DESIGN GUIDELINES

March 2023

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.

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 Operations at hearl@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 Campus Master Plan*

https://www.uwyo.edu/uwops/masterplan/uw-campus-master-plan_final_may-2020.pdf

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:

University of Wyoming - Historic Preservation Plan.pdf

Construction documents for all new buildings, renovations, and additions shall comply with the latest edition of the *UW Construction Standards & Guideline*-see:

Other documents involved with new construction include:

- *Design Guidelines March 2023*
- *UW Utility Master Plan, April 2020* see - uw-utilities-master-plan_final_april-2020.pdf (uwyo.edu)
- *Chilled Water Utility Development Plan- 2000* – see 2000 UW CHILLED WATER UTILITY (uwyo.edu)
- *West Campus Satellite Energy Plant - Heating Cooling Analysis -2017* see: West Campus Satellite Energy Plant (uwyo.edu)
- *AV/IT Integration Matrix* – see: av-it-security_integration_matrix_november_2016.pdf (uwyo.edu)

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 (EDAC) in consultation with the Board of Trustees' Facilities Construction 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 EDAC will meet with the design firm and provide input on the exterior design of the project buildings. 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 EDAC shall hold at least one community/public meeting to seek input.

The design firm shall take the EDAC's input into consideration in designing the exterior or 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.

MAJOR CONSTRUCTION PROJECTS GUIDING PRINCIPLES

The following guiding principles are intended to address issues arising 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 facility's exterior design 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 *University of Wyoming Campus Master Plan.*
3. Facilities shall incorporate today's most advanced thinking in construction design, programmatic design, and sustainability, while providing flexibility for programmatic growth, modern 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 Planning Team to address the programmatic nature 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.
7. The design firm shall be responsible for designing high-performing buildings. After a one year tune up run, for the second year and beyond, the buildings shall perform at least to the levels listed below.

Building Type:	Comments	KBTU/SF-YR (includes all electrical, gas, steam or hot water, chilled water usage)
Typical B-2 including Administration, Classrooms and Gymnasiums	General	50
Laboratory Buildings	100 Fume Hoods/100,000 SF	150
Laboratory Buildings	80 Fume Hoods/100,000 SF	130
Laboratory Buildings	40 Fume Hoods/100,000 SF	100

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 and their sub-consultants shall review the following documents:
   - *UW Campus Master Plan*
   - *UW Strategic Plan*
   - *UW Historic Preservation Plan*
   - *UW Design Guidelines*
   - *UW Construction Standards*
   - *UW Utilities Master Plan*
   - *West Campus Satellite Energy Plant - Heating Cooling Analysis -2017*

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 and groundwater issues
   j. Surrounding/ private land use
   k. Parking capacity

l. Impacts of construction/ phasing on surrounding property and property users.

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 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 occupied 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 a minimum Silver rating with certification. 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. 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 v4.1, 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 of 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 racetrack 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 with over 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 like that for the first floor, except 200-299 for Second Floor, 300-399 for Third Floor, etc.

3. The room numbering pattern shall be similar on all floors, as much as possible without creating other inconsistencies. That is, rooms with the same second and third digits shall be 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. Buildings with a circular or racetrack design shall have odd-numbered rooms on the building's perimeter.

6. Room numbers on one or both sides of a corridor shall be skipped 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 rule, enough 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 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 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 sides, room numbers shall be skipped on both sides to accommodate future subdividing of rooms.

7. In the case of a suite of rooms or where there are “interior” rooms off 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.

SUBMITAL PROCESS

1. All submittals for UW projects shall be in a searchable pdf format. Illegible or non-searchable file submittals are subject to rejection.

DOCUMENTATION

1. Record Drawings
    a. The Owner shall receive two (2) full-size bound printed sets of the final Plans and Specifications, including such revisions made during bidding and construction. Each sheet of the final Plans shall be prominently noted, "Record Drawings".
    b. 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."
    c. Owner shall receive two (2) flash drives containing the following:
        i. Searchable 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 following 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 two (2) sets of 8-1/2" x 11" 3-ring binders with accompanying compact flash drives 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. Manuals shall be searchable.

3. Balancing Report
    a. Balancing report shall have an executive summary detailing balancing and performance issues found during the work. Balancing contractor shall work for the University, not the Mechanical Contractor.

4. Standards for Geographic Information System (GIS) Deliverables
    a. The Contractor shall consult with the Deputy Director for Utilities Management (UW Operations) and the Utilities GIS Technician 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 the 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 University of Wyoming 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. 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 Contractor access to necessary geospatial data, reports, schematics or other pertinent information or a data copy. When requesting data from the UW, the Contractor shall identify which data layers they require. An official request to UW Operations and WyGISC for data/schematics shall be completed before any information to verify requirements is released. The Contractor shall request the most current GIS base map data (aerial imagery) from the University of Wyoming at the beginning of each project and verify the alignment with coordinate system outlined in #5 above.

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 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 UW 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.

SITE DESIGN

General

1. The impact of icy conditions caused by shaded areas around buildings during the winter months should be considered.

2. UW discourages basement construction even in areas where geotech does not indicate excessive water.

3. Drainage from a roof or around a building, plaza, or recreation area, etc. shall be directed away from pedestrian pathways 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, debris, and overflow.

4. Whenever possible, protective cover over access ramps, parking, and dock facilities should be considered. Snow melting systems may be necessary for northern exposures.

5. Fire Department access shall be provided to all UW facilities as required by code.

6. Where loading docks are included in the design, thoughtful consideration shall be given to location, slope, and solar access. If a loading dock is on the north side of the building or in an area with minimal solar access, a snow melt system shall be budgeted for.

7. 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.

8. 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.

9. Street design and specifications shall meet City of Laramie and State (i.e., Wyoming Public Works) standards.

10. 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 with them.

11. 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.

    In addition to the above standards, exterior sanitary and storm sewers shall have 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. In general, the slopes are (ft/100ft & m/100m):

6”Φ 0.60	8”Φ 0.40	10”Φ 0.28	12”Φ 0.22	14”Φ 0.17
15”Φ 0.15	16”Φ 0.14	18”Φ 0.12	20”Φ 0.11	21”Φ 0.10
24”Φ 0.08	27”Φ 0.067	30”Φ 0.058	33”Φ 0.051	36”Φ 0.046

    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 highest available flow rates shall be used (1.6 GPF minimum). An engineering investigation of the pipe condition, 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. Exterior cigarette receptacles shall be provided at major building entrances.

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. When stairs or ramps are unavoidable, consider placing indoors. All exterior ramped sidewalks and stairs shall meet the requirements of the ADA Standards for Accessible Design.

After-Hours Entrance

The University will designate entrance(s) to each building as its after-hours entrance(s). The after-hours entrance(s) should 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(s) shall be provided with a proximity/ card reader with key override and web camera connected to the campus door access control/camera systems. A recess-mounted Knox-Box shall be provided in an exterior wall at this location. Knox-Box placement must be approved and verified (with keys) after install by the UW Project Manager and the City of Laramie Fire Department. The Knox-Box shall be a Series 3200 installed at approximately 60 inches nearest the main entrance or as designated by the Authority Having Jurisdiction.

Service and Emergency Access

Access shall be provided for emergency, 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 City of Laramie Fire Department.

Concrete Sidewalks

Concrete sidewalks shall be wide enough to accommodate pedestrians and bicycle traffic - 6’-0” wide minimum. Sidewalks shall be designed to accommodate snow removal by mechanized plows or brooms. Concrete sidewalks shall support the weight of any vehicles that can be expected to drive on the walks. Concrete sidewalks should slope away from buildings - two percent (2%) slope preferred, five percent (5%) slope maximum. A medium broom-finish should 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 nosing's 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 (1) inch chamfered edges or notches shall be provided to discourage property damage from skateboarding and similar activities. Face-mounted, metal skateboard-deterrent solutions shall not be permitted.

Parking Lot Layout

The 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 not exceed 25'-0" unless otherwise approved by UW Operations. Light fixtures shall be Owner-approved.

Fresh Air Supply to Buildings

Locate parking, loading, plumbing waste vents, garbage/dumpster sites away from fresh air intakes of buildings to prevent vapors and 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 for lab buildings. Generator exhausts shall be modeled and routed to ensure that the exhaust does not get ingested into the building fresh air systems.

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 Campus Architect shall be consulted regarding applicability of this requirement.

MECHANICAL AND ELECTRICAL DESIGN

The Mechanical and Electrical Engineer shall have a review meeting with UW Operations to go through the systems at the ~50% and 100% SD, 50% and 100% DD phase, and 50% and 100% CD phase of development.

After completion of commissioning, the commissioning agent shall meet with UW Operations to discuss how the commissioning went, the issues and their resolutions.

After completion of the HVAC balancing, the Balancing Contractor shall meet with UW Operations to discuss how the balancing went, the issues and their resolutions.

Mechanical Rooms shall have the following considerations:
- Large floor sinks with at a minimum, 4” sanitary line sized to handle full back flow preventer discharges.
- Lighting shall be manually controlled and on emergency power.
- All equipment shall be removable, including any HX or water or HRC coils, water heaters, etc. AHU’s can be broken (not cut) apart.
- Leave inserts installed in ceiling for installation of equipment in place for future use.
- All equipment shall have adequate maintenance access.
- Have ~ 2 marked outlets on e-power minimum.
- Provide a lockable storage area for PM storage, ~10’x10’ minimum, 10’x15’ preferred.
- RO/DI and Water Softener systems shall either be on the ground floor, or accessible via a freight elevator.
- Keep room temperatures <= 80°F, preferably using outside air for cooling.
- Any piping, ductwork, etc. that will be a “head knocker” shall be redesigned.
- Equipment on concrete equipment pads, 4” height.
- Keep 13.2 KV outside of the building.
- Final Layout shall be accepted by UW Operations and the MEP Engineer(s) for the project.

Electrical Rooms shall have the following considerations:
- Lighting shall be manually controlled and on emergency power.
- All equipment shall be removable, including the main distribution gear, transformers, etc.
- Leave inserts installed in ceiling for installation of equipment in place for future use.
- All equipment shall have adequate maintenance access and code-required exclusion zones should be clearly marked.

- Have ~ 2 outlets on e-power.
- Keep transformers on equipment pads.
- Keep room temperatures <= 80°F, preferably using outside air for cooling.

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

Provide domestic water backup system for watered cooled equipment such as refrigeration/freezers, process water, etc. if the chilled water loop goes down. The transition shall be automatic and integrated with the campus BAS.

Designer should provide a statement of how the supply air, exhaust air, and return air quantities will be controlled (i.e., flow measuring, offset, etc.) in the Design Development submittal.

Designer should provide a statement of how equipment/design will be impacted by extreme elevation (7220 ft), wind speeds in excess of 75 kts, and low temperatures (-30° F) in the Design Development submittal.

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 restrooms, the chase shall be at least 30” wide with a 2’ wide by 5’ high access door.

Building chilled water systems shall have a 20° F. temperature differential as a basis of design (41°-61°F). With chilled water systems connected to any air handling unit that has outside air, the chilled water system shall be glycol protected and separated from the campus loop via a flat plate heat exchanger designed to deliver glycol chilled water within 1-2° F of the loop supply temperature. In lieu of the flat plate, consideration shall be given to using freeze-proof HVAC coils (heating and cooling) as manufactured by Cooney Technologies. Systems not attached to outside air (fan coils, refrigeration equipment, walk in coolers, etc.) can be directly attached to the campus system and they should not require a building chilled water pump as the main loop pumps should be able to handle the load. Process chilled water shall also be attached to the campus loop via flat plate heat exchangers with some storage capacity. The process water pumps shall be on e-power.

New Building Heating Systems: New building heating systems shall be designed for 140° F entering water temperature with a minimum of 20 degree delta return temperature. Heating water pumps shall be on standby emergency power. Domestic water would then be provided via natural gas fired equipment.

Existing Building Heating Systems: If steam is used, a flash tank shall be part of the system. In general, 125 psig steam condensate is flashed to a 60 psig system, 60 psig steam is flashed to a 15 psig system and 15 psig steam is tied to the condensate return system. Condensate entering the campus system should be less than 180° Fahrenheit. Atmospheric venting of steam shall be minimized. This may require installing a lower pressure heat exchange system in the building. Heating water pumps shall be on standby emergency power.

In multiple-fan array systems, individual motors shall be a minimum of 10 horsepower and on separate Variable Frequency Drives (VFD's). In some cases, two motors can be on one drive. In all cases, the maximum fan speed shall be 66 Hz.

All air handling equipment shall have MERV 13a filtering, using Camfil Farr Higo Flo EX bag style of 22" deep filtering with Camfil Fast Frames with no prefiltering.

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. Provide all study software files at completion of analysis to Owner. The following software is compatible with ETAP:

- 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. At least two (2) fixture models from different manufacturers shall be specified for all fixture types and shown on the schedule. The two models specified shall not be represented by the same company. Design lighting wattage densities should be below 0.3 Watts/SF.

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

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 code compliance verifications. An energy use report shall be generated showing estimated yearly chilled water, gas, steam and electrical consumption and peak loadings.

LANDSCAPE DESIGN

Landscape Design Principles

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

- Campus landscapes shall require limited maintenance.
- Campus landscapes shall conserve irrigation water.
- Drought-tolerant plant materials shall be used wherever possible.
- Drip irrigation shall be used wherever practical and is preferred by any vehicle parking areas.
- Boulders and trees should be placed outside of utility corridors.
- 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.
- Design shall consider snow removal operations and areas to place snow.
- Concrete mow strips shall be provided where lawn abuts planted areas.
- 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, buildings, vehicles, any signage, and other electrical equipment. UW's irrigation water has a high total dissolved solids content which can easily stain surfaces.
- Campus Sustainable landscaping practices and designs shall be used after consultation with the University.
- Minimize plantings

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 underground utilities, walks, roofs, and foundations.

Tree and plant materials 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.

When placing trees, reference the UW's Tree Succession Plan scheduled to be complete and available on the UW Operations website by Spring of 2022.

Landscape Rock/Mulch

Mineral Mulch (2-4") is the preferred method for weed mitigation.

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. A weed barrier shall be installed to fully 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 UW Operations. 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 only 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

Stone

Full-depth sandstone to match the historic campus is the preferred exterior finish material. Variations shall be analyzed utilizing the UW Historic Preservation Plan and Design Guidelines.

Brick

When brick is used on a building's exterior, a single color shall be used. Brick color shall be based on the campus standard brick colors or match the brick on existing buildings near the project site. The use of dark brown brick must be approved by the Campus Architect, except on additions to existing buildings with 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 extremely hot (180° F.) so materials with low absorption coefficients shall be used, especially for window wall framing systems. 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 per the recommendations found in the UW's Historic Preservation Plan. The use of concrete masonry units (CMU) as an exterior finish material is 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 shall include building envelope commissioning. The University will contract directly with a third-party building envelope commissioning agent for each project. Design teams must 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 building air barriers' boundary limits and 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 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 electrical, plumbing and HVAC components; windows and doors; and material compatibility.

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 to withstand the maximum positive and negative air pressures 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, soffit or 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 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 like that at the trash enclosure of the Information Technology Building, rather than drop rods.

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 every laboratory building and shall include a wind-responsive exhaust study. The exhaust study shall consider all building fresh air intakes, lab exhausts, generator and vehicle exhausts and plumbing vents for all buildings in the area (including the proposed laboratory building). The location of garbage dumpsters shall also be coordinated with this study.

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 should be avoided on the ground floor of buildings for security reasons.

Bird Roosting/ Nesting Places

Conditions where birds can roost or nest should be avoided. If unavoidable, bird control measures must be utilized. Areas around chillers and generators shall have bird and mammal control measures incorporated into the design. Pigeons and turkey vultures have become a major problem for several of the campus buildings. Large glazing areas also end up killing many birds. Consult with UW Operations as to how the design team is going to reduce the bird impact.

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. Means must be provided to replace the heaviest piece of equipment in the mechanical room (host way, gantry crane, etc.).

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 and fall protection shall be investigated and installed if needed. Pavers shall be provided to access every piece of rooftop equipment.

Parapets

For buildings with "flat" or low-slope roofs, parapets shall be provided to guardrail height (42 inches above roof level) wherever possible. UW strongly discourages the use of fall protection as a substitute for parapets and handrails.

Fall Protection

Fall protection anchorages shall be provided on all roofs per OSHA and ANSI/ASSE Z359 Fall Protection Code requirements. These anchors shall not interfere with reroofing operations.

Window Washing Anchors

On buildings over two stories in height, mounting provisions for a window washing system utilizing swing stage scaffold shall be provided. The window washing system shall include safety tie-off anchors. The use of permanent window washing equipment shall 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 in rooftop 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 recirculating exhaust air and odors from plumbing vents, considering site-specific wind patterns. Access for maintenance shall not require the removal of unit panels, screws, nuts, or bolts. 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, burnisher/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, 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 on the ground floor and near main entrances, where possible. Faculty offices and other spaces with low traffic should be on the upper floors of multi-story buildings.

No furniture shall not be installed against atrium rails. 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.

The University recommends the consultant get input from subcontractors about wall types, specifically standard drywall. Ease of maintenance is the concern.

Atriums

If possible, design with only 2 levels to negate the use of a smoke evacuation system.

Doors for makeup air for smoke evacuations systems will be considered case by case and discouraged.

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. Consult with the security team if access control will be required.

IT Room

In larger new buildings having multiple technology classrooms, consider including an IT room or office.

IT Mechanical Room Requirements

All mechanical rooms shall have access to the UW WiFi network.

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.

Card Access System

The UW standard for door access control software is S2. Design for the system shall be coordinated with UW Operations and the Planning Team to verify access needs. For doors with access controls, the primary controller, door controller, card reader, and security multiplexer will be ordered through UW Operations 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). Absolutely no magnetic door locks shall be used. In the construction documents, the A/V Consultant shall include the infrastructure for S2 at the after-hours entrance and as directed by the Planning Team for special conditions. S2 operation shall interface with the ADA door operators.

Security Cameras

Design for security camera systems shall be coordinated with UW Operations, 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. As a minimum, exterior doors with card access and each exterior side of the building shall have camera coverage.

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 approaching completion. 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 there is adequate space within the penthouses of new facilities to accommodate this requirement.

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 at least one elevator to provide accessibility. In larger multi-story buildings, it may be desirable to provide a second elevator hoist way 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, and 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.

Handheld Showers

When a shower is provided in an academic building, the shower shall be equipped with a handheld 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 future modifications to the custom regulatory and door signage. See the UW Interior Signage Standard link under General Conditions of these documents.

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 several 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 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 the instructor may reconfigure. Seminar rooms will typically not have a formal instructor's station, although one wall should have a marker/glass/chalkboard, 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/chalkboard, 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 size range's upper end, 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/ chalkboard, 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. 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 to 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.

Classroom Technology Design Guidelines

SEMINAR ROOMS	
General Guidelines	**Parameters**
Student Station Capacity	12-19
Square Feet/Student Station	20-30 (at tables)
Square Footage	240-570
Aspect Ratio (Length/Width)	.6 to 1.5
Min. Angle of Incidence	20°
Max. Horizontal Viewing Angle	120°
Instructional Guidelines	
Clear/Teaching Area	6' minimum
Preferred Seating	Movable tables and chairs with arms
Marker/Chalk Boards	Maximize on teaching walls within angular parameters
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	Avoid location on teaching wall.
Windows	Operable, if used. Provide roller screens for light control.
Finishes	
Walls	Gypsum board with smooth Level 4 finish (test section to be approved by Owner) and satin/eggshell paint. Chair rail on side & rear walls.
Floor	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	**Parameters**
Student Station Capacity	20-39
Square Feet/Student Station	18-30 (varies with seating capacity)
Square Footage	975 maximum
Aspect Ratio (Length/Width)	0.75 to 1.2
Min. Angle of Incidence	30° desirable
Max. Horizontal Viewing Angle	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 on 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 locating on teaching wall.
Windows	Operable, if provided. Provide roller screens for light control.
Finishes	
Walls	Gypsum board with smooth Level 4 finish (test section to be approved by Owner) and satin/eggshell paint. Chair rail on side & rear walls.

Floor	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	**Parameters**
Student Station Capacity	40-79
Square Feet/Student Station	16-22
Square Footage	640 to 1,740
Aspect Ratio (Length/Width)	.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 on 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	Flat, but may be shaped for acoustical purposes in upper size range.
Ceiling Height	9’ minimum
Entrances	Avoid teaching wall.
Windows	Operable, if provided. Provide roller screens for light control.
Finishes	

Walls	Gypsum board with smooth Level 4 finish (test section to be approved by Owner) and satin/eggshell paint. Chair rail on side and rear walls if movable seating is used.
Floor	Vinyl composition tile, carpet, or carpet tiles.
Ceiling	Acoustical panel ceiling system and/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 & Telecommunications	See UW Classroom Technology & Design Guidelines.
Environmental	Temperature and ventilation as per ASHRAE.

LECTURE HALLS

General Guidelines	**Parameters**
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 & audio-visual consultants
Min. Angle of Incidence	30° desirable
Max. Horizontal Viewing Angle	90° desirable
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.

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/glassboard. The length of whiteboard/glassboard units that are specified should 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

General Guidelines	**Parameters**
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.
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. Emergency shutoff for gas supply to room
Electrical	110V/220V on lab benches, at front demonstration bench, and on 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.
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 with NO cloth fabric

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 keyed, removable mullion and an inactive leaf.
Space between lab benches	5’ or greater to provide ease of access.
Windows	Should not be operable, unless required by the research activity.
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.
Base	Continuous sheet vinyl cove 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 and the requirements of the academic department. Tepid water is needed for these emergency systems. Floor drains capable of accommodating

	a 30 gpm flow shall be placed adjacent to or under the eyewash and safety shower 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. Chairs and other seating furniture shall not have cloth fabric as a cover.

RESEARCH LABORATORY DESIGN REQUIREMENTS

General

1. For laboratory space guidelines, see the Space Management Utilization Standards, Appendix 1, Unireg 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)*, 6th 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 a particular researcher's requirements unless 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 workspaces for laboratory employees and graduate students should be provided off 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 they will remain closed during operation.

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 must 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 steel 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. Autoclave heating source shall be carefully considered, considering if the building is steam fed or hot water fed. The number and anticipated usage shall also be factored in, including issues with the annual campus steam shutdown. Remote steam or natural gas boilers are discouraged. City of Laramie water shall not be allowed to cool or produce a vacuum for these units unless approved by UW Operations. Consider using chilled water if available to cool the vacuum water to the plumbing code requirements. The drain water shall go to at least 10' or hubless cast iron drainpipe before switching to a plastic piping system.

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 operate with a loss of 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 be able to automatically resume operations after 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® 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 must 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 systems shall have some form of Owner-approved heat recovery. These systems shall be maintainable without shutting down the exhaust side of the air-handling system.

20. For all lab designs, a computational fluid dynamics (CFD) analysis shall be made to select the best inlet and discharge locations for the facility and the optimal generator exhaust location, if one is used. It shall also model the effects of the proposed facility on 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 and breaker space 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 an elevated risk factor, emergency stop stations shall be used.

Emergency Power

1. Emergency power shall be provided to all HVAC control and BAS equipment, lab monitoring equipment, heating pump system, IT equipment and door access controls.

2. Uninterruptible Power Supply (UPS) power supply shall be provided to the HVAC control, IT equipment 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 if they indicate a potentially hazardous condition.

PLUMBING REQUIREMENTS

1. Auxiliary shut-off valves for gas and vacuum lines shall be outside the lab in a lockable cabinet.

2. Sink drain traps shall be easy to inspect or have drain plugs to facilitate mercury spill control.

3. 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.

4. 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 encounter a substance that is corrosive, severely irritating to the skin, biohazardous or radiological, or which is toxic by skin absorption. A floor drain or floor sink capable of accommodating 30 gpm with a trap seal shall be placed adjacent to all eyewash and shower locations.

5. Water supplied to emergency showers and eyewash stations shall be tepid. If tepid water is not readily available, the water should be tempered in accordance with the most current version of ANSI Z358.1 (typically 70°F).

6. Compressed air supply fittings shall be provided with medical grade, stainless steel ¼-inch NPT quick disconnects.

7. All gas turrets shall be knife blade style for safety.

8. 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 adjacent to one 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 should be considered in the designs.

Fume Hood Selection

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

Laboratory design shall follow the 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 Principal Investigator and Risk Management and 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 air supply 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, Unireg 2-181 in the Level II planning document. If private offices are on the building perimeter, provisions should be made to allow maximum daylight penetration to workstations 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/Gender Neutral/Assisted-Use Restrooms

One Family/Gender Neutral/Assisted-Use restroom shall be provided on the main entrance level of new buildings and major renovation. For A Occupancies, follow the IBC.

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 and mirrors.

Paper Towel Dispensers and Waste Receptacles

Paper towel dispensers shall be near the restroom entrance. 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.
CUSTODIAL WORKROOMS	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.
CUSTODIAL EQUIPMENT & STORAGE RMS.	Included in Custodial Work Room	1@ 100 SF	1@ 100 SF	2 @ 150 SF
TRASH STORAGE ROOMS	1 @ 60 SF	1 @ 80 SF	1 @ 100 SF	1 @ 150 SF

Notes:

1. If the building has more than two stories, provide another Custodial Work Room with a floor sink with a floor area of at least 60 SF on each other level.
2. Distribute 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 related to custodial services. Ladders or access doors to mechanical spaces, attics or roof areas shall not be in custodial workrooms.

Custodial Workrooms

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

Service Sink: Floor-level service sink, 24-inch square, with hot and cold-water mixing faucet with vacuum breaker. The floor sink shall be at the front of the room so it can be reached without removing 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 feet 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 should 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. A break room for the custodial staff shall also be considered.

Location: Custodial equipment and storage rooms should be near 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 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 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 air 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, the location and sealing of penetrations and allowing proper duct sizing for reduced noise levels that come from reduced duct velocities.