them to use the lab for other instructional purposes:
- Soil Science
- Agronomy
- General Biology for transfer
- Distance nursing from Worthington
- Dental hygiene career laddering

Canby dental graduates are employed over the 4 state region. Strong support from Southern Minnesota Dental Association. DOER expects 40,000 job vacancies in soil science, agronomy & agribusiness in the southwest over the next ten years.

MSC-Southeast TC at Winona & Red Wing:
Convert Classrooms into Multi-purpose Science Labs
SETC has just started an RN nursing program, which requires 9 credits of science lab courses. They have no science labs at present. Labs would be used for:
- Nursing
- Anatomy & Physiology
- General Biology for transfer
- General Chemistry for transfer

Currently 40 nursing vacancies in the region. Six area healthcare employers have formed a Health Job Skills Consortium with SETC.
5.2 b Laboratories – Ventilation Systems

General Guidelines

1. Ventilation in laboratories is often focused on the fume hood, however, fume hoods are just one part of a complete Laboratory Ventilation System (LVS). LVS’s are comprehensive systems consisting of:
   - The entire room exhaust system which includes fume hoods, “snorkels” and simple room exhaust.
   - The room supply-air control that maintains the room pressure (keeps odors contained within the room) and varies the supply air to match the exhaust flow.
   - The make-up air system that conditions (heats or cools) the incoming air that replaces the air that is exhausted from the room.

2. Laboratory fume hoods do, however, provide the primary means of control in the laboratory environment to minimize users exposure to toxic fumes, vapors, mists or gases generated by the use of chemicals during classroom or research activities.

3. There are several types of safety hoods that may be encountered depending upon the type of lab, specific function or level of safety, including:
   - Chemical Fume Hoods
   - Perchloric Acid Hoods
   - Ductless Filtered Enclosures
   - Fume Exhaust Connections
   - Biological Safety Cabinet
   - Laminar Flow Bench

4. By far the most used and most common safety hood is the Chemical Fume Hood, which is the main focus of this section. Standard chemical fume hoods are generally available in one of two types based upon how the exhaust system functions: Constant Air Volume (CAV) or Variable Air Volume (VAV). In the past, CAV hoods were the standard type of hood used for most fume hood applications.
6. **Variable air volume (VAV) hoods** differ from constant air volume (CAV) hoods in their ability to vary the volume of air exhausted through the hood based on the position of the sash. Because of this ability, VAV hoods are able to mostly eliminate the excess face velocity which generates air turbulence which can lead to spillage of contaminated air outside the hood. To accomplish this, an electronic control system is incorporated into the hood which continuously measures the amount of air being exhausted and automatically makes adjustments to the system to maintain the required face velocity at the sash opening.

**Variable Air Volume (VAV) Hoods:**
- higher first cost
- operating and maintenance costs are lower because of reduced energy use (as long as sash is kept closed)
- are more energy efficient than traditional CAV hoods
5. A traditional **CAV fume hood** is attached to a ventilation system that is constantly running at one speed at all times. The hood is equipped with a bypass or grille opening located above the glass window or sash which is intended to address the varying face velocities that create air turbulence. Air turbulence within a fume hood can lead to air spillage potentially carrying contaminants outside of the hood enclosure. The bypass opening limits the increase in face velocity that occurs when the sash is moved toward the closed position. The bypass forces the fume hood to maintain a constant volume of exhaust air regardless of the position of the sash. For most general purpose installations, CAV hoods should be avoided in favor of VAV hoods because of their considerable operating and maintenance costs and inefficient use of energy.

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**Constant Air Volume (CAV) Hoods:**

- typically have lower first cost
- are more expensive to operate than VAV hoods due to large quantities of tempered room air being constantly exhausted.
- are typically more expensive to maintain due to constantly running fan
- typically waste energy due to “constant on” operation regardless of use
Design Considerations

- All the air supplied into the laboratory is exhausted to the outside. The volume of supply air is between 6 and 10 air changes per hour depending on the amount of fugitive odors expected in the lab. The air volume can be reduced when the lab is unoccupied and reduced even more when the building is closed with the proper laboratory ventilation controls and good chemical housekeeping. A reduced air volume control strategy, based on demand, is encouraged to conserve energy.

- Energy recovery systems have short paybacks in situations where the labs are heavily used, such as research labs where hood are open most of the time. Where the labs are used less, the best payback is better demand based ventilation controls.

- A constant volume, six foot, chemical hood uses $2500/yr in energy. The same variable volume hood using demand based ventilation strategies would use only $500/year.

- Sash should be closed when not in use to minimize energy usage.

- Fume hoods should not be used to store chemicals or materials. Note that means of teaching and closing off fume hoods when not in use could save significant operational dollars.
Laminar Flow Bench draws in room air, filters and blows smooth stream of filtered air over work area to prevent outside contamination from effecting the experiment.

Biological Safety Cabinets (BSC) indicated on the left operate differently than a chemical fume hood. While primary purpose of a chemical fume hood is to safety exhaust fumes, the primary purpose of BSC is to filter out minute particles (air inside cabinet has a HEPA filter) from the air both within the cabinet and from air being exhausted out of the cabinet. Important to verify use and confirm materials removed so that the unit may be turned off.

Both Laminar Flow Bench and Biological Safety Cabinets indicated at the left are typically only used in research situations.

Laboratory Design Resources:


“American National Standard Laboratory Ventilation”, ANSI/AIHA 29.5-2003, American Industrial Hygiene Association


Offices are the single largest space type on campus; and these offices hold the important intellectual capital that fuel learning. The average office space consumes 20 – 30% of the total square footage; approximately one-quarter of the non-residential space on a campus*. Square footage devoted to offices exceeds space allocated to that of classrooms and class laboratories.

Space planning is typically based on function for classrooms and labs. For those kinds of spaces there exists a set of predefined, uniformly accepted dimensions for a space; a direct correlation between the size of a space and the function of a space. For many reasons academic offices do not always fit an easy pattern of prescriptive sizing. Due to renovation and hierarchy of the academic organizational structure, there can be inconsistent and sometimes non-functional office space. Design priority and focus is rightly given to student and teaching areas, and that is sometimes to the detriment of the office space.

Developing and applying space guidelines may result in improving the academic office spaces.

Prior to developing space guidelines at your campuses, it is important to take an inventory. As part of the Facilities Master Planning process, this may be a very important step in understanding the campus space needs. However, even if you are not actively working on the master plan, taking inventory of the office spaces and documenting size, position and location may assist in analyzing and developing specific campus policies.

There are many campuses that have relied on seniority in placement of offices, and that may or may not be successful. One of the key components in the Facilities Master Plan is to document and evaluate the spaces; this should also be done at the office level. Categorize the Offices by program or type and the square footage. Often times there will be stunning realizations of inequalities. Management should recognize these issues and be willing to work to mitigate unusual conditions such as the administrative assistant that has an office four times larger than the Dean with 30 people she is supervising. In the private sector; offices are changed on a regular basis to improve the service delivery. Changing offices can spur new energy, collaborations and synergy to enhance the campus!

In developing space guidelines it is valuable to review to concepts and ideas that have successfully emerged in large corporations. Various forces have impacted the space design of corporate America this

*Information source: (APPA, Facilities Manager, Volume 21, Number 3, May/June 2005)
past fifty years. Many new ideas have been implemented and many have failed. Other concepts have evolved and matured to become standards that are embraced by employers and employees alike.

A number of key concepts that have been flushed out over many years include:
1. elimination of the bullpen office environment in favor of cubicle workstations.
2. reduction of hard walled offices in favor of the open office workstation environment.

Both of these have prevailed because they greatly reduce costs and increase flexibility. Over the years new and functional support spaces have emerged and gained popularity:
- ‘hoteling’ stations
- ‘war rooms’
- large quantity of smaller meeting areas/rooms.
- personal alcoves

Office space guidelines address the personal work environment and, as such, should provide clarity, equity and uniformity for employees. It is important for each campus to evaluate and regularly review their guidelines in order to ensure they,
1. respond to and balance the need for adequate functional personal work space within the campus
2. respond to the system strategic requirement to optimize space utilization.
3. act as an information resource in generating related academic policies and contracts.

Work Space Designation:
1. Full-Time Faculty or Part Time Faculty
2. Full-Time Staff or Part Time Staff: Administrative or Academic
3. Visiting Scholars, Visiting Faculty and Research Associates and Emeritus Faculty
4. Administrative Hierarchy: President, Vice Presidents, Deans, Provost, etc
5. Student Interns and other
5.3 Office Space

Considerations:

1. **Placing offices on the building core** to create flexibility, promote air quality, increase natural light penetration and reduce costs.

2. **Collocating offices** in order to share support spaces and equipment. The concept of shared spaces further advances academic cooperation and potential for program collaboration as well as access to shared support services (copier, etc.)

3. **Collocation of staff within offices.** Ex.: visiting faculty, visiting scientists, occasional lecturers, teaching adjunct and affiliate faculty.

4. **Apply a modular planning approach for flexibility** (whenever possible).
   a. Consider building restrictions when developing standards. Example: Office size may be dictated by building grids/window mullions.
   b. Develop consistent sizes for rooms of different functions. Example: size offices and small conference rooms similarly; size a large conference room the same as a small classroom.

5. **Standardize office furniture** so that only people move and not furniture.

6. **Create multiple small rooms** as an alternate to conferencing areas in every office. If feasible, situate these rooms for use by faculty and students.

7. **Develop a formal campus office space policy** that supports optimal space utilization. Review and update on a regular basis to reflect changing academic programs and space needs (suggest reviewing at five year increment with the Facilities Master Plan).

8. **Develop a process to ensure employees have one workspace only.** Provide hoteling stations/offices and conference rooms where secondary work spaces are necessary.

9. **Annually purge and archive.** Designate and communicate a day (or time period) to eliminate excess paper, etc. Manage this event by strategically locating, and regularly emptying, large recycle bins throughout the designated time period. Storage areas MUST be reviewed annually to confirm that important space is not being used with unimportant items.

10. **Annually review spaces.** Manage spaces to prevent the retired staff that has an office larger than a current Dean. Evaluate storage areas to verify it is appropriate program storage area that supports that specific office space. Vacant space should be clearly labeled as such; so it can be used as an opportunity.
5.3 Office Space

Approximately 100 SQ. FT

Accommodates:
- 1 desk with return
- 1 office chair
- 2 lateral files (beneath desk return)
- 1 conferencing area
- Side chairs
- 2 bookcases

During the early stages of the design process it is critical to seek input from office occupants to understand their work style preference. The typical traditional office configuration may be desirable for faculty that maintain high levels of student interaction in their office setting. Flexible furniture systems today support traditional arrangements while still accommodating a conference space as an integral piece of the desk, as shown.

Note: Suggested security location is to have staff able to face the opening. Also noted to have computer screen not visible from the opening.

Hard Wall – Private Office No. 1

Informal, task oriented configuration

Traditional configuration

Slide 51
5.3 Office Space

Approximately 100 SQ. FT.

Accommodates:
- 1 desk with return
- 1 office chair
- 2 lateral files (beneath desk return)
- 1 – 2 side chairs
- Bookcase

Hard Wall – Private Office No. 2

Informal, task oriented configurations

Formal configuration
5.3 Office Space

Accommodates:
• 2 – 3 work areas; desks with returns
• Lateral files (beneath desk return)
• Optional side chairs

Potential Users:
Full time faculty
Part time faculty
Adjunct faculty
Research/graduate students

Shared offices support collaboration and may provide a good opportunity to foster team work efforts. They may be very appropriate for certain types of academic programs.

Assess staff space needs and determine space accordingly. Synergies can often be gained from a shared work environment. Some campuses actually prefer shared office spaces!
5.3 Office Space

Accommodates:
• 4 – 6 work areas; desks with returns
• Lateral files (beneath desk return)
• Optional side chairs
• Personal Lockers optional

Potential Users:
• Full time faculty
• Part time faculty
• Adjunct faculty
• Research/graduate students

Hard Wall - Shared Office Space

Shared office – 4
With conference rooms and lockers

Rochester Community Technical College
Part-time flexible faculty spaces
5.3 Office Space

Reevaluate office space and the way work is conducted to systemically improve space use and space utilization. In this example, faculty enjoy the shared use and collaborative benefits from working adjacent to each other.

Understanding and communicating the idea that an office is not a permanently owned space is key to expanding the way we view academic office space.

Many private corporations have long embraced the idea of open offices. An open office environment typically consists of modular workstations with partial height walls (panels) in a large open floor plan. Space is largely based on function rather than hierarchy.
5.3 Office Space

Review how office areas are designed. In a linear fashion or within a suite configuration? Or a combination of both? There is no right or wrong but evaluating the pros and cons of the alternative layouts is a very productive effort.

**Traditional:**
- More collegial interactive layout
- Centralized accessible support services.
- Increased circulation requirement.

**Linear:**
- Minimal interaction. Offices typically open to main corridors.
- Support services are not immediately accessible; convenience issue.
- Minimal circulation requirement.

**General Consideration:**
When determining office suite space requirements, add a factor of 20 – 30% of the total space requirement for circulation.

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**Hard Wall - Office Suites**

*Traditional Office Suites*
5.3 Office Space

Option No. 1 – 48 SQ. FT.
Accommodates:
• 1 desk with return
• 1 office chair
• 1 overhead storage unit
• 1 lateral file (beneath desk return)

Open Office #2 – 64 SQ. FT.
Accommodates:
• 1 desk with return
• 1 office chair
• 2 overhead storage units
• 1 lateral file and 1 side chair, or 2 lateral files
5.4 Conference/ Seminar Room

Conference Room No. 1
80 - 100 SQ. FT.

Accommodates:
• 4 people
• 1 - 42" round table
• 1 wall mounted white board.

Conference Room #2
100 - 150 SQ. FT.

Accommodates:
• 6 – 8 people
• 1 - 48" round table
• 4 – 6 chairs
• 1 wall mounted white board.

General Considerations:
• Estimate 20 – 25 square feet/person as a guide to establishing conference room size; economies of scale apply as room size increases.

• Implement assigning and sharing of conference rooms with other units and students. Maximize usage by scheduling rather than 'owning'.

Slide 58
5.4 Conference/ Seminar Room

150 - 300 SQ. FT.

Accommodates:
• 12 – 16 people
• 4 – 6 modular table units
• 1 wall mounted white board

General Consideration:
• Utilizing modular tables provides increased flexibility for reconfiguration and multi-function; allowing test taking, meetings, and a variety of activities.

• Large ‘boat’ shaped tables are nice in appearance but offer no flexibility. (see below)
5.4 Conference/Seminar Room

400 + SQ. FT.

Accommodates:
- 30+ people
- 6+ modular tables
- 1 wall mounted white board

3 Configurations:

Large (Three Configurations)

Configuration No. 1
5.4 Conference/Seminar Room

400 + SQ. FT.

Accommodates:
• 30+ people
• 6+ modular tables
• 1 wall mounted white board

Large (Three Configurations)

Configuration No. 2
400 + SQ. FT.

Accommodates:
- 30+ people
- 6+ modular tables
- 1 wall mounted white board

Large (Three Configurations)

Configuration No. 3
5.4 Conference/ Seminar Room

Conference and seminar room furniture allow multiple arrangements creating flexibility for various configurations!

Simple, strong colors and lighting enliven space.
5.5 Libraries

Key Issues – Summary

1) Locate centrally
2) Maximize connectivity to academics and student services
3) Connect to IT
4) Welcoming entry and visibility
5) Daylighting
6) Small group study, quiet and loud areas
7) Consider acoustics
8) Zone for activities
9) Use stacks to define spaces
10) Staff to supervise spaces
11) Choose furniture wisely
12) Select finishes to coordinate with campus
13) Possible direct entry

Learning environments include daylight and views for library users

General Guidelines

1. Locate the library centrally and/or in the context of social environments such as Cafeteria, Student Center, Commons, Bookstore, Student Services, Computer Labs, etc.

2. Locate the library to maximize connections to other academic support functions (Reading and Writing support, Tutoring, Academic computer labs).

3. Consider connections with IT to maximize support for technical issues and ‘virtual’ learning.

4. Entry to library should be visible and welcoming and the library should be visible and connected to the campus. Use ceiling treatment and signage outside library, use interior glazing for transparency to corridors and other common spaces. Locate openings to give a sense of the whole library.

5. Daylighting and views can be important. Connect library spaces to outside with windows or with views through other spaces.

6. Provide small group and quiet study locations to allow remainder of library to be more active.

7. Consider acoustical needs of spaces that change in use.

8. Zone for activities: Locate reference materials near seating and staff; provide casual seating near periodicals; strive for easily understandable organization.

9. Use components (stacks, etc.) to create smaller pockets of seating and diversity of spaces.

10. Locate staff for visual supervision of activities and exits.

11. Select furniture for active learning: Diversity of types. Workstation rather than reading desk. Flexible and changeable; recognize that library space and furniture will be used in different ways at different times.

12. Select durable finishes, signage and furnishings that coordinate with a campus-wide palette.

13. Outside direct entrance to the library may be explored for future consideration.

Computers too close together for study use
5.5 Libraries

Libraries in a Digital Age
As the nature of information resources is shifting from mostly print to mostly digital media, the focus of libraries is shifting too. The essential question is how to create a place for learning. In 1970, resources were 70% print and 30% digital. The near future may likely flip that ratio to 30% print & 70% digital.

Academic libraries are increasingly places for supported study and collaborative learning as well as repositories for academic resources.

Adapt Library environments to:
• foster learning communities
• reduce barriers between the librarians and the learners to support collaboration.
• providing for a variety of student ages and backgrounds may require a need for more computer support
• “Distance Learners”, whether in online or interactive TV (ITV) courses, likewise may need more support from Library /Resource centers.

Planning References

Planning Considerations
Sources include analysis of MnSCU 2007 Library Survey and Council of Educational Planners International (CEFPI) Space Planning Guidelines for Institutions of Higher Learning, noted here only as a reference and not as a recommendation

1. Provide seating (casual, at tables, in group rooms, at distributed computers) for 5% of the full-year equivalent enrollment (FYE), or 10% of FYE at schools under 500 FYE.* (Exclude Computer space seating)

2. Space required for collections can be estimated at .1 sf/volume (books), .1 sf per 30 CDs and 1 sf for 20 videotapes, assuming 6-7’ shelving. In absence of specific information, plan for a volume range of 2-6,000 for FYE<500, 12-20,000 for FYE 3,000+/- Collections of other materials varies greatly, and quantities should be given by institution.

3. Number of small group rooms is related to school size, academic programs and additional functions of the Library. At many colleges with FYE<500, testing, tutoring or advising takes place in the library, and typically a higher number of group spaces is needed. At minimum:

   2 group study rooms for FYE<1000
   3 group study rooms for FYE 1000-2000
   4 group study rooms for FYE 2000-4000

4. Determine Auxiliary Services to be housed in Library (e.g. testing, tutoring, ID photos), and allow adequate space. Locate so easily found by their users.

5. Unless laptops are available to most/all students, allow for distributed computers for 3-5% of FYE for <500 FYE, .5-1% for others. More students are studying at computers.

6. Provide 50-100 sf of closed (not visible) storage, minimum, for supplies and equipment.

7. Efficiency multipliers for net useable sf to net assignable sf for the library will be in the range of 1.1 to 1.3 (+ 10-30%), to cover internal circulation and interior partitions.

*Schools with significant FYE to headcount ratio should evaluate these numbers
5.5 Libraries

Specific campus reviews needed to determine components

Library Office
- Desk and task chair
- File storage with work surface top (equip with data & elect.)
- Space for book cart(s)
- Collaborative/meeting table – 30”x30” with 2 guest chairs
- Adjacent to circ/ref. workstation
- Glazing to observe library
- Acoustically private

Open Table Seating
- 70 SF minimum for 4 people
- Built-in power and data
- Recommend rectangle or square tables for flexibility

Circulation / Reference Desk
* Located near main entry (Control)
- Work surfaces 30” high
- ADA requirement is 30” high Max.
- Transaction top – 42” high
- Storage & files below counter
- Patron accessible: low & high
- Minimum 6’ wide workstation – with more activities 8’ may be used
- May be separated but adjacent

Reference Desk – Independent
- Consultation space with computer monitor

Slide 66
5.5 Libraries

Specific campus reviews needed to determine components

**Book Drop-Off Box**
Address noise in how built, location

**Computer**
- 25 SF per station +/-
- 4’ width allows for materials at sides
- Consider task lighting for layout space

**Table Arm Casual Seating**
- 25 SF per seat +/-
- Near power and data
- Lounge seat - 30” min to 40”

**Stacks**
- 10.5 SF per 3 lf unit
- Spacing Face to face: 3’6” min aisle, 4’10” ideal aisle
- Address lighting for full height

**2 Person Group Room**
- Multipurpose use
- 2 - 4 People: 80 SF minimum
(Refer to Group Study below)

**Multipurpose / Group Study**
- Multipurpose use
- Accessible space around perimeter
- Power & network connections
- Observation/Visible from exterior
- DVD/VCR in cabinet, on countertop, or portable

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Component Diagrams

- **Computer**
- **Table Arm Casual Seating**
- **Stacks**
- **2 Person Group Room**
- **Group Study**
5.5 Libraries

**Suggested List of Spaces**
for a campus with approximately 500 students (FYE)

1. Circulation/Reference Desk
   for 2 persons
2. Reference Area – for 250 vols+
3. Periodicals
4. Stacks – 4,000 to 6,000 volumes
5. Seating (Tables) - for 24 people
6. Seating (Casual) – for 8 people
7. Distributed Computers
   – for 10 people
8. Computer Open Lab / Bibliographic Instruction - 26 stations
9. Small group room – 3 rooms
   for 3 to 6 people
10. Library Office – for 1 person
11. Work/Storage Area
    – for 1-2 staff at a time
12. A/V/ Closed Storage
13. Copier

   Internal Circulation
   + 15% minimum

**Prototype Space Template**

- Circulation/Reference Desk
- Reference Area
- Stacks
- Materials
- Seating
- Table Seating
- Casual Seating
- Distributed Computers
- Sm. Grp.
- Computer Open Lab (25) / Biblio Instr
- Library Office
- Work/Storage Area
- AV/Closed Storage
- Copy
- Circulation
- Group Learning

Provide a diversity of seating options

Periodical/Ref Area

Typical Medium Group room
5.5 Libraries

1. Circulation / Reference Desk for 1-3 people
2. Reference Area – for 750 vols
3. Periodicals
4. Stacks – 12-16,000 volumes
5. Seating (Tables) – for 65 people
6. Seating (Casual) – for 16 people
7. Distributed Computers – for 20 people
8. Computer Open Lab / Bibliographic Instruction - 30 stations
9. Small group room – 3 rooms for 3 to 6 people
10. Medium group room – 1 room for 8-12 people
11. Library Office – for 1 librarian, 1 guest
12. Work/Storage Area – for 2-3 staff at a time
13. A/V/ Closed Storage
14. Copier
   Internal Circulation + 15% minimum

Note – ADA space is created adjacent
5.5 Libraries

Adjacencies:

- Open space and seating by daylight and views
- Circulation / Staff centralized in position of visual control
- Group rooms near circulation for passive supervision
- Smaller pockets of seating and computers distributed within open area
- Securable office or work room directly adjacent to circulation desk
- Potential for independent use of computer lab, group rooms outside of library hours
- Secondary entry is good for multiple use and utilization, but need security measures and operations.

Separate Reference Desk good to connect staff with library users
5.5 Libraries

Tablet-Arm casual seating supports studying, computer use

Provide furniture supporting collaboration

Prototypical Space Plan

For a campus with approximately 500 FYE students
5.5 Libraries

Anoka Technical College: assembly of academic support functions

- Large (staffed) Computer Learning Lab supports growing on-line offerings
- Tutoring/ GED
- Testing
- Info Services adjacent
- Information Desk guides those in hall and those entering library
- Central Circulation/Reference Desk has visual access to most spaces
- Views to Commons and exterior from primary Seating area

Inviting Info Desk off hall

Seating Area views to Commons, Daylight good for connections, comfort

Very accessible Open Computer Learning Lab
Examples

Dakota County Technical College: Library at core of Student Commons

- Simple rectangle with ‘bar’ of enclosed functions such as office, workroom, Computer classroom/lab.
- Overhead door at entry and windows at computer counter contribute to sense of openness and connection to Commons and exterior.
- Stacks and translucent partition define casual seating areas
- Computer Lab and Group room may be accessed independently of library

Translucent end panels contribute to light quality

Quick use computer stations by Reference

Efficient Table and Computer Seating
Other Considerations

Engineering Considerations
1. Locate mechanical units away from student and staff work areas to avoid noise issues.
2. Provide controllable cooling/heating particularly for computer-heavy areas and for group rooms that will have variable use.
3. Use lighting design to contribute to function and understanding of use: indirect/direct preferable for general lighting. Consider task lighting at tables.
4. Provide power and data distribution throughout library. Consider floor outlets and perimeter raceway for flexibility and distribution.

Operational and Security Considerations
- Organize for staffing efficiencies.
- Provide some closed and some secured storage.
- Create passive security through visibility to all areas.
- Locate a securable room directly adjacent to circulation desk for lock-down situations.
- Library should be part of the building electronic security system.
- Allow space for a book security system. Check technical requirements for distances from metal, widths.
- Book returns may be located within or outside of the library space. Consider issues of noise and vandalism.
- Beverage and noise policies should encourage use of library – this should be a vibrant, active place of study!

Disaster Recovery Plan
Every library should have a plan for emergencies, such as a weather event or a roof leak (St. Paul College’s recent flood due to a burst roof drain), coordinated with campus-wide emergency response plans.

Simple preparation might include:
- Dedicated supply of plastic sheeting, duct-tape, scissors
- Phone numbers for service and cleanup businesses
Seating.....exterior spaces, diversity, expansion of the classroom and a visual reminder of the seasons and fun!

5.6 Lounges / Congregational Area

Examples

Exterior learning space is very popular with students and faculty!

This unique natural free from amphitheatre allows for an artistic weaving of natural grass to sit on while still allowing for a structured amphitheater for lectures or gathering.
5.6 Lounges / Congregational Area

Seating.....exterior spaces, diversity, expansion of the classroom and a visual reminder of the seasons and fun!

Examples

On a pleasant day; classes are a natural for this seating area at Winona State University.

Even on a cold, overcast day the illusion of this amphitheater allows one to image an interesting lecture at Inver Hills CC.
5.6 Lounges / Congregational Area

Examples

Seating.... Enhances the collegiate experience. It allows for educational discourse and interaction.
5.6 Lounges / Congregational Area

Examples

Natural light and updated their student common spaces creating inviting areas to study, network and casual learning.
5.6 Lounges / Congregational Area

Seating: “found” spaces to continue conversations, study and socialize.

Examples

Removal of lockers and incorporation of benches and wall treatment: immense aesthetic and functional improvement.
5.6 Lounges / Congregational Area

Seating.....the classroom expanded

Corridors with tables become impromptu conference and teaming areas for students.

Examples
5.6 Lounges / Congregational Area

Seating…..the hallway and corridor become an extension of the classroom….to study, team and learn.

Examples
5.6 Lounges / Congregational Area

Placement of seating at the ends of the corridors or adjacent to classrooms provides an important opportunity to advance student to student, student to staff, and staff to staff discussion.

Seating..... opportunities will be expanded in the next major science building / renovation

Examples
5.6 Lounges / Congregational Area

Seating.....corridors are more than a pathway

Examples
5.6 Lounges / Congregational Area

Seating…..corridors are more than a pathway

Examples

Before:
above typical corridor

After:
Entry between student commons and main entry Northland CTC
Thief River Falls;
Technology Staff created 2005
5.6 Lounges / Congregational Area

Seating.....corridors are more than a pathway

Examples

Entry between student commons and main entry at Northland CTC Thief River Falls; Technology Staff created 2005
Window ledges, tables and a variety of chairs all allow for interaction and learning to continue.
5.6 Lounges / Congregational Area

Seating options for interaction: benches, chairs, window ledges, tables, etc.

Examples
5.6 Lounges / Congregational Area

Expanded corridors with seating and technology all create spaces for interaction

Examples
5.10 Applied Technology

Corridors and public spaces in Applied Technology spaces should be as attractive and inviting as general college portions of a campus. Encourage interaction and discussion in Corridor.

Well lit, functional and attractive instructional labs are possible with thoughtful design of spaces utilizing clear circulation, good lighting, practical finishes and appropriate clearances between machines/work stations.

a. Summary

This section addresses four programs in the Applied Technology group: Diesel Truck Mechanics Instructional Lab, Autobody Instructional Lab, Automotive Service Instructional Lab, and Carpentry and Cabinetmaking Instructional Labs. Each of these fields are separated to more clearly document the specific requirements for each trade. The General Guidelines subchapter applies to all of the four trades. For Applied Technology facility it is appropriate to implement both the general and program specific guidelines contained in this chapter.

General Guidelines

- Safety is of primary importance for all layouts. Care must be taken to consider material flow, work zones, and emergency personnel access.

- Work zones are required at each piece of fixed equipment or work bench. (Work zones vary by type and function of equipment and may vary for similar equipment from different manufacturers.)

- Acoustical control strategies must be considered for quality instruction, health of students and instructors and safety concerns.

- Instructor’s offices should be located adjacent or with ease of access to the Instructional Labs (preferably with windows and doors directly into the lab) for safety considerations and to facilitate instructional supervision.

- Use of computers will increase as more learning activities are conducted through e-tutorials along with increased reliance on computer graphics and analytical software. Note Computer Labs should be accessible to Applied Labs and also available for general college classroom use.

- Air quality is a priority due to fumes created by solvents and exhaust. Air borne materials caused by finishing, cutting, grinding and sanding operations must also be considered.

- Vestibules between instructional labs and corridors minimize the transfer of both noise and dirt. A sequence of walk-off mats will help remove moisture, grit, dust, and dirt from shoes.

- Flexible overhead power access for small tools, portable saws, and cutting tools improves instruction and increases shop safety.
a. General Guidelines (cont…)

- A potential solution for block scheduling is to group non-dedicated classrooms for Applied Technology Labs and require programs using block scheduling to coordinate use.

- In addition to saving energy, high-quality lighting is critical for quality instruction, increased lab safety and student comfort.

- Consider daylighting with clerestory windows. Note: Minnesota State Colleges and Universities Facilities Design Standards do not permit skylights.

- Colleges sharing facilities with high schools or other institutions must be sensitive to space utilization needs and creatively use space for maximum time allowed. Suggest lockable storage areas for each groups to use the same spaces at different times of the day.

- Recommend windows into lab areas from the general circulation corridor for safety and to market the program.

- Work flow for material delivery and processing that mirrors commercial manufacturing/production facilities should be applied where feasible to the instructional environment.

- Some institutions use “live” work as a means to accommodate skill development while others rely on “mock” situational instruction or apprenticeships to accommodate pedagogical requirements. Each different approach can effect space planning.

- Recommend floor markings indicating safety clearance around equipment and tools.
5.10 Applied Technology

Specific Considerations:

- Size exterior yard for turning and maneuvering of large tractor-trailer rigs.
- 20’ clear height required for lifting cabs and engines.
- Provide 5 ton hoist/ crane.
- Suggest two lifts for small vehicle diesel engines.
- 14’w x14’h sectional garage doors required for trucks; 24’w x 16’h for agricultural equipment.
- All clearances between lab and outside should be adequate to allow use of forklifts.
- Honed concrete provides an ideal slip resistant and easily cleaned floor finish.
- Wash bays are recommended. However design and use for multi-purpose use.
- Dynamometer bays may be an option, although their use in the work environment is diminishing.

b. Diesel Truck Mechanics Instructional Lab

Suggested List of Spaces

General Classroom and Computer Lab: Direct access between lab and classroom is not required and should be discouraged for sound, air quality, and flexibility. Block scheduling and psycho-motor skills* education should be considered when assessing availability. Note Computer Labs should be accessible to Applied Labs and also available for general classroom use.

Demonstration Model/Sample: Located both outside and inside. Consideration should given to perimeter storage racks accessible by forklift in lieu of committing to additional square footage.

Exterior Storage: Verify this requirement. Consult on appropriate energy efficient structure and requirement for academic needs.

Instructor’s Offices: Best when located adjacent to lab allowing visual access to lab area for safety, instructor access and open lab functions.

Resource Area: Work area containing table, three or four computers, and shelving for manuals to allow direct access to resource information on materials, tools/equipment, current repair methodologies, trouble-shooting techniques, and pricing information.

Vestibules: Interior/Exterior transitions (may be vestibule and/or walk off mats) to control transfer of dust, debris, airborne particulates and fumes.

Bench Lab: Size may accommodate 24 students for optimal flexibility and space utilization.

Instructional Lab: Space for 8-12 tractor/trucks - varies depending on programs and enrollment.

Fabrication Shop: Space for cutting, welding, grinding, and greasing mechanical assemblies.

Dynamometer Bay: Consider engine Dynamometer rather than Chassis Dynamometer to conserve space.

* Specific movement or actions preceded by mental activity or cognitive behavior (Eye-hand coordination skills combined with problem solving skills).
b. Diesel Truck Mechanics Instructional Lab

[Suggested List of Spaces](#) (cont…)

**Wash Bay:** Space for one tractor/truck; multipurpose bay that can be used for other programs.

**Tool Storage:** Student tool storage, program specific tool and equipment storage, and material/model/sample storage. Typically consists of large bench top storage bins with drawers on wheels for portability; approximately 30” x 60”; one per student.

**Program specific storage:** Tools and equipment specifically required for instruction and demonstration.

**Trench drain:** Ideally located in the center of the lab space.

Sectional doors need to be well insulated and sealed for energy efficiency and student comfort. Clear drive lane access needs to be maintained for safety and increased flexibility for the needs of future programs. Windows are suggested for natural light.

Bench Lab can be used as a breakout space that can facilitate group learning and discussion.

Evaluate carefully space layout for tool boxes to be as efficient as possible.

Retractable exhaust control systems increase space flexibility.
5.10 Applied Technology

Central wash station ideally located near toilets, lockers and vestibule.

Large equipment should not be stored within instructional space and has significant impact on space utilization.

b. Diesel Truck Mechanics Instructional Lab

- Multiple doors are not energy efficient and require more exterior circulation space.
- Layout allows for better day lighting potential which is created along the elongated exterior wall.
5.10 Applied Technology

Special Considerations:

- All clearances between lab and outside should be adequate to allow use of forklifts.
- Honed concrete provides an ideal slip resistant and easily cleaned floor finish.
- Frame racks can be dangerous due to high forces exerted on the vehicles during frame adjustment.

Overhead Doors:

- Location and number of overhead doors varies by program.
- 12'w x 12'h garage doors provide ease of access and fewer damage claims. Doors may also be used for automotive or diesel programs.
- One overhead per bay provides flexibility but is not energy efficient and requires more maintenance.
- Drive-thru layouts with doors at each end of a lab are energy efficient and provide very good instructional space. (ample maneuvering space may be required to accommodate program requirements.)

C. Autobody Instructional Lab

Suggested List of Spaces

General Classroom and Computer Lab: Direct access between lab and classroom is not required and should be discouraged for sound, air quality, and flexibility. Block scheduling and psychomotor skills* education should be considered when assessing availability. Note Computer Labs should be accessible to Applied Labs and also available for general college classroom use.

Demonstration Model/Sample: Located both outside and inside. Consideration should given to perimeter storage racks accessible by forklift in lieu of committing to additional square footage.

Exterior Storage: Verify this requirement. Consult on appropriate energy efficient space and requirement for pedagogy needs.

Instructor’s Offices: Best when located adjacent to lab allowing visual access to lab area for safety, instructor access and open lab functions.

Resource Area: Work area containing table, three or four computers, and shelving for manuals to allow direct access to resource information on materials, tools/equipment, current repair methodologies, trouble-shooting techniques, and pricing information.

Vestibules: Interior/Exterior transitions (may be a vestibule and/or walk off mats) to control transfer of dust, debris, airborne particulates and fumes.

Instructional Lab: 8-12 bays – varies depending on programs and enrollment.

Tool Storage: Student tool storage, program specific tool and equipment storage, and material/model/sample storage. Typically contained in large bench top storage bins with drawers on wheels for portability; Approximately 30” x 60”; One per student.

Program specific storage: Tools and equipment specifically required for instruction and demonstration needs.

Outdoor storage: For outdoor storage, should have security and adequate fencing. Aesthetics and fences are important to maintain good relationships with neighbors and to establish a “collegiate” atmosphere.

* Specific movement or actions preceded by mental activity or cognitive behavior (eye-hand coordination skills combined with problem solving skills).
c. Autobody Instructional Lab

**Suggested List of Spaces** (cont…)

**Customer Service:** Small service counter for checking in customers and providing estimates for programs performing "live" work, including space as part of instructor's offices or part of transition vestibule between public hallway and instructional lab.

**Paint Booths:** Large paint booths with specific and stringent ventilation requirements are necessary.

**Paint Prep Areas:** Adequate space with specific and stringent ventilation requirements is necessary.

**Frame Racks:** Large pre-engineered frame racks for frame alignment.

**Space Diagram**
- One door in and out of the space is very energy efficient with minimum exterior wall and insulated doors.
- This does not require significant space used at exterior for circulation.
- Clearly mark traffic areas for safety.
5.10 Applied Technology

Special Considerations:

• 12’w x 12’h garage doors provide ease of access and fewer damage claims. Doors may also be used for auto body or diesel programs.

• All clearances between lab and outside should be adequate to allow use of forklifts.

• Honed concrete provides an ideal slip resistant and easily cleaned floor finish.

• Recommend up-lighting from the floor to high-light the under carriages of vehicles in the up-lifted condition.

• 16’ clear height from floor to underside of structure required for lifts.

Suggested List of Spaces

General Classroom and Computer Lab: Direct access between lab and classroom is not required and should be discouraged for sound, air quality, and flexibility. Block scheduling and psycho-motor skills* education should be considered when assessing availability. Note Computer Labs should be accessible to Applied Labs and also available for general college classroom use.

Demonstration Model/Sample: Located both outside and inside. Consideration should given to perimeter storage racks accessible by forklift in lieu of committing to additional square footage.

Exterior Storage: Verify this requirement. Consult on appropriate energy efficient structure and requirement for academic needs.

Instructor’s Offices: Best when located adjacent to lab allowing visual access to lab area for safety, instructor access and open lab functions.

Resource Area: Work area containing table, three or four computers, and shelving for manuals to allow direct access to resource information on materials, tools/equipment, current repair methodologies, trouble-shooting techniques, and pricing information.

Vestibules: Interior/Exterior transitions (may be vestibule and/or walk off mats) to control transfer of dust, debris, airborne particulates and fumes.

*Specific movement or actions preceded by mental activity or cognitive behavior. (eye-hand coordination skills combined with problem solving skills.)
5.10 Applied Technology

**Special Considerations:**

**Overhead Doors:**
- One overhead per bay provides flexibility but is not energy efficient and requires more maintenance.

**In-floor hoists:**
- Provide good work flow around bays
- Result in fewer damage claims
- Provide good flexible space for different instructional activities and placement of vehicles.
- Consider above grade hydraulic tanks to mitigate environmental concerns regarding contaminated soil.
- The center piston position may create an obstacle for access to repairs.

**Overhead hoists:**
- Economical to install, repair and replace.
- Minimum of 4’ clear must be maintained between pillars when overhead hoists are used.
- Overhead hoists are the most common type of lift in the service industry.

**d. Automotive Service Instructional Lab**

**Suggested List of Spaces (cont...)**

**Bench Lab:** Size may accommodate 24 students for optimal flexibility and space utilization.

**Instructional Lab:** 8-12 bays - varies depending on programs and enrollment.

**Tool Storage:** Student tool storage, program specific tool and equipment storage, and material/model/sample storage. Typically consists of large bench top storage bins with drawers on wheels for portability; approximately 30” x 60”; one per student.

**Program specific storage:** Tools and equipment specifically required for instruction and demonstration.

**Customer Service:** Small service counter for checking in customers and providing estimates for programs performing “live” work. Space may be included as part of instructor’s offices or within vestibule between public hallway and instructional lab.

**Outdoor storage:** For outdoor storage, should have security and adequate fencing. Aesthetics and fences are important to maintain good relationships with neighbors and to establish a “collegiate” atmosphere.

**Trench drain:** Ideally located in the center of the lab space.

Overhead hoists have become the industry norm due to lower costs and ease of maintenance. Retractable exhaust control systems increase space flexibility.
5.10 Applied Technology

Specific Considerations:

- Construction of for-sale homes at remote sites or use of trailer homes campus will affect exterior space needs.

- At programs with off-site instructional locations inclement weather may create overcrowded conditions when students working off-site return to campus to avoid missing instructional time. Campus to evaluate space for flexible options so overcrowding does not occur.

- Work flow for material movement and processing within the space must be carefully considered due to the size of lumber products and the danger associated with high-speed cutting machinery.

- Carpentry uses hand tools. Cabinetmaking uses more bench cutting machines and requires more space.

- Carpentry Program may have larger space needs than single purpose programs.

e. Carpentry and Cabinetmaking Instructional Labs

Suggested List of Carpentry Spaces

General Classroom and Computer Lab: Direct access between lab and classroom is not required and should be discouraged for sound, air quality, and flexibility. Block scheduling and psychomotor skills* education should be considered when assessing availability. Note Computer Labs should be accessible to Applied Labs and also available for general college classroom use.

Demonstration Model/Sample: Located both outside and inside. Consideration should be given to perimeter storage racks accessible by forklift in lieu of committing to additional square footage.

Exterior Storage: Verify this requirement. Consult on appropriate energy efficient space and requirement for pedagogy needs.

Instructor’s Offices: Best when located adjacent to lab allowing visual access to lab area for safety, instructor access and open lab functions.

Resource Area: Work area that contains table, three or four computers, and shelving for manuals to allow direct access to resource information on materials, tools/equipment, current repair methodologies, trouble-shooting techniques, and pricing information.

Vestibules: Interior/Exterior transitions (may be vestibule and/or walk off mats) to control transfer of dust, debris, airborne particulates and fumes.

Material Storage (Interior): Add appropriate areas to store both board and flat stock lumber.

Material/Equipment Storage (Exterior): Scaffolding, generators, ladders, vehicles/trailers etc. are typical items used only at the off-campus “home building” sites.

Tool Crib: Storage for hand tools required by program instruction that are not required to be purchased by the students, such as reciprocating saws.

* Specific movement or actions preceded by mental activity or cognitive behavior. (eye-hand coordination skills combined with problem solving skills.)
5.10 Applied Technology

Organized workbench areas and storage racks for lumber create successful learning environments.

Good quality lighting, good ventilation and flexible particle exhaust systems are fundamental requirements for good carpentry and cabinetry shops.

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e. Carpentry and Cabinetmaking Instructional Labs

Suggested List of Carpentry Spaces (cont…)

Mock-up Lab: Large high-bay (16’ to 20’ clear) space to accommodate the semester long assembly of mock-ups; Each mock-up consists of an 8’ x 8’ module with minimum 6’ clearance at all sides for scaffolding and cutting/staging areas; two to four students per mock-up. Note: Campuses with off-site programs may have reduced need for on-site mock-up space.

Equipment Shop: Small shop area with work benches and saws.

Tool Storage: Tool and equipment storage. Storage of student’s tools is usually minimal for carpentry programs.

Make-do storage solutions are unsafe, inefficient and unattractive.

Conditions that combine storage, workbench areas and cutting machines should be avoided.

Relationship Diagram

1. Vestibule
2. Office
3. Material Storage
4. Shop Area
5. Mock-up/Bench Lab
6. Tool Crib
7. Resource Room
8. Exterior Vestibule
9. Exterior Cold Storage
10. Corridor
11. Classroom
12. Computer Lab
13. Work/Material Flow
5.10 Applied Technology

Specific Considerations:

- Conditions that combine storage, workbench areas and cutting machines should be avoided as it is safety hazard.
- Organized storage and workbench areas create successful learning environments.
- Carefully designed storage racks for lumber and framing material encourage neat and orderly learning environments.
- Lofts can provide additional storage areas, but they must be safely designed to code.
- Consider flexibility in space planning for instructional labs in order to accommodate updated and new machinery.
- Isolated spray booths with proper ventilation for contact sprays and finishes are mandatory for safe learning environments and quality products.

e. Carpentry and Cabinetmaking Instructional Labs

Suggested List of Cabinetmaking Spaces

General Classroom and Computer Lab: Direct access between lab and classroom is not required and should be discouraged for sound, air quality, and flexibility. Block scheduling and psycho-motor skills* education should be considered when assessing availability. Note Computer Labs should be accessible to Applied Labs and also available for general college classroom use.

Instructor’s Offices: Best when located adjacent to lab allowing visual access to lab area for safety, instructor access and open lab functions.

Resource Area: Work area that contains table, three or four computers, and shelving for manuals to allow direct access to resource information on materials, tools/equipment, current repair methodologies, trouble-shooting techniques, and pricing information.

Vestibules: Interior/Exterior transitions (may be vestibule and/or walk off mats) to control transfer of dust, debris, airborne particulates and fumes.

Material Storage: Add appropriate areas to store both board and flat stock lumber. Perimeter storage racks accessible by forklift.

Tool Crib: Storage for hand tools required by program instruction that are not required to be purchased by the students, such as reciprocating saws.

Equipment Shop/Processing Area: Large open area for saws, shapers, CNC cutters, edge banding, etc; proper working clearances around each tool is critical for safe instruction and operation by students.

Bench shop: Large open area for student benches; approximately 4’ x 6’ each; proper working clearance around each bench is critical for safety.

* Specific movement or actions preceded by mental activity or cognitive behavior. (eye-hand coordination skills combined with problem solving skills.)
e. Carpentry and Cabinetmaking Instructional Labs

Suggested List of Cabinetmaking Spaces (cont…)

Product Storage: Large flexible space to accommodate finished cabinetry products; mezzanine space accessible by forklift is acceptable.

Spray Booth (Contact sprays): Spray booth / room or cabinetry must have proper exhaust for application of contact cements.

Spray Booth (Finishes): Manufactured spray booth with proper exhaust for application of wood finishes.

Tool Storage: Appropriate storage for lumber materials (flat and board stock); tool and equipment storage. Finished product storage (cabinetry programs only).