



UNIVERSITY  
OF WYOMING

## DESIGN GUIDELINES

**October 2017**

# INTRODUCTION

## INTENT

In place of the previous University of Wyoming (UW) *Instructions to Architects & Engineers*, two new documents have been developed—the *UW Design Guidelines* and the *UW Construction Standards*. The *UW Design Guidelines* are intended to serve as a resource for design professionals to facilitate the planning and design of UW facilities. The *UW Construction Standards* are intended to convey technical requirements for the design of new and renovated facilities and contains much of the substance of the previous *Instructions to Architects & Engineers*. These guideline documents were prepared to address problems that UW has experienced during design, construction, and operation of new and renovated facilities. The intent of these documents is to provide the information necessary to avoid these problems in the future and to promote the design and construction of better university facilities. These guideline documents will answer many frequently asked questions and can help consultants avoid redesign and unnecessary construction administration time.

## ORGANIZATION

The *UW Design Guidelines* are organized into general classifications for consideration during the design phases of a project. A detailed Table of Contents has been provided instead of an index.

## DISCLAIMER

These design guidelines are not intended to be a substitute for specifications prepared by design professionals, and do not relieve the consultants from their responsibility to exercise due care in design and documentation of UW projects in a manner consistent with accepted standards of professional practice.

## MODIFICATIONS

This document is intended to be an evolving resource, and UW encourages comments, suggestions, and proposed corrections/modifications from consultants and other interested parties. Please email your comments to UW Facilities Construction Management at [mkibbon@uwyo.edu](mailto:mkibbon@uwyo.edu). Suggestions will be considered and the guidelines updated periodically.

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## DESIGN GUIDELINES

### GENERAL

The design of all new buildings and additions on the UW campus shall follow the recommendations of the University of Wyoming Long Range Development Plan (LRDP)—see:

<http://www.uwyo.edu/uwops/lrdp/supporting-documents.html> to visit this site.

The design of all renovation, remodeling and additions to historic buildings on the UW campus shall follow the guidelines in the University of Wyoming Historic Preservation Plan Update—see:

[http://www.uwyo.edu/uwops/\\_files/construction\\_standards\\_guidelines/uw\\_historic\\_preservation\\_plan\\_july\\_2015.pdf](http://www.uwyo.edu/uwops/_files/construction_standards_guidelines/uw_historic_preservation_plan_july_2015.pdf).

Construction documents for all new buildings, renovations, and additions shall comply with the *UW*

[http://www.uwyo.edu/uwops/construction\\_standards\\_guidelines/](http://www.uwyo.edu/uwops/construction_standards_guidelines/).

### EXTERIOR DESIGN ADVISORY COMMITTEE (EDAC)

On all new building projects or major renovations, the Vice President for Administration will appoint an Exterior Design Advisory Committee, in consultation with the Board of Trustees' Facilities - Contracting Committee. The Committee will be composed of 5-6 members as follows:

- One member of the Board of Trustees
- One member of the Wyoming Legislature
- One member of the Division of Administration
- One representative of the community who is not an employee of the University
- One representative of the unit that will primarily use the building
- If private funds are used to fund the project, one representative of the UW Foundation

This Committee will meet with the design firm and provide input on the exterior design of the project building(s). The design of all new or renovated buildings shall be consistent with the existing historic buildings on campus and incorporate elements consistent with the UW Historic Preservation Plan. The Committee shall hold at least one community/public meeting to seek input.

The design firm shall take the Committee's input into consideration in designing the exterior of the building. The design firm shall document departures from the Historic Preservation Plan in creating the exterior building design. The proposed exterior design shall be submitted to the Board of Trustees for review and approval. See [http://www.uwyo.edu/generalcounsel/\\_files/docs/uw-reg-updates-2017/uw\\_reg\\_1-102\\_attachment\\_h.pdf](http://www.uwyo.edu/generalcounsel/_files/docs/uw-reg-updates-2017/uw_reg_1-102_attachment_h.pdf).

### MAJOR CONSTRUCTION PROJECTS GUIDING PRINCIPLES

The following guiding principles are intended to address issues which have arisen during recent construction projects. They are intended to be the initial set of guiding principles and are expected to be modified, refined and adapted as UW proceeds with major construction projects.

1. The exterior design of the facility shall be consistent with campus design standards pursuant to the *UW Historic Preservation Plan*. The design firm shall focus its objectives to achieve a varied

but cohesive architectural style that enhances the character of the University and respects its history.

2. The building shall be located and sited consistent with the current *UW Long Range Development Plan*.
3. Facilities shall incorporate today's most advanced thinking in construction design, programmatic design, and sustainability, while providing flexibility for programmatic growth, new technologies and long-term use and functionality of the facility.
4. Investments in facilities shall demonstrate wise stewardship of funds, taking full advantage of opportunities to reduce costs through standardization, shared resources, and institutional collaboration.
5. The design firm shall anticipate and provide plans to address infrastructure requirements of the campus in the most efficient and least intrusive manner possible.
6. Each major construction project shall have its own guiding principles developed by the college or unit intended to address the programmatic and functionality of the proposed facility which supplement, but not deviate from, these guiding principles for that specific project. The project-specific guiding principles shall be submitted to the Board of Trustees Facilities Construction Committee for review and approval.

## **LEVEL II PLANNING**

When Level II planning services are included in the scope of an Architect agreement, the Architect shall provide the following services:

1. The Architect shall review the following documents:
  - UW Long Range Development Plan
  - UW Strategic Plan
  - UW Historic Preservation Plan
  - UW Design Guidelines
  - UW Construction Standards
  - UW Utilities Master Plan
2. The Architect shall comply with the following requirements of W.S. 9-5-108 related to the development of Level II feasibility studies:
  - a. Include a detailed analysis of factors relevant to development, construction, operation and maintenance;
  - b. Identify major problems and opportunities concerning development and the environmental, social and economic effects of development;
  - c. Identify the desired sequence of events, including commencement of local, state and federal permitting activities and acquisition of land;
  - d. Include soils and other site test drilling procedures;
  - e. Contain final concept design and cost estimates;
  - f. Include the project financing plan; and
  - g. Identify the interests in land to be acquired and the proposed means and costs of acquisition.
3. Identify current and projected space requirements:
  - a. Assignable square footage
  - b. Gross square footage
  - c. Building efficiency assumptions

4. Identify architectural requirements per the UW Historic Preservation Plan.
5. Identify International Building Code and City of Laramie planning requirements, including what year or cycle of code and what, if any, exceptions are to be used.
6. If applicable, perform an evaluation of potential sites identified by the Owner to include the following:
  - a. Existing land use
  - b. Existing use of any buildings on the proposed site
  - c. Site area
  - d. Opportunities to expand site area if adjacent streets were vacated (as in the Lewis Street area)
  - e. Pedestrian and vehicular circulation, and delivery access
  - f. Open space and landscape opportunities
  - g. Utility infrastructure
  - h. Place-making and campus character
  - i. Environmental conditions including but not limited to: solar access, wind, geotechnical
  - j. Surrounding/ private land use
  - k. Parking capacity
  - l. Impacts of construction/ phasing on existing University activities
7. Prepare Room Design Data Sheets for all space types in the proposed building to include the following:
  - a. Room area (assignable square feet)
  - b. Adjacency and proximity requirements
  - c. Equipment to be located in the space
    - i. Shielding requirements
    - ii. Vibration requirements
    - iii. Access, maintenance and replacement requirements
  - d. Casework requirements
  - e. Power requirements
  - f. Plumbing requirements
  - g. Temperature/ HVAC requirements
  - h. Acoustic requirements
  - i. Data/ network requirements
  - j. Security requirements
  - k. Hazardous material/ chemical requirements
8. Prepare the proposed Project Budget to include the following budget lines:
  - a. Site development
  - b. Utilities
  - c. Estimated construction cost
  - d. Audio-Visual/ IT
  - e. Furniture, fixtures and equipment
  - f. Moving
  - g. Design fees
  - h. Operation and maintenance costs
  - i. Anticipated construction cost escalation



9. Develop the proposed Project Schedule to include the following:
  - a. Funding Schedule, if project funding is not already in place
  - b. Design and Documentation Schedule, including review by the Exterior Architecture Advisory Committee
  - c. Construction Schedule with phasing, if required
10. Prepare a 90% draft of the final Level II planning document for review by the Planning Team and UW Administration.
11. Prepare the final Level II planning document to include the following:
  - a. Table of Contents
  - b. Planning Team composition
  - c. Executive summary
  - d. Goal summary statement
  - e. Planning context
  - f. State Building Commission Requirements
  - g. Planning process
  - h. Existing facilities analyses
  - i. Regulatory requirements
  - j. Assessment of facility needs
  - k. Adjacency diagrams
  - l. Space program by department or unit
  - m. Room design data sheets including requirements for mechanical, illumination, power, structural, vibration requirements, accessibility, technology/ data requirements, acoustic requirements and security (as an appendix)
  - n. Site analysis/ selection
  - o. Color-coded conceptual floor plans of the facility which can be utilized for estimating construction costs
  - p. Project Budget
  - q. Project Schedule
  - r. Owner's Project Requirements (provided by UW)

## **ACCESSIBLE DESIGN**

All facilities shall be designed to meet the requirements of the current ADA Standards for Accessible Design.

An accessible path shall be provided from the nearest parking lot with accessible parking spaces to each exterior door, preferably with solar exposure.

All electronic displays shall be designed to meet ADA requirements for reach (to controls) and captioning (if audio is provided).

A bottle-filler shall be provided at the accessible drinking fountain on each floor of academic buildings.

Curb ramps shall have a width of 7 feet and meet Wyoming Department of Transportation (WYDOT) requirements for Curb Modification at Curb Ramps.

## **LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN (LEED)**

The University goal is to achieve a position of zero net energy or provide the capabilities to achieve zero net energy. Project design shall incorporate LEED principles to achieve at least a Silver rating without certification. Certification will be a decision of the Owner upon obtaining the project specific opportunities from the Architect at the end of the Schematic Design Phase. Regardless of whether or not the Owner decides to pursue LEED certification, the Architect shall be responsible for providing documentation compatible with that required for the LEED prerequisites and credits that the Architect and Owner elect to pursue on the LEED Scorecard for the project. In order to reduce energy consumption in Wyoming's climate, increased ventilation shall not be used as a strategy to achieve the Enhanced Indoor Air Quality Strategies credit for LEED v4, formerly the Enhanced Indoor Air Quality credit (IEQc2) in LEED version 2009.

## **NON-DETECT FOR ASBESTOS-CONTAINING MATERIALS**

All materials installed in University construction projects shall be non-detect for asbestos-containing materials.

## **ROOM NUMBERING STANDARDS**

The following standards are used by the University of Wyoming (UW) in numbering rooms and doors throughout its facilities. For new buildings, these standards shall be followed without deviation. In the cases of renovations or additions to existing buildings, there are two options:

- Option 1: The building's current room numbering system would be maintained and extended.
  - Option 2: The University would make the decision to abandon the existing building's numbering system and use the following standards to renumber the entire building.
1. Each facility's room numbering system shall be structured so that it flows through the building in a comprehensible and consistent pattern.
    - a. For buildings with the main corridors in a north/south orientation, the lower numbers shall start at the south end the building and progress to the north.
    - b. For buildings with the main corridors in an east/west orientation, the lower numbers shall start at the east end of the building and progress to the west.
    - c. For buildings with a race track corridor design, the lowest numbers shall start at an obvious point such as the front entrance or main elevator and progress in a clockwise direction.
  2. The room numbering system for a building shall use three-digit numbers, plus applicable prefixes and suffixes. For buildings in which there are more than 99 numbered rooms on any floor, a four-digit numbering system may be used; refer to UW Facilities Construction Management for guidance. For buildings with multiple floors, the following room numbering system shall be used:
    - a. First floor rooms: The uppermost floor entered at grade (or half-level above grade) shall have "1" as the first digit of the room numbers. First floor room numbers begin at 100 and end at 199.
    - b. Basement rooms: Basement room numbers begin at 001 and end at 099. In buildings where there are more than two floors below the floor defined above, consult UW Facilities Construction Management.

- c. Sub-basement rooms: The prefix “SB”, followed by a hyphen, shall precede the numbers, which will begin at 001 and end at 099 (i.e., SB-001 through SB-099).
  - d. Second floor rooms and above: Room numbering shall be similar to that for the first floor, except 200-299 for Second Floor, 300-399 for Third Floor, etc.
3. The room numbering pattern should be similar on all floors, as much as possible without creating other inconsistencies. That is, rooms with the same second and third digits should be located in the same relative position in the building when viewed in plan. For example, rooms 001, 101, 201, 301, etc. should align vertically.
4. Each room shall have only one number, regardless of the number of doors opening into it. This includes all assignable areas, building service areas, and mechanical areas (as defined by the *National Center of Education Statistics Postsecondary Education Facilities Inventory and Classification Manual*). Circulation spaces such as corridors, halls, stairs, elevators and lobbies are addressed in Items 8, 9 and 10.
5. Room numbers shall be coordinated sequentially such that even numbers are on one side of a corridor and odd numbers are on the other as follows:
  - a. Buildings with a north/south main corridor orientation shall have the odd-numbered rooms on the east side of the corridors.
  - b. Buildings with an east/west main corridor orientation shall have the odd-numbered rooms on the south side of the corridor.
  - c. Building with a circular or race track design shall have the odd-numbered rooms on the perimeter of the building.
6. Room numbers on one or both sides of a corridor shall be skipped in order to maintain succession with room numbers on the opposite side of the corridor and to allow for future renovations that convert large spaces into smaller spaces as follows:
  - a. As a general rule, sufficient numbers shall be reserved whenever possible to allow for large spaces to be subdivided into standard-size office spaces. Windows, columns, and other structural features may offer cues on possible future partition placement.
  - b. When a suite of rooms or large space is entered through a single door (and no other doors are located on that same side until further down the corridor), numbers should be skipped in order to maintain succession with room numbers on the opposite side of the corridor.
  - c. When a corridor has large rooms such as classrooms, meeting rooms, etc. on both of its sides, room numbers shall be skipped on both sides in order to accommodate future subdividing of rooms.
7. In the case of a suite of rooms or where there are “interior” rooms off of a larger space, one number shall be designated for the main room or space, and the room numbers for the interior rooms shall include the main room number plus an uppercase suffix letter. For example, 101 might be designated as the number of a room whose entry is made from the corridor into the suite; and 101A, 101B, 101C, etc. might be designated as the numbers of rooms that are inside the suite and do not have doors to the corridor or hall. The numbers of inner rooms shall be designated in a logical and sequential manner.

8. All corridors and halls shall be identified using the prefix “C” or “H” respectively, followed by a three-digit number. The first digit of the room number shall correspond to the first digit of the rooms on that floor, and the second two digits shall be unique beginning with 01. For example, C001 being used for the basement, C101 for the first floor, C201 for the second, and so. On floors with multiple corridors or halls, the next three-digit number in sequence shall be used; no two halls or corridors shall have the same three-digit number (i.e., C101, H102, H103, C104, etc.). Sub-basement corridors shall be identified using the prefix “SB-” (i.e., SB-001).
9. Each vestibule and lobby shall be identified using the prefix “V” or “L” respectively, followed by the three digit number of the corridor, hall, or other space it is adjacent to.
10. All stairwells and elevators shall be identified by an “S” or “E” respectively, followed by a numeral unique to that stairwell or elevator, a hyphen, and then the number of the corresponding floor. For example, the space Stairwell 1 occupies on the third floor of a building would be designated S1-3. On the first floor, the space occupied by the same stairwell would be designated S1-1. If a Stairwell 2 passed through the first floor of the same building that space would be designated S2-1.
11. During renovation projects, all re-numbering of renovated rooms shall be consistent with the existing numbering in adjacent spaces.
12. Doors shall be designated by the room number into which they open. For rooms with more than one door, each door shall be designated by the room number, followed by a hyphen and a number unique to that door, beginning with “1”. A single door number shall be designated to paired or “double” doors.
13. The room numbering scheme shall be developed jointly by the Architect and the UW Manager of Space Allocation in the Design Development phase and revised as needed in the Construction Documentation phase.

## DOCUMENTATION

1. Record Drawings
  - a. Owner shall receive three (3) full-size bound printed sets of the final Plans and Specifications, including such revisions that have been made in the course of bidding and construction. Each sheet of the final Plans shall be prominently noted, “Record Drawings”.
  - b. Owner shall receive one (1) complete electronic media set of the final Plans in both AutoCAD® and PDF file formats with sheets individually bookmarked and sorted by trade, and the Building Information Model (BIM) for the project in Revit® file format.
  - c. Owner shall receive electronic media versions of the final Specifications in both Microsoft Word® and searchable PDF file formats. All revisions or changes shall be properly annotated on both the printed sets and electronic versions, as well as cross-referenced within the documents. The Cover sheet for each volume of the final Specifications shall be prominently noted, “Record Specifications.”
  - d. Owner shall receive two (2) sets of compact disks containing the following:
    - i. PDF files of all record drawings, specifications and building permit documentation.

- ii. Full set of AutoCAD files from which the record drawings were created.
  - iii. REVIT files for the project from which the record drawings were created, to include architectural, structural and mechanical drawings at a minimum; all other disciplines as available.
  - iv. Record drawings shall be turned over to the Owner within one month after Substantial Completion.
  - v. The Architect-Engineer shall provide the files used to perform the energy analysis in a format approved by the Owner.
2. O&M Manuals
- a. Owner shall receive three (3) sets of 8-1/2" x 11" 3-ring binders with accompanying compact discs containing the following information for electrical, mechanical, elevator and other special systems (if special systems are in question, coordinate with the UW Project Manager):
    - i. Parts lists
    - ii. Actual wiring diagrams
    - iii. Lubrication, maintenance and operation manuals
    - iv. Other pertinent information as applicable for full owner operation, maintenance, and parts replacement.
  - b. A draft set of the O&M manuals shall be provided to the Owner a minimum of one week prior to any owner training.
  - c. The final draft of the O&M manuals shall be reviewed by the consultant(s) prior to issuing to the Owner.
  - d. All manuals shall be searchable.
3. Balancing Report
- a. Balancing report shall have an executive summary detailing balancing and performance issues found during the work.
4. Standards for Geographic Information System (GIS) Deliverables
- a. The Contractor shall consult with the Deputy Director for Utilities Management (UW Operations) and the Enterprise GIS Architect Wyoming Geographic Information Science Center (WyGIS) to acquire the database schema before populating the attribute tables to ensure the data matches the needs of the University. Layer level metadata updates are required for all updated or new layer deliverables, and the Contractor shall consult with UW Operations and WyGIS to identify the specific metadata content requirements.
  - b. Where possible, the Contractor shall utilize source GIS data provided by UW. The Contractor will be provided a copy of any GIS data required in ESRI format (shapefile or file geodatabase).
  - c. All GIS data shall adhere to the requirements and standards listed in this document.
  - d. All GIS data provided to UW shall adhere to the database schema requested by the University for each data layer.
  - e. The GIS deliverable shall be delivered on CD-ROM or DVD to UW for Quality Assurance (QA), and the University will have two weeks to review the data. The Contractor will have two weeks to make any corrections and produce the final deliverable.
  - f. The Contractor shall provide a document (in Excel format) that lists all layers developed or updated for the task.

- g. All data collection shall conform to Field Collection grade digitizing/ conversion collection procedures as specified by the task or project as a whole. The acceptable data formats for GIS deliverables are, in order of preference: ESRI file geodatabase, shapefile or AutoCAD version 2014 or earlier, provided that the data adhere to the following requirements regarding the coordinate system, metadata, feature attribution and data integrity:
5. Projected Coordinate System: All datasets shall be delivered in the State Plane Wyoming East FIPS and use the NAD83 datum and feet for units of measure. For locations off-campus, the appropriate State Plane for that area shall be used.
  6. Metadata: The Contractor shall supply, at a minimum, metadata for each feature class in XML format. The following elements of the Federal Geographic Data Committee (FGDC) Content Standard for Digital Geospatial Data (CSDGM) shall be included as part of the deliverables. Feature level metadata may be required at the discretion of the University. Details on the standard can be found at: <http://fgdc.gov/metadata/geospatial-metadata-standards>

#### Contact Details

- Contact information for the data steward
  - Person
  - Organization
  - Position
  - Telephone
- Email Description – characterization of the data
  - Abstract
  - Purpose
- Time Period - explains how current the dataset is
  - Currentness Reference
  - Date
- Keywords – word/phrase descriptors of the data

#### Data Quality

- Positional Accuracy – accuracy assessment of the data
  - Horizontal Accuracy Report
  - Vertical Accuracy Report (if applicable)
- Source Information – list of sources and a short citation of each
  - Source Citation (Details)
    - Title
    - Originator
    - Publication Date
- Process Step – an explanation of how/when the data was created
  - Process Description
  - Process Date
- Spatial Reference
  - Horizontal Coordinate System
  - Vertical Coordinate System (if applicable) – vertical datum information
    - Datum Name
    - Distance Units

- a. Data Integrity: Data accuracy standards for all deliverables shall be in accordance with those set forth in the section entitled "Data Collection Procedures". All deliverables shall include an accuracy report in the metadata.
  - b. The Contractor shall employ appropriate QA/QC standards to ensure that data is topologically correct, accurate and complete (to include):
    - i. No erroneous overshoots, undershoots, dangles or intersections in the line work.
    - ii. Point and line features will be snapped together where appropriate to support networks. For example; do not break linear features for labeling or aesthetic purposes.
    - iii. Line features shall be continuous. Point features shall be digitized as points, using attribute block symbols with insertion points in the center of the block/feature.
    - iv. No sliver polygons.
    - v. Digital representation of the common boundaries for all graphic features shall be coincident, regardless of feature layer.
    - vi. Geometric network connectivity shall be maintained for utility networks.
  - c. A summary of the methods used to correct inconsistencies and any remaining errors by case shall be included in the metadata under the "Logical Consistency Report" and "Completeness Report" sections.
7. University-Furnished Materials: The University will provide the Consultants access to necessary geospatial data, reports, schematics or other pertinent information or a data copy. When requesting data from UW, the Contractor shall identify which data layers they require. An official request to UW Operations and WyGIS for data/schematics shall be completed prior to the release of any information to verify requirements. The Consultant shall request the most current GIS base map data (aerial imagery) from UW at the beginning of each project.
8. Data Collection Procedures:
- a. All data collection shall include an accuracy statement at the 90% or higher confidence interval. Accuracy statements shall include the method of determination, preferably from a recognized standard such as the National Standard for Spatial Data Accuracy (NSSDA).
  - b. The Contractor shall contact UW Operations and WyGIS to identify the necessary Feature Attributes (specified by the University) and attribute database schema for all new, updated or edited features first by field verification, and then by using existing sources.
9. Field Collection: When field data collection is stipulated in the contract, the Contractor shall utilize conventional or other methods to gain the highest accuracies and precision possible, such as a Total Station or Global Positioning System (GPS) in accordance with the applicable Geospatial Positioning Accuracy Standards published by the Federal Geographic data Committee (FGDC). At a minimum, the Contractor shall provide resource/ survey grade GPS collection at an accuracy level of less than one (1) meter, and after differential correction shall attain target accuracies of less than 0.1 meters. Where appropriate or as stipulated in the contract, or determined by UW, the Contractor shall use survey grade GPS at an accuracy of +/- 5cm. GPS data collection activities shall be based on a post-processed environment using an accurately

sited base station. Base station files for post-processing acquired locally by an off-site Continuous Operating Reference Station (CORS) shall be verified for accuracy. GPS data giving the location of utility lines shall be captured at a minimum of every 50 feet of straight line, and at each turn, bend or change in elevation of the line, and shall be processed as a line feature. GPS data on the location of utility features and points shall be captured using the centroid of the feature, unless signal obstruction or access prohibits. If unable to gain points, they shall be collected at a uniform distance and direction from the centroid and the offset captured in the metadata for that feature. Polygon features shall be collected at every vertex of the feature, and processed as a polygon.

All survey grade data collected shall be provided to UW in a digital format, with an attached Survey Report identifying the survey method used, equipment list, calibration documentation, survey layout, description of control points, control diagrams, quality control report, and field survey data.

Use of UW-established control points is required. A digital Survey Control Database will be produced for all survey control points established under this contract, including the horizontal and vertical order and coordinate location of each point. Where digitizing/conversion is stipulated in the contract, the Contractor shall digitize/ convert features from designated sources (including remotely sensed data, hardcopy scans and vector data) to support various GIS applications. Contractors may access the UW campus control network by first registering at <https://applications.wygisc.org/Secure/Register.aspx> and accessing the application at <http://applications.wygisc.org/campuscontrolnetwork101.aspx>.

10. University Review: The University will review the submitted data and documentation upon completion of all stated work. Missing or incomplete items will be documented and returned to the Contractor for correction. Failure to adhere to any of the stated delivery specifications could result in the rejection of the deliverables and nonpayment. Contractors shall, at a minimum, submit data and documentation samples at 25% and 75% project completion to avoid the rejection of final deliverables. Samples can be submitted via email or shared link to cloud resources.

## **SUBMITTALS**

All submittals for UW projects shall be in electronic format and searchable. Non-searchable PDFs are not permitted.

## **SITE DESIGN**

### **General**

1. The impact of icy conditions caused by shaded areas around buildings during the winter months should be considered.
2. Drainage from a roof or around a building, plaza, or recreation area, etc. shall be directed away from pedestrian ways and preferably to the south. Drainage shall be directed away from the building envelope to prevent saturation of the ground near the walls. Planters attached to buildings shall be avoided. Sidewalks in front of entrances shall be sloped so that water does not



accumulate (especially during heavy rains) and seep into the building. Grated drains have been used in the past but can fill with dirt and debris and overflow.

3. Whenever possible, protective cover over access ramps, parking, and dock facilities should be considered. Snow-melting systems may be necessary for northern exposures.
4. Fire Department access shall be provided to all UW facilities as required by code.
5. Where loading docks are included in the design, serious consideration shall be given to location, slope, and solar access. If a loading dock is located on the north side of the building or in an area with minimal solar access, a snow-melt system shall be budgeted for.
6. Adequate space for snow removal operations and the stockpiling of snow shall be provided. Snow storage locations shall be reviewed with UW Operations and indicated on site plans.
7. Space is available on the UW campus for temporary storage of surplus soil. Such storage shall be coordinated with the UW Project Manager and UW Operations. The Contractor shall dispose of the surplus soil when the project is complete.
8. Street design and specifications shall meet City of Laramie and State (i.e., Wyoming Public Works) standards.
9. All underground utilities shall be designed and constructed as required by the Wyoming Public Works Standards, the City of Laramie Public Works Standards, and Wyoming Department of Environmental Quality Rules and Regulations, latest additions, as amended by these instructions. Materials specifications shall be in accordance therewith as well.
10. The University of Wyoming must provide surface water management as outlined by the East Campus Drainage Study for the University of Wyoming and the City of Laramie, Wyoming; April 1983 and as amended by agreement between the University and the City. A drainage study based upon historical storm water runoff shall be provided for any properties of the University not contained within the above surface water drainage for each improvement. Retention and surface water control must be a part of each site development plan. Copies of the East Campus Drainage Study will be provided upon request.
11. In addition to the above standards, exterior sanitary and storm sewers shall be designed to provide the minimum slopes per WDEQ Water Quality Rules and Regulations, Chapter 11, DESIGN AND CONSTRUCTION STANDARDS FOR SEWERAGE SYSTEMS, TREATMENT WORKS, DISPOSAL SYSTEMS OR OTHER FACILITIES CAPABLE OF CAUSING OR CONTRIBUTING TO POLLUTION AND MOBILE HOME PARK AND CAMPGROUND SEWERAGE AND PUBLIC WATER SUPPLY DISTRIBUTION SYSTEMS. See Section 21300 of the UW Construction Standards for minimum slopes.

Exceptions to the above will be dealt with on a case-by-case basis.

12. For existing facilities whose sewer systems are being modified and the underground sewer piping material is older cast iron, water closets and urinals with the 1.6 gpf flow rates. An

engineering investigation of the pipe condition, including cameraing the below slab mains, type and slope will be required to make a final determination.

13. Gratings in sidewalks shall be traffic-rated for snow removal and maintenance trucks and be suitable for pedestrian use (i.e., accommodate a ¼" high heel).
14. Space shall be provided for bike racks to accommodate 6% of the building occupants or as required by code. Bike racks shall be Madrax/ Belson Outdoors "Triton" in bronze powder coat finish, or substitutions approved by the UW Project Manager and UW Operations.
15. Cigarette receptacles will be dealt with on a case by case basis between the Owner and Consultant.
16. Exterior trash/ recycling enclosures shall be considered. Need, location, access and sizing shall be coordinated with UW Operations. Exterior building materials for trash enclosures shall match those of the main building.
17. Where possible, main building entrances and access ramps shall have exposure to the sun, and drainage shall be routed away from entrances and access ramps to eliminate ice build-up in the winter.
18. Colored concrete (meeting City of Laramie requirements) shall be provided at curb cuts.

### **Building Floor Elevation**

The first floor levels of buildings shall normally be at sidewalk grade level so that stairs or ramps are not required. All exterior ramped sidewalks and stairs shall meet the requirements of the 2010 ADA Standards for Accessible Design.

### **After-Hours Entrance**

The University will designate one entrance to each building as its after-hours entrance. The after-hours entrance shall be well lit, located on an accessible route to parking facilities, and will typically be equipped with an automatic door operator. The after-hours entrance shall be provided with a proximity/ card reader with key override and be connected to the campus door access control system. A recess-mounted Knox-Box shall be provided in an exterior wall at this location. Knox-Box placement must be approved by the UW Project Manager and the City of Laramie Fire Department.

### **Service and Emergency Access**

Access shall be provided for service and delivery vehicles. The width and capacity of roadways and walks shall be designed to accommodate anticipated vehicle sizes and weights. Access shall be provided to buildings for emergency vehicles per the requirements of the Authority Having Jurisdiction.

### **Concrete Sidewalks**

Concrete sidewalks shall be wide enough to accommodate pedestrians and bicycle traffic—6'-0" minimum. Sidewalks shall be designed to accommodate snow removal by mechanized plows or brooms. They shall be designed to support the weight of any vehicles that can be expected to drive on the walks. Concrete sidewalks shall slope away from buildings—two percent (2%) slope preferred, five percent

(5%) slope maximum. A medium broom-finish shall be provided on concrete walks. Single steps shall be avoided.

### **Exterior Stairs**

Exterior stairs should be avoided due to icing, safety and maintenance concerns—especially when part of an egress system. Where unavoidable, the following standards shall be employed:

Exterior concrete stairs shall have 12-inch treads (minimum) and six-inch risers (maximum). Stair treads shall be sloped two percent (2%) toward the nosings for drainage. Stair landings shall have ¼-inch-per-foot slope for drainage. A medium broom-finish shall be provided on stairs and landings. Dense, air-entrained concrete shall be provided for proper coverage of steel reinforcing. Metal pan stairs or pre-cast concrete stairs shall only be used in exterior applications where the stairs are protected from the weather.

### **Concrete and Steel Site Elements**

At low walls, benches, etc., one-inch (1") chamfered edges shall be provided to discourage property damage by skateboarding and similar activities. Devices such as "Skatestoppers" (see [www.skatestoppers.com](http://www.skatestoppers.com)) may be provided at walls and stair handrails if they are deemed necessary to decrease property damage.

### **Parking Lot Layout**

Parking lot layout shall meet the requirements of Table 15.14.030-4: Parking Angle Dimensions in the City of Laramie *Unified Development Code*. The standard color for painted striping is white. Accessible parking spaces shall be provided per the requirements of the ADA and International Building Code (IBC).

### **Parking Lot Lighting**

A minimum of 0.2 foot-candles to a maximum of 0.5 foot-candles of illumination shall be provided in all parking lots. LED light sources shall be specified for parking lot lighting. The ground-to-lamp height shall per City of Laramie *Unified Development Code*. Light fixtures shall be IDA-approved.

### **Vehicle Proximity to Fresh Air Intakes**

Locating parking and loading areas near fresh air intakes of buildings shall be avoided to prevent exhaust fumes from being brought into the building via the HVAC system. See section on Wind Tunnel Testing for requirements for exhaust and intake air location determinations.

### **Site Limits**

The site limits shall extend to logical termination or transition points. Site and landscape repair shall include areas where utility connections and trenching work are to be performed. Site limits shall not divide an existing planting area; the new landscape treatment shall extend into the remainder of the planting area.

### **Site Furnishings**

The following site furnishings shall be included in major construction projects:

- Benches – Victor Stanley "Steelsites" FRB-6 Series, surface mount. Color: Victor Stanley Bronze.
- Bike racks – Madrax/ Belson Outdoors "Triton".

- Trash receptacles - Victor Stanley “Ironsites” Model SD-42 with rain bonnet lid.

**Site Lighting**

A minimum of 0.5 foot-candles to a maximum of 2 foot-candles of illumination shall be provided on all exterior walkways. Exterior ambient light levels in non-pedestrian areas shall be one (1) foot-candle (maximum).

A sandstone base (with square foundation) shall be provided at pole-mounted pedestrian lights on Prexy’s Pasture and in select, prominent locations on campus. The University shall be consulted regarding applicability of this requirement.

**MECHANICAL AND ELECTRICAL DESIGN**

Schematics showing the air, heating water, chilled water, process water, natural gas and domestic water flow shall be included in the mechanical and plumbing drawings.

A statement of how the supply air, exhaust air, and return air quantities will be controlled (i.e., flow measuring, offset, etc.) shall be provided in the Design Development submittal.

The building energy usage levels below for both new building and major renovation projects are the maximum KBTU/SF-YR the University expects to achieve. The consultant team shall use these levels as a basis of design.

<b>Building Type</b>	<b>Criteria</b>	<b>KBTU/SF-YR (includes all electricity, gas, steam or hot water, chilled water usage)</b>
Typical B-2 occupancy including administration, classrooms and gymnasiums	General	50
Laboratory Buildings	With 100 fume hoods per 100,000 SF	150
Laboratory Buildings	With 80 fume hoods per 100,000 SF	130
Laboratory Buildings	With 40 fume hoods per 100,000 SF	100

With input from and review by UW Operations, the MEP Engineer shall provide the HVAC design for the project, including all necessary equipment (new, existing and/or modified) with a sequence of control and the required drawings and specifications. On certain (typically smaller) projects, UW Operations will procure and install the Building Automation System (BAS) controls equipment, with the funding for this work coming from the Project. This decision will be made at the beginning of the Construction Document phase. For those projects, UW Operations will complete an on-site investigation, develop a scope of work, and provide a cost estimate for the proposed BAS system installation. For other (typically larger) projects, the BAS system installation will be performed via a controls contract with the General Contractor, with UW Operations providing the necessary head-in equipment for the Project and having major input into the architecture and sequence of control.

Plumbing chases shall provide adequate access for servicing the components. In general, for a back-to-back chase between two major restrooms, the chase access needs to be as wide as possible (24" wide door x 5' high door minimum). Other chases shall have a minimum 24" x 24" access door.

Building chilled water systems shall have a 20° F. water temperature rise as a basis of design (41-61).

Building heating systems shall be designed for 125° F. entering water temperature. If steam is used, a flash tank shall be provided as part of the system. In general, 125 psig steam condensate shall be flashed to a 60 psig system, 60 psig steam shall be flashed to a 15 psig system, and 15 psig steam is tied to the condensated return system. Atmospheric venting of steam shall be minimized. This may require the installation of a lower pressure heat exchange system within in the building.

Buildings shall have a back-up gas-fired hot water boiler for summer use, including back-up domestic water generation.

In multiple-fan array systems, individual motors shall be a minimum of 10 horsepower and on separate Variable Frequency Drives (VFDs). Drive speeds shall be below 66 Hz.

Electrical modeling for Arc-Flash shall be performed using ETAP software or be compatible with ETAP. The results shall be inputted into UW's system model. If needed, the University will loan the software dongle to the consultant for this work. Training is available from ETAP. Software compatible with ETAP are:

- SKM PowerTools® - Dapper®/ Captor™ PTW32
- ESA EasyPower®
- Siemens PSS®E

LED lighting shall be used throughout new and renovated facilities and shall have the capability of dimming via a 0-10VDC signal, if needed. A minimum of two (2) fixture models from different manufacturers shall be specified for all fixture types on the fixture schedule. The two models specified shall not be represented by the same company.

The UW Operations Building Automation System (BAS) Team shall be consulted regarding what lighting control system is to be specified. Each new facility shall only have one manufacturer utilized throughout the facility.

### **Life-Cycle Cost Analyses**

The Architect-Engineer shall perform life-cycle cost analyses to quantify 20-year impacts of energy costs, operational costs, greenhouse gases, etc. using the current version of the National Institute of Standards and Technology (NIST) Building Life Cycle Cost (BLCC) program at the Schematic Design, Design Development, and Construction Documents project milestones.

### **Energy Modeling**

The Architect-Engineer shall use eQuest, Energy Plus, or compatible plug-ins for REVIT or other BIM platforms to model proposed building designs, assist with life-cycle costing, estimate greenhouse gas (GHG) emissions, and facilitate future measurement and verification. At a minimum, reports with the requirements stated below shall be provided at the following project milestones:

1. Schematic Design: Initial modeling results of massing, orientation and/or major HVAC systems with sensitivity analysis.
2. Design Development: Multiple parametric runs comparing options of systems and strategies as determined in the initial and/or subsequent integrated designs.
3. Construction documents: Complete design and base case models used for LEED and/or code compliance verifications.

## **LANDSCAPE DESIGN**

### **Landscape Design Principles**

The design of campus landscapes shall adhere to the following principles:

- Campus landscapes shall be designed to require low maintenance.
- Campus landscapes shall be designed to conserve irrigation water.
- Drought-tolerant plant materials shall be used wherever possible.
- Drip irrigation shall be used wherever practical, especially in parking lots and close to buildings.
- For new planting areas, pre-emergent weed control shall be provided beneath the landscape mulch.
- Grass shall only be used in areas that are large enough to easily maintain.
- Concrete mow strips shall be provided where lawn abuts planted areas.
- In general, any irrigated landscaping shall be held back from building perimeters a minimum of 3'-0".
- Care shall be taken to prevent irrigation water from spraying onto light pole bases, transformers and other electrical equipment.

### **Trees**

New trees shall be a minimum 2½"-3" in caliper. Trees that bear excessive fruit or seedpods shall be avoided. Trees shall be placed a sufficient distance from buildings, sidewalks and other structures to permit proper growth when mature and to avoid damage to walks and foundations.

Tree and plant materials that are to remain or be relocated shall be protected during construction to avoid damage from construction activities, lack of water, and freezing. The area within the drip line of all existing trees shall be protected from construction equipment and any construction activities that will result in soil compaction. The Contract Documents shall include a standard detail for protecting existing trees.

### **Landscape Mulch**

Landscaping mulch and placement shall be designed to minimize future unwanted plant growth (weeds and grasses) and accumulation of trash. Areas to receive mulch shall be raked smooth and clear of all obstacles that would penetrate weed barrier. Weed barrier shall be installed in a manner to completely cover the area to receive the mulch.

The use of mineral mulch shall be limited to a 5'-wide strip adjacent to buildings, unless approved by the University Architect. Mineral mulch shall be a minimum 2" diameter rounded rock with smooth edges. Mineral mulch shall be washed and be free of fines and dirt.

Shredded bark mulch shall only be used in areas where the use of mineral mulch is not practical or does not provide the required aesthetic design considerations. Bark mulch shall be treated with a sealer product to defend against UV ray and weather degradation and a binder product to prevent wind and water erosion in the landscaped areas

## **EXTERIOR BUILDING FINISHES**

### **Brick**

When brick is used on the exterior of a building, a single color of brick shall be used. Brick color shall be based on the campus standard brick colors, or match the brick on existing buildings in the vicinity of the project site. The use of dark brown brick must be approved by the University Architect, except on additions to existing buildings having dark brown brick.

### **Pre-finished Metal**

The use of pre-finished metal with concealed fasteners is preferred for exterior trim, soffits and copings. Dark metals can get very hot (180° F.) so materials with low absorption coefficients shall be used. The use of wood exterior trim is discouraged.

### **Prohibited Materials**

The use of Exterior Insulation and Finish Systems (EIFS) is prohibited. The use of cement stucco with synthetic finish color coat is allowed. The use of concrete masonry units (CMU) as an exterior finish material is generally discouraged.

### **Joints**

Sealant and caulk joints shall be no wider than necessary. Details shall be provided for control and sealant joints and the intersection of different building materials. Butt joints with width to depth ratio in accordance with the Sealant, Waterproofing and Restoration Institute shall be the standard method of installation.

## **EXTERIOR CONSIDERATIONS**

### **Building Envelope Commissioning**

All UW capital construction projects will include Building Envelope Commissioning. The University will contract directly with a third-party building envelope commissioning agent for each project. Design teams are required to participate in the commissioning process, including the incorporation of design review comments prepared by the commissioning agent. The commissioning process and building performance tests shall adhere to the following standards:

1. National Institute of Building Sciences (NIBS) Guideline 3-2012 – “Building Envelope Commissioning Process”
2. ASHRAE Guideline 0-2005: “The Commissioning Process”
3. ASTM E779 “Standard Test Method for Determining Air Leakage Rate by Fan Pressurization”
4. ASTM E783 “Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors”

5. ASTM E1105 “Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference”
6. ASTM E1827 “Standard Test Methods for Determining Air Tightness of Buildings Using an Orifice Blower Door”

### **Designing for Extreme Temperatures**

Due to issues experienced in campus buildings during periods of extremely cold temperatures, the building envelopes of new buildings and additions shall be designed to meet the requirements of the most recently adopted version of the International Energy Conservation Code. Particular attention shall be given to:

1. Air barriers (see ¶C402.4).
2. Recessed lighting fixtures in the building envelope (see ¶C402.4).

The air barrier design shall comply with ¶5.4.3.1.1; and the Air Barrier Installation shall comply with ¶5.4.3.1.2 of the most recently adopted version of the ASHRAE Standard 90.1-2010, Energy Standard for Buildings Except Low-Rise Residential Buildings. The air barrier shall be indicated on wall sections and details of the construction documents with a bold solid or dashed line.

### **Building Airtightness**

The basic airtightness requirements and processes for UW projects follow:

1. The Architect shall clearly identify the boundary limits of the building air barriers and of the portion or portions of the building to be tested for building airtightness on the construction documents. All air barrier components of each envelope assembly shall be approved by UW and clearly identified on the construction documents. The joints, interconnections, and penetrations of the air barrier components shall be detailed.
2. The air barrier materials of each assembly shall be joined and sealed to the air barrier materials of adjacent assemblies, allowing for the relative movement of these assemblies and components. Air barrier continuity shall be clearly identified on the plan and section construction drawings.
3. Details shall be provided to seal all penetrations of the air barrier assembly, including but not limited to electrical, plumbing and HVAC components; windows and doors; and compatibility of materials with one another.
4. Details shall be provided which illustrate integration of air barrier materials at all transitions (e.g., roof-to-wall, wall-to-floor, building expansion joints, exterior doors and windows, parapet copings, etc.).
5. The air barrier shall be supported so that it will withstand the maximum positive and negative air pressures that will be placed on the building without displacement or damage, and transfer the load to the structure. The air barrier assembly shall be sufficiently durable to last the anticipated service life of the envelope.
6. Attention shall be paid to details at the roof assembly to the exterior wall and at soffit and canopy locations. Thermal breaks shall be avoided by bridging the construction with spray foam insulation in lieu of insulating and air sealing the parapet or soffit/canopy which lies outside of the exterior wall and conditioned space.



## Building Mockups

Building mockups shall include representative conditions of the exterior wall systems and curtain walls. If exterior shading devices are included in the architectural design, the shading device shall be included in the building mockup. All materials included in the mock-up shall be full scale.

## Daylighting

The utilization of daylighting techniques in building design is encouraged if there is an acceptable payback. On roofs, clerestory windows are preferred over skylights.

## Sun Control

Sun control and shading devices (such as overhangs, horizontal sunshades or electrochromic glazing) should be utilized to control excessive solar gain. Sun control and shading devices should be provided at east- and west-facing windows to control solar gain in the early morning and late afternoon hours during the summer months. Horizontal shading devices should be provided at south-facing windows to control solar gain in the summer (when sun angles are high) but permit passive heating in the winter (when sun angles are lower). High performance glazing shall be utilized where heat gain is an issue.

## Gate Latches at Exterior Enclosures

Gates at exterior enclosures such as trash enclosures and equipment yards shall be provided with a lock-latch similar to that at the trash enclosure of the Information Technology Building, rather than drop rods. Below are examples of successful installations at UW.



## Computer Modeling

For new buildings and major additions, computer modeling of daylighting, sun control, and solar gain shall be provided. Mechanical systems shall not be relied upon to compensate for uncontrolled solar gain. For laboratory buildings with fume hood exhaust systems, computer modeling shall be used to dictate the parameters of the exhaust discharge so it will not be re-ingested into surrounding facilities.

## Wind Tunnel Testing

Wind tunnel testing is required for each new laboratory building and shall include a wind-responsive exhaust study. The exhaust study shall take into consideration all air intakes, building lab exhausts, and generator exhausts for all buildings in the area (including the proposed laboratory building).

## Operable Windows

Operable windows are acceptable on upper levels of multi-story buildings and shall be integrated with HVAC control systems for energy conservation. Operable windows shall be avoided on the ground floor of buildings for security reasons.

### **Bird Roosting/ Nesting Places**

Conditions where birds can roost or nest shall be avoided, if unavoidable bird control measures must be utilized. Pigeons and turkey vultures have become a major nuisance at several campus buildings. Large glazed areas can kill many birds. Design teams shall consult with UW Operations regarding how they will reduce the bird impact.

## **ROOFTOP ACCESS AND DESIGN**

### **Interior Stair**

If a mechanical penthouse is provided, an elevator to a mechanical penthouse is the preferred means of access to the penthouse. Where elevator access to a mechanical penthouse cannot be provided, an interior stair to the roof penthouse is the next preferred means of roof access.

### **Roof Hatch**

If an elevator or stair cannot be provided for roof access, a roof hatch with a stair or ladder is the third-preferred means of roof access. Where a ladder is provided for roof access, a handrail or ladder extension shall be provided as required by the applicable codes or regulations (including OSHA). Ship's ladders shall not be used for roof access.

### **Parapets**

For buildings with "flat" or low-slope roofs, parapets shall be provided to guardrail height (42 inches above roof level) wherever possible. Where it is not possible for parapets to be provided, fall protection measures shall be provided.

### **Fall Protection**

Fall protection anchorages shall be provided on all roofs per OSHA requirements.

### **Window Washing Anchors**

On buildings over two stories in height, a window washing system (utilizing a swing stage scaffold) shall be provided. The window washing system shall include safety tie-off anchors. The use of permanent window washing equipment should be considered on high-rise buildings.

### **Roof Penetrations**

The number of roof penetrations shall be minimized. Clerestory windows are preferred over skylights.

### **Rooftop Mechanical Equipment**

If provided, rooftop HVAC units shall be located in roof-top enclosures. Where this is not feasible, rooftop HVAC units shall be located away from the roof perimeter to minimize visibility of the units from grade level and to avoid the need for fall protection while performing maintenance. Access to rooftop HVAC units shall be provided per OSHA requirements. Special consideration shall be given to the height

of HVAC equipment above the roof deck, clearances for maintenance and operation, snow ingestion, and fumes from exhaust systems and/or generators. Intake vents shall be located to avoid the recirculation of exhaust air, taking into consideration site-specific wind patterns. Access for maintenance shall not require the removal of unit panels. All piping, wiring, etc. to the units shall be chased from below the roof and then up through the roof curb or mechanical equipment enclosure. Services shall not be run across the roof.

## **INTERIOR FINISHES**

### **Corridor Flooring**

Corridor flooring shall be vinyl composition, porcelain or ceramic tile, burnished/polished concrete or other durable low-maintenance flooring approved by the UW Project Manager.

### **Chair Rails**

Chair rails shall be considered in the design of meeting and conference rooms.

### **Corner Guards**

Corner guards shall be provided in high traffic areas such as corridors.

### **Wall Coverings**

The use of wall coverings is discouraged.

### **Carpet**

Specifying carpet with recycled content and carpet that can be recycled in the future is encouraged. Provide 2% of each type, color, texture and pattern for future use. Provide rolled goods in full width rolls.

### **Walk-Off Mats**

C/S "Peditred" or C/S "Gridline" or similar product shall be provided for walk-off mats. Mats shall be removable for cleaning, approximately 60-80 square feet in area, and installed in recessed areas with hard surfaces and/or metal trim surrounding them.

## **INTERIOR CONSIDERATIONS**

### **General**

Classrooms and other high traffic areas should be located on the ground floor and near main entrances, wherever possible. Faculty offices and other spaces with relatively low traffic should be located on the upper floors of multi-story buildings.

### **Atriums**

If an atrium is proposed for a new building, limit the height of the atrium to two stories to avoid the IBC requirement for a smoke evacuation system.

Atrium railings adjacent to fixed furnishings shall be designed for fall protection from the top of the writing or sitting surface, rather than floor height.

### Recycling Bins

Recycling bins shall be provided in new buildings and major addition and renovation per the following chart:

Location	Quantity & Stream	Notes
On every floor	One (minimum) triple-compartment (LANDFILL, MIXED PAPER, BOTTLES & CANS)	Locate where bin can be seen when entering the building/floor from every direction.
In open computer labs	One single-compartment (MIXED PAPER), or one double-compartment (MIXED PAPER, LANDFILL)	
In designated vending machine areas	One single-compartment (BOTTLES & CANS), or one double-compartment (BOTTLES & CANS, LANDFILL), or one triple-compartment (LANDFILL, MIXED PAPER, BOTTLES & CANS)	

Recycling bins shall be Max-R® interior recycling/garbage bins customized to accept Toter® model #79232 32-gallon cart with the following options:

Roof Style: Vail  
 Opening Location: Top Load  
 Panel Color: Grey (*may be changed to coordinate with facility design if desired*)  
 Trim Color: Carmel (*may be changed to coordinate with facility design if desired*)

If split colors are used, the following colors shall be used:

- MIXED PAPER - White lettering on green panel
- BOTTLES & CANS - White lettering on blue panel
- LANDFILL - White lettering on gray panel

Custom or built-in bins may be provided in lieu of Max-R bins if desired, but the bins shall be designed to accept Toter model #79232, 32-gallon cart.

### Door Hardware

When specifying door hardware for classroom doors, consideration should be given to providing the capability to lock the door from inside the classroom without a key.

### IT Room

In larger new buildings having multiple technology classrooms, consideration shall be given to including an IT room or office.

### Audio/Visual Systems

The design of audio-visual (A/V) systems shall be coordinated with UW Information Technology (IT). Classroom Technology Systems (CTS) will provide product selections for classroom technology (i.e., digital projectors, document cameras, podiums, etc.) to the A/V Consultant. The A/V Consultant shall ensure that any backing or structural support required for A/V equipment is included in the construction documents. Podiums shall be specified by CTS or designed to meet ADA requirements.

For responsibilities for provision and installation of Audio/Visual IT, and security equipment and systems, see the AV/IT/Security Matrix at:

[http://www.uwyo.edu/uwops/\\_files/construction\\_standards\\_guidelines/av-it-security\\_integration\\_matrix\\_november\\_2016.pdf](http://www.uwyo.edu/uwops/_files/construction_standards_guidelines/av-it-security_integration_matrix_november_2016.pdf)

### **Card Access System**

The UW standard for door access control software is Blackboard®. This software is licensed through UW Auxiliary Enterprises, and managed by the UW Campus ID Office. Design for the Blackboard system shall be coordinated with UW IT and the Planning Team to verify access needs. For doors with access controls, the master controller, door controller, card reader, and security multiplexer will be ordered through UW IT and installed by the Contractor. Door hardware required for the access control system (such as electric latch retraction rim device, electric power transfer, power supply, door position switch, etc.) shall be provided and installed by the Contractor (see UW Construction Standards). In the construction documents, the A/V Consultant shall include the infrastructure for Blackboard at the after-hours entrance and as directed by the Planning Team for special conditions. Blackboard operation shall interface with the ADA door operators.

### **Security Cameras**

Design for security camera systems shall be coordinated with UW IT, UW Police, and the Planning Team. In the Construction Documents, the A/V Consultant shall include the infrastructure for security cameras in corridors near the principal building entrances and as directed by the Planning Team for special conditions. The A/V Consultant shall ensure that any backing or structural support required for security cameras is included in the construction documents. Security camera systems will typically be installed by UW IT.

### **Emergency Responder Radio Coverage**

Emergency Responder Radio Coverage (ERRC) shall be provided in new buildings and major renovations per the International Building code. ERRC testing shall be performed when construction is nearly complete. Preliminary testing may be performed earlier, particularly on existing buildings that are being expanded.

### **Attic Stock Storage**

In new buildings and major renovations, a 100 SF of space shall be provided to store “attic stock” for such materials as resilient flooring, carpet tiles, etc. Typically this space would be in a penthouse or basement mechanical room.

### **Storage of O&M Manuals**

In the design of buildings, provision shall be made for the storage of O&M manuals. A designated shelf or storage cabinet shall be provided within a major electrical/ mechanical room.

## **Main Stairways**

The main stairway between the first and second floors of multi-story buildings shall be open, inviting, visible from the main entry and lobby, and ample in width to encourage use of the stair.

## **Interior Stairways**

Exposed surfaces shall be painted or finished in appearance (including the underside of stairs). Interior stairways shall be well lit. Windows providing natural light are desirable in stairways.

## **Elevators**

Every multi-story building shall be served by a minimum of one elevator to provide accessibility. In larger multi-story buildings, it may be desirable to provide a second elevator hoistway and larger machine room to accommodate a future elevator. One elevator in each multi-story building shall be sized to accommodate the anticipated furniture, furnishings and equipment, as well as standard building materials as verified by the user group and the UW Project Manager. Major mechanical penthouses shall be served by an elevator whenever possible.

## **Hand-Held Showers**

When a shower is provided in an academic building, the shower shall be equipped with a hand-held shower head.

## **Paint Colors for Hollow Metal Door Frames**

In general, the Campus Standard paint color for hollow metal door frames is Sherwin-Williams "Urbane Bronze" #SW 7048, or equivalent. Facilities for Residential Life and Dining Services may have a different standard paint color for hollow metal door frames.

## **Regulatory and Door Signage**

Campus standards have been developed for regulatory and door signage, utilizing these standards is strongly encouraged. If the project deviates from the standard signage the department will be responsible for the costs of future modifications to the custom regulatory and door signage.

## **Fire Suppression**

The following guidelines shall be employed in the design of fire suppression systems:

- Wherever possible, piping shall be concealed above ceilings or behind walls where it is less subject to damage from horseplay, use as an exercise bar, or as a support for hanging items.
- When overhead piping is exposed in areas with student access, the hangers shall be spaced closer together to provide additional support.
- When standard (rather than concealed) heads are used in corridors, the arms or frame of the head shall be oriented parallel to the hallway length so the arms protect the link from damage due to items being moved or thrown.
- Wherever possible, concealed heads shall be installed. When mounted flush with the ceiling and covered with a flat round plate, these sprinklers are less susceptible to damage from being knocked or struck, and do not provide an easy place to hang clothes, decorations, and other items.

- Sprinkler heads shall be installed in large closets, attic spaces, and other areas that may be used for storage.
- Separate sprinkler shut-off valves shall be provided for each floor (or other area less than the entire building) to facilitate turning off the water if a sprinkler is damaged.

## **CLASSROOM DESIGN GUIDELINES**

### **General**

The information in these guidelines describes preferences and minimum standards that shall be incorporated into the design of seminar rooms, small classrooms, large classrooms, lecture halls, and Active Learning Classrooms in new or renovated facilities. In renovation projects, some variation from these standards may be necessary due to the location of existing building elements. When this occurs, the resulting design should be carefully evaluated to ensure that a fully useable and effective space for learning activities is provided. The matrices that follow provide general requirements for the various types of classrooms. More specific requirements for classroom design follow the matrices.

### **Seminar Rooms**

Seminar rooms are for small classes, usually of less than 20 students, where teaching is generally conducted in a discussion format (see chart on the following page). Seminars are usually held for upper division undergraduate and graduate classes. Seminar rooms shall be equipped with movable tables and chairs that may be reconfigured by the instructor. Seminar rooms will typically not have a formal instructor's station, although one wall should have a marker/glass/chalk board, projection screen, and telephone/data connections. Seminar rooms often double as conference or meeting rooms.

### **Small Classrooms**

Small classrooms vary in size from about 20 to 39 student stations (see chart on following page). These classrooms are small enough to permit flexibility in seating arrangement and can accommodate various teaching formats—discussion, small group interaction, demonstration, and lecture. Small classrooms are usually equipped with movable student seating, either tables and chairs or tablet-arm chairs. Small classrooms shall have an identifiable teaching wall with marker/glass/chalk board, one or more projection screens, and telephone/data connections. An instructor's station with desk or table, chair, and table or floor lectern shall be located near the teaching wall.

### **Large Classrooms**

Large classrooms vary in size from about 40 to 79 student stations (see chart on following page). Classrooms of this size are usually equipped and configured for instruction in the lecture format. At the upper end of the size range, sloped or tiered floors should be considered to improve sight lines. Fixed seating, either at tables or tablet-arm chairs may be required to maintain aisle widths required by fire and life-safety codes. Large classrooms shall have one identifiable teaching wall with main marker/glass/chalk board, one or more projection screens, and telephone/data connections, and controls. An instructor's station with desk, table, or podium (which may be equipped with lighting, sound, and audio-visual equipment controls) shall be located near the teaching wall.

### **Lecture Halls**

Lecture halls have a student seating capacity of 80 or more, fixed seating, sloped or tiered floors, and are often specially shaped for acoustical and line-of-sight considerations. The size of lecture halls usually necessitates the use of audio and visual reinforcement. For this reason, specialists in acoustics and audio-visual equipment should be included on the design team for lecture hall facilities. Very large lecture halls, sometimes referred to as “teaching auditoriums”, may have a stage or platform presentation area and can serve as a performance venue.

**Active Learning Classrooms**

Active Learning Classrooms utilize many different teaching techniques and classroom settings and may require exceptions the above requirements, such as those relating to a teaching wall and instructor’s station. Active Learning Classrooms typically embody the following concepts:

- Cooperative learning environments that encourage student collaboration and peer teaching.
- Technology that allows students to easily present work for review by peers and instructors.
- Furniture designed to facilitate small-group work.
- The ability for instructors to interactively coach students during activities.
- New options for student interaction and class structure.

**SEMINAR ROOMS**

<b>General Guidelines</b>	<b>Parameters</b>
Student Station Capacity	12-19
Square Feet/Student Station	20-30 (at tables)
Square Footage	240-570
Aspect Ratio (Length/Width)	0.6 to 1.5
Min. Angle of Incidence	20°
Max. Horizontal Viewing Angle	120°
<hr/>	
<b>Instructional Guidelines</b>	
Clear/Teaching Area	6’ minimum
Preferred Seating	Movable tables and chairs with arms
Marker/Chalk Boards	Maximize at teaching walls within angular parameters.
Projection Screen	8’ maximum width at teaching wall
<hr/>	
<b>Room Configuration Guidelines</b>	
Wall Planes	Parallel
Floor Plane	Flat
Ceiling Plane	Flat
Ceiling Height	9’ minimum
Entrances	Avoid locating on teaching wall.
Windows	Operable, if used. Provide roller screens for light control.
<hr/>	
<b>Finishes</b>	
Walls	Gypsum board with smooth Level 4 finish and satin/eggshell paint. Chair rail on side and rear



Floor	walls. Vinyl composition tile, carpet or carpet tiles.
Ceiling	Acoustical panel ceiling system or gypsum board with light-colored, non-reflective paint.
Acoustics	Ambient noise not to exceed 35db. Wall sound transmission coefficient (STC) 50 minimum.

**Utilities & Systems**

Lighting	LED required. 30 fc minimum at work surfaces; dimmable to 5 fc for projector or video use.
Electrical	See UW Classroom Technology & Design Guidelines.
Audio/ Visual/ Telecommunications	See UW Classroom Technology & Design Guidelines.
Environmental	Temperature and ventilation as per ASHRAE.

**SMALL CLASSROOMS**

**General Guidelines**

Student Station Capacity
Square Feet/Student Station
Square Footage
Aspect Ratio (Length/Width)
Min. Angle of Incidence
Max. Horizontal Viewing Angle

**Parameters**

20-39
18-30 (varies with seating capacity)
975 maximum
0.75 to 1.2
30° desirable
90° desirable

**Instructional Guidelines**

Clear/Teaching Area	8' minimum
Preferred Seating	Option 1: Movable tablet-arm chairs (10% LH) Option 2: Movable tables and chairs
Marker/Chalk Boards	Maximize at teaching walls within angular parameters; additional walls if required.
Projection Screen	8' maximum width at teaching wall

**Room Configuration Guidelines**

Wall Planes	Parallel
Floor Plane	Flat
Ceiling Plane	Flat
Ceiling Height	9' minimum
Entrances	One in rear 2/3 of room. Avoid teaching wall.
Windows	Operable, if provided. Provide roller screens for light control.

**Finishes**

Walls	Gypsum board with smooth Level 4 finish and satin/eggshell paint. Chair rail on side and rear
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Floor	walls. Vinyl composition tile, carpet or carpet tiles.
Ceiling	Acoustical panel ceiling system or gypsum board with light-colored, non-reflective paint.
Acoustics	Ambient noise not to exceed 35 db. Wall STC 50 minimum.

**Utilities & Systems**

Lighting	LED required. 30 fc minimum at work surfaces; dimmable to 5 fc for projector or video use.
Electrical	See UW Classroom Technology & Design Guidelines.
Audio/ Visual/ Telecommunications	See UW Classroom Technology & Design Guidelines.
Environmental	Temperature and ventilation as per ASHRAE.

**LARGE CLASSROOMS**

**General Guidelines**

	<b>Parameters</b>
Student Station Capacity	40-79
Square Feet/Student Station	16-22
Square Footage	640 to 1,740
Aspect Ratio (Length/Width)	0.75 to 1.3
Min. Angle of Incidence	30° desirable
Max. Horizontal Viewing Angle	90° desirable

**Instructional Guidelines**

Clear/Teaching Area	12' minimum
Preferred Seating	Option 1: Movable tablet-arm chairs (10% LH) Option 2: Movable tables and chairs
Marker/Chalkboards	Maximize at teaching walls within angular parameters; additional walls if required.
Projection Screen	12' maximum width at teaching wall

**Room Configuration Guidelines**

Wall Planes	Parallel
Floor Plane	Flat, sloped or tiered, depending on capacity, size and configuration.
Ceiling Plane	Generally flat, but may be shaped for acoustical purposes in upper size range.
Ceiling Height	9' minimum
Entrances	Avoid locating on teaching wall.
Windows	Operable, if provided. Provide roller screens for light control.

**Finishes**

Walls	Gypsum board with smooth Level 4 finish and
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Floor	satin/eggshell paint. Chair rail on side and rear walls if movable seating is used.
Ceiling	Vinyl composition tile, carpet or carpet tiles.
Acoustics	Acoustical panel ceiling system and/or gypsum board with light-colored, non-reflective paint. Ambient noise not to exceed 35 db. Wall STC 50 minimum.

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**Utilities & Systems**

Lighting	LED required. 30 fc minimum at work surfaces; dimmable to 5 fc for projector or video use.
Electrical & Telecommunications	See UW Classroom Technology & Design Guidelines.
Environmental	Temperature and ventilation as per ASHRAE.

## LECTURE HALLS

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### General Guidelines

Student Station Capacity	80 and over
Square Feet/Student Station	8-22 (varies with seating capacity and style)
Square Footage	1,200 minimum
Aspect Ratio (Length/Width)	Established by acoustical and audio-visual consultants
Min. Angle of Incidence	30° desirable
Max. Horizontal Viewing Angle	90° desirable

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### Parameters

### Instructional Guidelines

Clear/Teaching Area	Determined by audio-visual requirements.
Preferred Seating	Option 1: Fixed tablet-arm chairs (10% LH) Option 2: Fixed tables and swing-away chairs Option 3: Theatre seats with folding tablet arms (10% LH).
Marker/Chalkboards	Consider double- or triple-hung motorized lighted boards.
Projection Screen	Type, size and placement as determined by A/V requirements.
Projection Room	Separate room accessible from lecture hall and corridor. Layout determined by A/V and acoustical requirements.
Preparation Room	Consider room adjacent to teaching area for demonstration set-ups and equipment storage.

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### Room Configuration Guidelines

Wall Planes	Determined by audio-visual and acoustical requirements.
Floor Plane	Sloped or tiered, as determined by A/V, acoustical and sight-line requirements.
Ceiling Plane	As determined by A/V and acoustical requirements.
Ceiling Height	9' minimum
Entrances	Multiple entrances as required by code. Consider "light lock" design.
Windows	May not be desirable. Determined by A/V and acoustical requirements.

### Finishes

Walls	Gypsum board with smooth Level 4 finish and satin/eggshell paint. Finishes should be selected in coordination with acoustical designer.
Floor	Vinyl composition tile, carpet or carpet tiles selected in coordination with acoustical designer.

Ceiling	Tiles selected in coordination with acoustical designer.
Acoustics	Ambient noise not to exceed 35 db. Wall STC 50 minimum. Acoustician to be part of design team.

**Utilities & Systems**

Lighting	LED required. 30 fc minimum at work surfaces; dimmable to 5 fc for projector or video use.
Electrical	See UW Classroom Technology & Design Guidelines.
Audio/ Visual/ Telecommunications	See UW Classroom Technology & Design Guidelines.
Environmental	Temperature and ventilation as per ASHRAE for room type.

**Whiteboards/Chalk Boards**

Whiteboards or glassboards are preferred over chalkboards. Chalkboards shall be provided only where specifically requested by an academic department. Consideration should be given to locating a whiteboard/glassboard on a side wall(s), in addition to the teaching wall. Projection screens shall not cover or overlap whiteboards/glassboards. The length of whiteboard/glassboard units that are specified shall be limited to the length of unit that could be transported to the room if replacement is necessary.

**Classroom Doors**

All classroom doors shall have either a sidelight (preferred) or vision panel in the door.

**LABORATORY DESIGN GUIDELINES**

**General**

The matrices that follow provide general requirements for teaching and research laboratories. More specific requirements for laboratory design follow the matrices.

**TEACHING LABORATORIES**

<b>General Guidelines</b>	<b>Parameters</b>
Student Station Capacity	Confirm requirements with academic department.
Square Feet/Student Station	25-54 (depending on academic department)

**Room Configuration Guidelines**

Access	Easily accessible from main circulation corridor.
Entrances	Minimum door size is 3'-0" x 7'-0".
Space between lab benches	6' to provide ease of access.
Windows	Desirable with light control and black-out shades.

**Finishes**

Walls	Water-resistant gypsum board with smooth Level 4 finish and semi-gloss enamel paint with low volatile organic compounds (VOC).
Floor	Seamless sheet vinyl flooring that is impervious to chemicals. Vinyl composition tile is <u>not</u> acceptable.
Ceiling	Suspended ceiling grid with vinyl-coated, water-resistant, laboratory-grade acoustical panels.
Ceiling Height	9' minimum; 10' desirable.

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**Utilities & Systems**

HVAC	Provide required exhaust test/laboratory procedures, lab pressurization relationships, and if lab corridor doors are to be left open.
Plumbing	Confirm sink requirements with academic department. Provide emergency shower and eyewash equipment per applicable code and the requirements of the academic department. Floor drains capable of accommodating a 30 gpm flow shall be placed adjacent to the eyewash stations.
Lab Utilities (gas, air, vacuum, etc.)	Confirm requirements with academic department.
Electrical	110V/220V at lab benches, at front demonstration bench, and at floor (if required).
Lighting	LED required. 50 fc minimum at work surfaces.
Data	Provide data outlets at each lab bench and at front demonstration bench.
Acoustics	Acoustic isolation required.

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**Equipment**

Fixed	Lab benches/tables (one bench/ table minimum to accommodate ADA access), demonstration bench, perimeter counters, recessed projection screen, overhead video projection, whiteboards, and tack boards.
Fume Hood(s)	If provided, include one ADA fume hood minimum.
Movable	Chairs/lab stools

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**RESEARCH LABORATORIES**

**General Guidelines**

**Parameters**

**Room Configuration Guidelines**

Entrances

Minimum door size is 3'-0" x 7'-0". Consider use of 40"-42" wide door, or a pair of doors with

Space between lab benches	keyed, removable mullion and an inactive leaf.
Windows	5' or greater to provide ease of access. Should not be operable, unless required by the research activity.
<b>Finishes</b>	
Walls	Water-resistant gypsum board with smooth Level 4 finish and semi-gloss enamel paint with low volatile organic compounds (VOC).
Floor	Seamless sheet vinyl flooring that is impervious to chemicals. Vinyl composition tile is <u>not</u> acceptable.
Base	Continuous sheet vinyl-coved base with metal top edge trim.
Ceiling	Suspended ceiling grid with vinyl-coated, water-resistant, laboratory-grade acoustical panels.

**Utilities & Systems**

HVAC	Provide required exhaust test/laboratory procedures.
Plumbing	Confirm sink and drain requirements with researcher. Provide emergency shower and eyewash equipment per applicable code. Floor drains capable of accommodating a 30 gpm flow shall be placed adjacent to the eyewash stations.
Lab Utilities (gas, air, vacuum, etc.)	Confirm requirements with researcher.
Electrical	Provide electrical outlets to meet electrical current requirements, with an additional 20%-40% capacity.
Lighting	LED required. 50 fc minimum at work surfaces; lighting level depends on lab activities (see IES). Provide light sources with high color rendition index (CRI).
Data	Provide data outlets at each lab bench.
Acoustics	Acoustic isolation required.

**Equipment**

Fixed	Requirements are specific to each research lab.
Fume Hood(s)	Requirements are specific to each research lab.
Movable	Requirements are specific to each research lab. Seating shall not have cloth upholstery.

**RESEARCH LABORATORY DESIGN REQUIREMENTS**

## General

1. For laboratory space guidelines, see the Space Management Utilization Standards, Appendix 1, Uni-Reg 2-181 in the Level II planning document.
2. New research and teaching laboratories shall be designed to meet the requirements for a Biosafety Level 2 laboratory. UW may hire a third-party to test and verify that Biosafety level is achieved. The International Institute for Sustainable Laboratories (I2SL and formerly Labs 21) resources shall also be used in the design of these labs.
3. Vivarium and Biological research facility design shall follow the standards identified in *Biosafety in Microbiological and Biomedical Laboratories (BMBL)*, 5<sup>th</sup> Edition.
4. The design of new research and teaching laboratories should be based on a standard laboratory planning module of 10'-6" to 11'-0" center-to-center in both directions.
5. Research labs shall not be designed around the requirements of a particular researcher, unless specifically required by the building program.
6. Laboratory utilities should be provided to each lab for future flexibility.

## Architectural Design Requirements

1. The design of a laboratory building shall incorporate adequate facilities (separate from laboratories) for food storage and consumption.
2. Separate offices or work spaces for laboratory employees and graduate students should be provided off of public corridors.
3. Each laboratory where hazardous, biohazardous or radioactive materials are used shall contain a sink for hand washing.
4. Laboratory sinks shall have lips that protect sink drains from spills.
5. Chemical storage shelves shall not be placed above laboratory sinks.
6. Sufficient space or facilities (e.g., storage cabinets with partitions) shall be provided so that incompatible chemicals/gases (waste and non-waste) can be physically separated and stored. Secondary containment shall be provided, wherever applicable.
7. The lab shall have a minimum aisle clearance of at least 36 inches. Main aisles for emergency egress shall have a clearance width of at least 36 inches.
8. A pathway of at least 36 inches shall be maintained at the face of the access/exit door.
9. The space between adjacent workstations and laboratory benches shall be 5 feet or greater to provide ease of access.



10. Laboratory doors shall be automatically self-closing, and labs shall be designed assuming that all doors will remain closed during operation of the lab.
11. Doors in "H"-occupancy laboratories shall have doors which swing in the direction of egress. Doors serving "B"-occupancy spaces shall swing in the direction of egress if the occupant load is 50 or more. Where possible, all "B"-occupancy lab doors should swing out.
12. The laboratory shall be designed so that it can be easily cleaned.
13. Laboratory bench tops shall be a seamless one-piece design to prevent contamination. Laminate bench tops are not suitable. Lab countertops shall incorporate a lip to help prevent run-off onto the floor. Penetrations for electrical, plumbing and other considerations must be completely and permanently sealed. If the bench abuts a wall, it must be coved or have a backsplash against the wall. Walls shall be painted with washable, hard non-porous paints.
14. Laboratory casework shall be Premium grade. Factory-finished, modular plywood cabinets with hardwood face veneer shall be used. Chemical-resistant, solid surface material shall be provided at lab countertops. The following materials may be used in laboratory casework, if approved by the UW Project Manager:
  - Plastic laminate over MDF
  - Melamine interiors
  - 3mm PVC edge banding
15. Special laboratory and safety programming will be necessary for the following:
  - Laboratories for Biosafety Levels 3, 3+ and 4
  - Radioactive Material Laboratories
  - Laboratories with Irradiators and/or Radiation Producing Machines
  - Laboratories using Non-Ionizing Radiation Sources, including Lasers
  - Vivarium Research Facilities

### **Laboratory Equipment**

1. Autoclaves shall be heated by steam. Electrical-heated autoclaves are not permitted, unless approved by UW Operations.

### **Laboratory Structural Design**

For floor design, the live load shall be 100 lbs. PSF minimum and 2,000 lb. point loading for portable equipment. Loads imposed by specific fixed equipment shall be considered.

## **HVAC REQUIREMENTS**

### **Controls**

1. Due to the critical nature of laboratory systems, building automation systems shall be provided with emergency power. The individual controller components shall be able to operate with a loss of any upstream equipment, including loss of communication.

2. HVAC systems shall be designed for continuous operation to maintain space conditions of heating up to 70° F. and cooling down to 78° F. during occupied periods and heating to 55° F. and cooling to 85° F. during unoccupied periods. An appropriately labeled override button shall be provided to switch the lab to “occupied” status if the research conducted in that room will not be compromised.
3. To maximize energy efficiency, controls shall be provided to switch the lab to “standby” status of 65°/80° F. during unoccupied periods. A sonic/thermal sensor located in the lab shall be provided to reset the controls from “standby” to “occupied” status if research in that area will not be compromised.
4. HVAC control equipment shall have the capability to resume operations following a power outage. When power service is resumed, the systems shall operate exactly as they did before the power outage, without the need for any manual intervention. Alarms shall require manual reset, should they indicate a potentially hazardous condition.
5. Automatic fire or fire/smoke dampers shall not be used in laboratory hood exhaust systems. Fire detection and alarm systems shall not be interlocked to automatically shut down laboratory fume hood exhaust fans.
6. Fume hood ventilating controls shall be arranged so that shutting off the ventilation of one hood will not reduce the exhaust capacity or create an imbalance between exhaust and supply for any other hood connected to the same system.
7. Air handling unit fans shall run continuously, without local control from the fume hood location and independent of any time clocks.

### **Exhaust Air System Design**

1. The exhaust stacks for fume hood and lab exhaust shall be located to prevent ingestion of exhaust into the same building and adjacent buildings. Measures to accomplish this requirement shall include an effective separation of 30 feet from building openings and specialized systems to eject exhaust away from the building. If the building design does not allow effective separation, the Engineer shall complete engineering analyses such as exhaust plume dispersion rate analysis to verify the safety of the proposed design, using I2SL<sup>®</sup> as a basis.
2. Exhaust ductwork shall be fire- and corrosion-resistant, and its selection shall be based on its resistance to the primary corrosive present. For most purposes, purge-welded Type 316L stainless steel is acceptable, but this material may be attacked by some corrosive materials (such as hot nitric acid).
3. Exhaust ductwork joints shall be sealed to protect against attack by chemicals.
4. All horizontal ducting shall be sloped (1/8 inch per foot) down toward the fume hood.
5. Ducting shall have pressure relief mechanism to protect the ductwork from any under/over pressurization issues that may occur with the system.

### **Supply Air System Design**

1. Laboratory ventilation systems shall not be internally insulated. System shall be designed such that acoustical silencers (including air valves) are not required.
2. An adequate supply of make-up air (90 to 100 percent of exhaust) shall be provided to the lab.
3. Corridors shall not be used as plenums.
4. Supply air shall meet the requirements of the laboratory work and the latest version of ASHRAE Standard 62, Ventilation for Acceptable Indoor Air Quality.
5. Supply air shall be filtered to 85 percent—Minimum Efficiency Operating Value (MERV) of 13a using Camfil Farr HiFlo ES 22”-deep bag filters with Fast Frames and no pre-filtering.
6. Air handling units for chemical fume hoods shall be connected to an emergency power system so that fans will automatically restart upon restoration of power after an outage and should be on variable frequency drives for low starting impact to the emergency power system. Priority shall be given to the exhaust fans. The building heating water system should also be connected to an emergency power system.
7. The supply air system shall be maintainable while in operation (i.e., filter changes can occur without loss of fume hood flow).
8. ANSI Z9.5, 2012 shall be used to lower lab air exchange rates when labs are not occupied.

### **Laboratory HVAC System Design**

1. Laboratory air handling equipment shall be separate from air handling equipment used for office and general use spaces.
2. Laboratories with fume hoods shall have mechanically-generated supply and exhaust air. All labs with hazardous materials shall exhaust a minimum of 100 percent of room supply air to the outdoors.
3. Cabinetry or other structures or equipment must not block or reduce effectiveness of supply or exhaust air.
4. The air changes per hour (ACH) of ventilation for laboratories shall be determined by professional review with Owner input that ensures compliance with applicable codes and institution requirements. (Typically, the range will be in the 4-10 ACH occupied and 2-4 ACH unoccupied.) Room light switches shall not be used to control either hood exhaust flow rates or room air change rates.
5. Laboratories shall be maintained under negative pressure in relation to the circulation corridor or other less hazardous areas. Clean rooms requiring positive pressure shall have entry vestibules provided with door-closing mechanisms so that both doors are not open at the same time.

6. The air velocity volume in each duct shall be sufficient to prevent condensation or liquid or condensable solids on the walls of the ducts.
7. General room exhaust outlets shall be provided where necessary to maintain minimum air change rates and temperature control.
8. Fume hoods shall be labeled to indicate which fan or ventilation system they are connected to.
9. Air flow in laboratories shall be designed to move from low hazard to high hazard areas.
10. Room air currents at a fume hood shall not exceed 20 percent of the average face velocity to ensure fume hood containment.
11. Make-up air shall be introduced to provide the best air distribution to the hood locations to the extent practical.
12. Make-up air shall be introduced in such a way that negative pressurization is maintained in all laboratory spaces and does not create a disruptive air pattern.
13. UW recommends the use of hoods certified for 60 fpm face velocity occupied (Labconco Extreme series or UW-approved substitution).
14. Consideration shall be given to automatic sash closers.
15. Fume hood exhaust systems from each floor shall not combine until the penthouse. There shall be NO dampers in the exhaust air duct except to isolate an exhaust fan for servicing, including fire and fire/smoke dampers.
16. Exhaust systems for animal facility rooms shall utilize 100% make-up air and 100% exhaust.
17. The current version of ANSI/ASSE Z9.14 "Testing and Performance Verification Methodologies for Ventilation Systems for BSL-3/ABSL-3 Facilities" shall be followed where applicable.
18. Approved manufacturers for laboratory air valves are CRC and Accutrol. Phoenix air valves are not permitted.
19. In general, most laboratory supply and exhaust system shall have some form of Owner-approved heat recovery. These systems shall be totally maintainable without having to shut down the exhaust side of the air handling system.
20. For all lab designs, a computational fluid dynamics (CFD) analysis shall be performed to select the best inlet and discharge locations for the facility and the optimal generator exhaust location, if used. It shall also model the effects from the proposed facility to other surrounding facilities.

## **ELECTRICAL REQUIREMENTS**

1. Electrical panels shall be designed with 30 to 40 percent excess capacity to facilitate future electrical modifications and growth.
2. Circuit breakers shall be located outside the lab, but not in fire-rated corridors.
3. The power capacity supplied to each laboratory should exceed current requirements by 20 to 40 percent.
4. For labs, electrical conduits shall be installed in the ceiling rather than in the floor slab.
5. For labs with a high risk factor, emergency stop stations should be considered.

### **Emergency Power**

1. Emergency power shall be provided to HVAC control and communication equipment, lab monitoring equipment, heating pump system, and door access controls.
2. Uninterruptible Power Supply (UPS) power supply shall be provided to the HVAC control and communication equipment through a master UPS system.
3. Emergency power shall be available to selected equipment locations within the lab. These locations shall be confirmed by the researcher and the UW Project Manager.
4. Chemical fume hood exhaust fans shall be connected to an emergency power system in case of a power failure.
5. Emergency power circuits shall be provided for supply fan service so that fans will restart automatically upon restoration of power following a power outage.
6. Alarms shall require manual restart, in the event that they indicate a potentially hazardous condition.

### **PLUMBING REQUIREMENTS**

1. Auxiliary shut-off valves for gas and vacuum lines shall be located outside the lab in a lockable cabinet.
2. Lab waste lines shall be separate from domestic sewage, and a sampling point(s) shall be installed in an easily accessible location outside the building, after the neutralization tank.
3. A plumbed eyewash and safety shower meeting the most current requirements of ANSI Z358.1 shall be provided at all work areas where, during normal operations or foreseeable emergencies, areas of the body may come into contact with a substance that is corrosive, severely irritating to the skin, biohazardous or radiological, or which is toxic by skin absorption. A floor drain capable of accommodating 30 gpm (~3") shall be placed adjacent to all eyewash and shower locations. These floor drains shall have a "trap seal" or equivalent to prevent the trap from drying out.

4. Water supplied to emergency showers and eyewash stations shall be tepid. If tepid water is not readily available, the water shall be tempered in accordance with the most current version of ANSI Z358.1.
5. Compressed air supply fittings shall be provided with medical grade, stainless steel ¼-inch NPT quick disconnects.
6. All gas turrets shall be knife blade style for safety.
7. The plumbing systems shall be designed to prevent contamination of the building water supply by lab activities.

## **FUME HOOD REQUIREMENTS**

### **Fume Hood Location**

1. Fume hoods shall be located away from activities or facilities which produce air currents or turbulence, such as high traffic areas, air supply diffusers, doors and operable windows.
2. Fume hoods shall not be located adjacent to a single means of access to an exit. Fume hoods should be located more than 10 feet from any door opening.
3. Fume hoods shall not be located opposite workstations where personnel will spend much of their working day, such as desks or microscope benches.
4. An emergency eyewash/shower station shall be within 10 seconds of walking time/distance from each fume hood.
5. Occupancy sensors or automatic sash closers shall be considered in the designs.

### **Fume Hood Selection**

See UW Construction Standards Section 115300 – Fume Hoods and the above paragraphs.

Laboratory design shall follow International Institute for Sustainable Laboratories Guidelines, current version.

### **Electrical Requirements**

1. In installations where services and controls are within the hood, additional electrical disconnects shall be located within 50 feet of the hood and shall be accessible and clearly marked.  
(Exception: If electrical receptacles are located external to the hood, no additional electrical disconnect shall be required.)

## **BIOLOGICAL SAFETY CABINET REQUIREMENTS**

1. All biological safety (biosafety) cabinets shall be NSF-listed, UL-approved, and installed in accordance with the manufacturer's requirements.

2. Consider the following factors when selecting a biosafety cabinet:
  - a. The type of protection required;
  - b. Product protection;
  - c. Personnel protection against Risk Group 1-4 microorganisms;
  - d. Protection against exposure to radionuclides and volatile toxic chemicals; or
  - e. A combination of the above.
3. Selection of a biosafety cabinet shall be done in consultation with the Principle Investigator and Risk Management & Safety.
4. Biosafety cabinets shall be located away from doors and high traffic areas.
5. External air currents degrade the effectiveness of the biosafety cabinet. All efforts shall be made to locate biosafety cabinets where supply air inlets will not interfere with performance.
6. Two biosafety cabinets shall not be installed directly opposite each other if they are closer than six feet apart.
7. A biosafety cabinet shall not be installed within 10 feet of an autoclave.
8. Biosafety cabinets shall be certified to NSF Standard 49 by a qualified independent testing organization prior to building acceptance; or, for installations not involving significant building modifications, before use with biohazards.
9. Biosafety cabinets shall be vented from the building if toxic or malodorous chemicals are used.
10. When biosafety cabinets are connected to external ducts, a flow-monitoring system with audible and visual annunciations shall be used to alert the user of the biosafety cabinet of loss of external ventilation. Alternatively, thimble connections or canopy mini-enclosures in biosafety cabinets shall be fitted with a ribbon streamer or equivalent attached at an angle through which air enters the device to indicate the air-flow direction.

## **OFFICE DESIGN GUIDELINES**

### **Office Area & Location**

For allowable office areas, see the Space Management Utilization Standards, Appendix 1, Uni-Reg 2-181 in the Level II planning document. If private offices are located on the building perimeter, provisions should be made to allow maximum daylight penetration to work stations located interior to the building.

### **Office Requirements**

Each faculty office shall have the following:

- A four-plex electrical outlet on the two walls where the desk, return or credenza are most likely to be located. A duplex electrical outlet shall be provided on the other office walls.
- Telephone/data outlets at two locations that are best suited for office furniture layouts
- A sidelight (with mini-blind) adjacent to the door

## **Private Offices**

In general, full-time faculty members shall be provided with private offices.

## **Shared Offices**

Non-tenured faculty members may share an office, if space is not available for individual offices. Adjunct faculty members will typically share office space.

## **RESTROOMS**

### **Family and Assisted-Use Restrooms**

A family or assisted-use restroom shall be provided on the main entrance level of new buildings and major renovations where the building design and budget allow.

### **Restroom Finishes**

Ceramic tile shall be provided on restroom floors. Ceramic tile shall be provided on restroom walls (particularly at the plumbing walls) to 7'-0" A.F.F., when the project budget allows; otherwise, a ceramic tile wainscoting shall be provided to 4'-0" A.F.F. Light-colored grout shall be avoided at ceramic tile floors in restrooms.

Wall-hung porcelain lavatories are preferred over vanity countertops because of the difficulty in keeping countertops clean and presentable.

### **Number of Plumbing Fixtures**

In addition to the requirements of the International Plumbing Code, the types of space use in areas served by restrooms should be considered when determining the number of plumbing fixtures. For example, areas with classrooms and lecture halls will have high demand for restrooms between classes.

### **Automatic Operation Fixture Valves**

Plumbing fixtures and faucets in multiple-occupant restrooms shall have automatic valves.

### **Sight Lines**

Sight lines into restrooms shall be considered when locating plumbing fixtures (such as urinals and water closets) and mirrors.

### **Paper Towel Dispensers and Waste Receptacles**

Paper towel dispensers shall be located near the entrance to restrooms. Space shall be provided for freestanding waste receptacles (provided by the Owner) near the entrance to restrooms. ADA clearance shall be maintained at freestanding waste receptacles.

## **CUSTODIAL FACILITIES**

Space for custodial workrooms and custodial equipment and storage rooms shall be allocated in accordance with the following table:



BUILDING AREA	UP TO 20,000 SQ. FT.	20,000 TO 30,000 SQ. FT.	30,000 TO 150,000 SQ. FT.	OVER 150,000 SQ. FT.
<b>CUSTODIAL WORKROOMS</b>	1 @ 120 SF. See Note 1.	120 SF per 15,000 SF of building area or portion thereof. See Note 2.	80 SF per 15,000 SF of building area or portion thereof. See Note 2.	80 SF per 15,000 SF of building area or portion thereof. See Note 2.
<b>CUSTODIAL EQUIPMENT &amp; STORAGE RMS.</b>	Included in Custodial Work Room	1@ 100 SF	1@ 100 SF	2 @ 150 SF
<b>TRASH STORAGE ROOMS</b>	1 @ 60 SF	1 @ 80 SF	1 @ 100 SF	1 @ 150 SF

**Notes:**

1. If the building has more than two stories, provide an additional Custodial Work Room with floor sink with a floor area of not less than 60 SF on each of the other levels.
2. Distribute in 80 SF increments on each floor level.

Use Restrictions: Custodial spaces shall not be used as a passageway to other rooms or share space with control panels, electrical panelboards, transformers, IT equipment, fire reporting equipment, plumbing systems/equipment, shutoffs, alarm panels/systems, fire pumps, or any other systems not directly related to custodial services. Ladders or access doors to mechanical spaces, attics or roof areas shall not be located in custodial workrooms.

**Custodial Workrooms**

The following shall be provided for custodial workrooms:

Doors: 3'-0" wide x 7'-0", out-swinging, equipped with storeroom function lock, closer, and 36"-high armor plate on inside face.

Service Sink: Floor-level service sink, 24" square, with hot and cold water mixing faucet with vacuum breaker. The floor sink shall be located at the front of the room so it can be reached without requiring the removal of equipment and supplies stored in the room.

Mop Hanger: Mounted above service sink, not on the same wall as the faucet.

Shelving: Provide 2 linear feet of wire shelving 16" deep over mop sinks and an additional 6 linear feet of 16" deep shelving in each custodial workroom.

Ventilation: Mechanical ventilation in room shall provide not less than six air changes per hour.

Room Finishes:

- a. Walls: Walls within custodial workrooms may be concrete masonry or gypsum wallboard, finished with semi-gloss enamel paint. Walls adjacent to and extending 1'-0" beyond the edge of the service sink shall be finished within an impervious material such as glazed ceramic tile or fiber-reinforced plastic (FRP) wall panels to a height of 4'-0" A.F.F.
- b. Floor: Sealed concrete.

Location: Custodial workrooms shall be centrally located so that no area in a building is more than 150' walking distance from such a room. Preferred locations are close to elevators, close to main circulation

areas, and close to toilet rooms. Doors to custodial workrooms shall open to a public corridor or other primary circulation area.

Electrical Requirements: Custodial workrooms shall have a light level of 50 foot-candles. Lighting fixtures shall be recessed flush or surface-mounted, supplied with a safety shield. Workrooms shall have one 4-plex electrical outlet on a separate circuit.

### **Custodial Equipment and Storage Rooms**

General: These rooms are used for the storage of major items of custodial equipment shared by several custodians, such as large ride-on scrubbers and vacuums, large walk-behind equipment, high-speed floor polisher, automatic floor scrubber, carpet shampooer, and carpet extractor. These rooms are also used for the storage of bulk custodial supplies.

Location: Custodial equipment and storage rooms shall be located in reasonable proximity to the building delivery entrance. Custodial rooms shall not be accessed through restrooms.

Room Finishes: Same as described above for custodial workrooms.

Electrical Requirements: Lighting and electrical receptacles for custodial equipment and storage rooms should be the same as described above for custodial workrooms, except that two 4-plex electrical outlets on separate circuits should shall be provided.

HVAC: The room shall be exhausted per ASHRAE standards.

## **ACOUSTICAL DESIGN**

### **STC Ratings**

Walls between classrooms shall have a minimum Sound Transmission Class (STC) rating of 50. Walls separating classrooms from common spaces or restrooms shall have a minimum STC of 53. Walls separating classrooms from mechanical spaces or other areas with high noise levels shall have a minimum STC of 60.

### **Acoustical Consultant**

An acoustical consultant should be utilized when designing important lecture halls, performance spaces, or other rooms with stringent acoustic requirements.

### **Mechanical Engineer's Responsibilities**

The Mechanical Engineer shall provide an acoustical design to deal with air noise through ducts and unit noise through walls to minimize the impact of noise from mechanical units in occupied spaces. HVAC systems shall be designed with slower fans and larger ductwork to eliminate the need for silencers. Ducts shall be sized to reduce noise levels caused by excessive duct velocities.

### **Architect's Responsibilities**

The Architect shall coordinate the acoustical design with the Mechanical Engineer by providing NRC ratings of wall, floor, and roof assemblies. Consideration shall be given to the need for door and window gaskets and the location and sealing of penetrations.