

TAB B DESIGN CRITERIA

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Design, Construction and Sustainability Standards

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TAB B: DESIGN CRITERIA

General

Included in this document are general standards for Design Criteria for UNLV projects. Additional information to supplement these standards may be included in documents related to specific solicitations (RFQ's, RFP's and other documents) for specific projects.

Consultants, contractors and vendors are to comply with these standards. Any requested substitutions must be submitted to the Owner in advance per substitution procedures, for review, rejection or approval. Consultants, contractors and vendors must comply with these standards in any design, proposal or submittal. Any deviance from these standards by a consultant, contractor or vendor is at their own risk, and Owner, at its sole determination, may enforce all elements of these standards in any design, proposal or submittal or reject any design, proposal or submittal based on non-compliance with these standards.

NSHE Standards:

All UNLV projects shall follow standards per the Nevada System of Higher Education (NSHE), the NSHE Board of Regents Handbook, and the NSHE Procedures and Guidelines Manual. These documents may be found at: <https://nshe.nevada.edu/leadership-policy/board-of-regents/handbook/>. Sections of primary relevance include:

NSHE Board of Regents Handbook:

- Title 4, Chapter 1, Section 9: Campus Development
- Other sections as applicable.

NSHE Procedures and Guidelines Manual:

- Chapter 1: Campus Development
- Chapter 5: Section 4. General Guidelines for Physical Master Plans to be Incorporated into the NSHE Master Plan

Include in construction scope and budget any plaques required as specified in NSHE Board of Regents Handbook, NSHE Procedures and Guidelines Manual or other NSHE materials. If other plaques are required on buildings based on other standards (i.e. SPWB or others), coordinate location of two plaques in unison. Location, text, font, layout, finish and other features of all plaques are to be approved by the Owner prior to ordering, fabrication and installation.

Sustainability

The Owner is committed to continually improving its advocacy for sustainable and energy/water efficient technologies in the classroom, in research, and in the facilities. Innovative ideas and best practices will be utilized to achieve this aspiration within limits of funding and resource availability. In addition, since the Owner is a co-signer of the American College & University Presidents' Climate Commitment, all initiatives and actions will comply with that commitment. These commitments are noted in this document.

The Consultant shall assist Owner with evaluating, documenting, and complying with the desired green building design goals as applicable to each project designated by the Owner to pursue sustainability.

The A/E Consultant shall schedule meetings with Owner and with all necessary sub-consultants as necessary to facilitate successful compliance with the applicable green building design goals. The Consultant's submittal shall include the initial cost and the return on investment (when applicable) for each green building design feature. The Consultant shall prepare and submit all calculations necessary to demonstrate compliance with the desired reductions in building energy and water consumption.

The green building design goals for projects involving a building with a gross floor area greater than 20,000 square feet will typically include, at a minimum, a 20% reduction in energy consumption beyond the requirements of ASHRAE/IESNA Standard 90.1-2004 and a 20% reduction in water consumption beyond the requirements of the Energy Policy Act of 1992.

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Should the Owner determine that it wants the project to attain a LEED Certification; the Consultant shall assist the Owner with obtaining the LEED certification from the U.S. Green Building Council. The Consultant shall lead the process including all necessary sub-consultants, and LEED specialty consultants as necessary to facilitate successful completion of the certification process (including meetings during the construction administration phase and during the warranty period when necessary).

The following guidelines are overall comments and direction as mandated in the Owner's Sustainability Policy, draft submitted July 1, 2008. Please refer to specific other references to sustainable design within other sections of these Design Guidelines.

UNLV Sustainability Task Force Document recommendations:

Campus facilities to be planned designed and constructed to be sustainable, efficient and livable.

Energy Star rated products to be used where products exist (and UNLV FM validates that these are maintainable and conserve resources/provide performance.)

Consider the connection of all campus planning, design and construction projects to multimodal transportation systems, and review feasibility and implement with Owner's approval bicycle commuter facilities (storage, changing, showering in the context of access and the campus master plan) and priority parking for car poolers. (coordinate with Owner's Parking and Transit Services)

Provide recycling containers (in accordance with LEED requirements) and space provisions as such in projects where refuse containers exist, especially in central areas and consolidated refuse collection/service areas in projects.

American College and University Presidents Climate Commitment

Building systems and elements for projects must be focused on being climate neutral.

New campus construction is recommended to be designed and built to a LEED Silver standard or equivalent. Coordinate with UNLV Planning and Construction as to requirements for LEED Certification or other methods of tracking LEED equivalence/LEED Certification.) .

Projects must be designed and constructed to encourage use of and provide access to public transportation for all faculty, staff, students and visitors of the institution.

UNLV Task Force on Sustainability: Guidelines: Latest Edition

Design and construction should, when possible, embody approaches that reduce life cycle costs, restore or maintain the functioning of natural systems, and enhance human well-being, guided by the University's mission coupled with the University's resources and the Campus Master Plan.

Design and construction should promote practices (in the design and construction process, as well as the resultant facility) that maximize beneficial effects and minimize harmful effects of operations.

The Owner will evaluate the impacts of its construction projects; incorporate green building and design methods; and consider the needs of future generations of the University community, including its greater Las Vegas setting, in campus planning, with the goal of minimizing the environmental footprint of campus.

To maximize the energy efficiency of UNLV the facilities and buildings will be constructed, renovated and maintained using LEED as a guideline. The standards for new construction will require LEED-NC or equivalent at the silver level but not necessarily LEED Certification. The standards for existing buildings will require LEED-EB or equivalent at the silver level equivalency but not necessarily LEED Certification. (Coordinate with UNLV Planning and Construction as to requirements for LEED Certification or other methods of tracking LEED equivalence/LEED Certification.)

The Owner will contribute to the reduction of the waste streams to the landfills through construction and operations recycling and reuse of waste materials.

As a resident of the Desert Southwest, the Owner will utilize all means to reduce water use. Turf reduction and water efficient appliances /fixtures are only (some) examples.

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Alternate modes of transportation will be used or encouraged as appropriate.

New technologies, processes and procedures for improved sustainability will be reviewed and considered, not limited to renewable energy technologies.

Motion and light sensors shall be installed in existing buildings and new construction so that lighting is not wasted on unused space. In spaces with much natural sunlight, indoor lighting may be completely unnecessary for many days of the year in our climate.

Inefficient, aging equipment such as air handlers, motors, boilers, etc., in all possible cases shall be replaced with high energy efficient models.

Energy set-points shall be 78 degrees in summer and 68 degrees in winter for all facilities.

Incandescent lamps shall not be used. LED lamps or other efficient technologies shall be used for lighting.

Decorative lighting shall be kept to a minimum. Decorative lighting shall address project goals for building design and shall contribute to the overall lighting plan for the project.

Ambient light sensors to dim lights at the brightest part of the day shall be used when no cost is involved or the A/E Consultant shall validate if there is a cost/payback analysis that justifies their use with the Owner's approval.

Outdoor lighting systems will utilize the latest technologies in efficiency and 'dark skies'.

Replacements/retrofits will follow these same requirements as appropriate. Fixture and bulb selection must coordinate with the Owner's Facilities Maintenance standards for maintenance programs.

The design of parking structures shall consider the provision for photovoltaic panels on the top deck to provide the dual benefits of shaded parking spots and on-site power production. Due to the long payback periods and technology cost creative processes will be reviewed to make these viable options. Partnering with utility companies or other contractors is a possible avenue and will be investigated.

Planning and Construction shall consider potentials for new and existing buildings to be serviced in some fashion or proportion by alternative fuel sources such as solar and other renewable technologies.

Energy Star certified products will be purchased in all areas where such ratings exist. Review of inclusion in design and construction projects shall be conducted with the Owner's Facilities Maintenance of these items in terms of effectiveness and capability to maintain.

UNLV SUSTAINABILITY POLICY: Latest Edition
<http://urban21.unlv.edu/taskforce/policy.html>

Policy Statement

The mandate for the University of Nevada, Las Vegas (UNLV) is to be the beacon concerning environmental sustainability and energy/water efficiency. Best practices will be utilized to achieve the goals of sustainability within limits of funding and resource availability.

Reason for Policy

Although many of the actions for and energy/water efficiency are the responsibility of Facilities Management, overall environmental stewardship is a campus-wide mandate and needs to be viewed as such. To be good stewards of our environment and protect our natural resource, UNLV must have a primary objective directed toward sustainability. It is imperative that the campus adopts a sustainability and energy/water efficiency policy to promote efficient use of energy and water while protecting the environment. Effective Sustainability could result in savings that can be reinvested into UNLV high priorities, in addition to conserving our natural resources. Although energy conservation is the focus of this policy, comfortable work and study conditions must also be achieved.

Design, Construction and Sustainability Standards

Introduction

The Senior Vice President for Business Affairs (SVPBA), with Facilities Management as their agent, has the overall responsibility for energy and water efficiency for buildings at UNLV. The SVPF&B, together with Facilities Management and Planning and Construction, are in campus leadership roles to help promote and support overall environmental sustainability goals. The purpose of this procedure is to provide understanding, guidance, and direction to all who are involved in campus buildings.

Project Initiatives

Sustainable and Renewable Energy Sources:

- To investigate pending funds, determine resource availability, and then implement sustainable and renewable projects. These would include all technologies available such as Photovoltaic's, Solar Collectors, Bio-waste products, Ground Source Heat Pump Systems, and Water Smart Landscaping (Xeriscaping).
- To obtain all available rebates or subsidies from any sources to make these endeavors more economically viable. Examples are Nevada Power's Solar Generations and Sure Bet Programs or Southern Nevada Water Authority's landscaping rebate.
- Leadership in Energy and Environmental Design Existing Buildings (LEED EB):
- To use LEED EB as a guideline to apply to existing building renovations, replacements and repairs, as well as new construction.
- "Green" Products, Services and Equipment:
- During the planning and installation of all renovations, replacements, new construction, and repairs, Priority consideration must be given to high efficiency and environmentally friendly products and services. Examples of which are: lighting, motors, HVAC, etc.
- To purchase Energy Star appliances and equipment if available.
- To purchase "Green" products such as cleaning supplies.

Communications:

- To support overall campus environmental sustainability goals and to engage the Owner's Community (Faculty, Staff, and Students) in sustainability and energy efficiency. Any media options may be used "to get the word out."
- To continue to participate in programs which encourage the public to do its part. The Energy Star "Change a Light Campaign" is an example.

Process

UNLV Temperature Guidelines:

To maintain reasonable comfort and lower energy expenditures, UNLV has adopted the State of Nevada Energy Conservation Plan recommended standards for comfort heating and cooling. Summer thermostat settings (air conditioning) are to be 76 to 78 degrees F. Winter settings (heating) are to be 68 to 72 degrees F. Exceptions to these guidelines must be approved.

Building Resource Management:

Windows and doors need to be kept closed during the heating season and during the summer in those areas that have mechanical cooling. Every member of the UNLV community will be asked to assume the responsibility of closing windows, turning off personal (desktop) computers and other office equipment when not in use, and shutting off the lights when leaving a room. Energy management devices and strategies will continue to be added. Schedulers of classes, meetings, and other campus activities will endeavor to minimize energy use. Evening and weekend classes will be concentrated in the fewest buildings possible, and where appropriate, the buildings used will be those that already have late night temperature setback. Use of stairs rather than elevators, except for the physically challenged and persons transporting heavy equipment or materials, is encouraged.

Lighting:

In compliance with Nevada Assembly Bill 178, which states that by January 2012 all incandescent bulbs (lamps) will be banned in the state of Nevada, interior lighting will be energy efficient technologies such as fluorescent or LED as appropriate. New energy-saving fixtures, lamps and ballasts will be used to replace

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existing less efficient lighting whenever economically feasible and appropriate. Exterior lighting will be high-pressure sodium or metal halide (metal halide is preferred) whenever possible, and will meet minimum current safety requirements. Decorative lighting will be kept to a minimum. Lighting levels recommended by the most recent edition of the IES (Illuminating Engineering Society) Lighting Handbook shall be used as guidelines. Where it makes economic sense, occupancy/motion sensors (ultrasonic or infrared) wired to area lighting will be installed to reduce and/or turn off lights in unoccupied, vacated areas. Day-lighting controls will be installed to automatically adjust lighting levels as appropriate. Task lighting, such as desk lamps, is recommended to reduce overall ambient lighting levels. Desk lights will be of the fluorescent type, which are now readily available.

Space Heaters:

Only electric space heaters purchased and owned by UNLV are allowed for use in campus buildings. In addition, the use of space heaters is only for emergency and temporary conditions. This requirement is necessary for fire safety and energy efficiency. All space heaters used on campus must be approved for fire safety, as classified by the National Fire Protection Association. No liquid fueled space heaters (e.g., kerosene heaters) shall be used on the UNLV Campus. Some electric space heaters also pose an unacceptable fire hazard. All space heaters must meet the following four specifications:

- Heaters must be UL approved.
- They must have elements that are protected from contact.
- They need to be tilt-proof (when tipped over, heater goes off)
- The heater needs to be thermostat-controlled.

The issue of energy efficiency is important. Electric space heaters are a very costly means of heating. If a member of the campus community feels that a space heater is necessary for adequate warmth, this may indicate that the central heating system needs repair. Facilities Management will be consulted if the central heating system is incapable of meeting comfort requirements. Facilities Management will be contacted if a space heater is to be used to offset excessive air conditioning. State regulations require that UNLV follow ASHRAE Standard 90.1, which states that heating and cooling are not allowed simultaneously in the same space for the sole purpose of achieving comfort. Excessive cooling of a space on campus below the summertime UNLV Temperature Guidelines will be reported to UNLV Facilities Maintenance, in order for air-conditioning levels to be adjusted.

Window Air Conditioning Units:

The use of window air conditioning/heat pump units is discouraged, except in cases of last resort. Use of these units require Facilities Management approval. They cause damage to the buildings, have high life cycle cost (energy and maintenance), and are noisy. Facilities Management must approve a new application of a window unit. Specific petitions for installation will be reviewed only after Facilities Management has determined that the primary heating/cooling source is not capable of meeting UNLV Temperature Guidelines.

Switchover from Heating to Cooling and Cooling to Heating:

Facilities personnel perform required changeover from heating to air conditioning in the spring. Because of the varying equipment installed throughout the campus, buildings must be changed over individually. Because there are many aged systems on campus that require manual intervention between the heating and cooling seasons, Facilities Management performs the changeover based on priorities established to maintain required temperatures to protect equipment and research in progress, and serve the greatest number of individuals and activities. Cooling (Air Conditioning) may not begin until outside temperature is at or above 75 degrees F for three consecutive days. Temperature projections are also considered. Heating may not begin until the high outside air temperature has dropped below at least 55 degrees F for three consecutive days. The wide swings in temperature during the spring and fall of the year and the difficulty in switching between heating and cooling make this policy necessary. Special problems or hardships with this policy will be addressed to Facilities Management.

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UNLV Master Plan

Review the UNLV Master Plan, so that the project complies with the master plan principles and initiatives, including the following as a minimum:

- Executive Summary and other summary master plan information may be found at <http://masterplan.unlv.edu/>
- Recommended site capacity for building area and minimum number of stories
- Open space relationships
- Mall systems
- Campus circulation system (pedestrian, vehicular/service), including Campus Mall system and related circulation.
- Linkage to sites beyond the university, particularly at the Midtown UNLV sites
- Consider the university's relationship with the adjacent community and design buildings at the edge of campus to engage the community.
- Other considerations.

Security Considerations

Consideration should be given to the design of the exterior space around the building. There should be adequate lighting and visibility for pedestrians to accommodate their safety. Landscaping and building features should be designed such that there are no areas where someone can hide and pedestrian safety is maximized always. Provide appropriately located conduit to provide coverage of main entries, service entries, and main walking paths around the building.

All exterior doors shall be equipped with an electronic strike controlled by the access control system mandated by the UNLV FM Lock Shop. Provide conduit for Owner's card readers at all exterior doors (primary and secondary entries). The Owner will designate which doors will receive the card readers. Refer to hardware standards for more information.

Provide security cameras on both exterior site areas and interior public spaces. Exact locations shall be determined in coordination with the Owner. Location of cameras shall be coordinated with UNLV Police, through the Owner, to address security, privacy and surveillance issues.

Determine locations of existing Emergency Phones near the project, to include at a minimum emergency phones near all exterior entries and in parking and site areas within the project site area, and coordinate with the Owner all final Emergency Phone locations.

Building Commissioning

Building Commissioning shall be required on all major projects. Commissioning observation and review shall be done by a third-party firm specializing in testing and commissioning of mechanical, electrical, climate control, and smoke control systems. This shall be done to test and document the functionality of the systems to confirm that the performance meets the documented design intent and the owner's operational requirements. The construction contractor and their subcontractors shall provide all services, verifications and activities to support the commissioning review and observation by the third-party commissioning consultant. Systems to be tested and commissioned shall include the following as applicable to each project. Other systems may require commissioning in projects based on the specific systems applicable to each project.

Mechanical/Plumbing:

- Cooling System
- Heating System
- Air handling and Ventilation System
- Terminal Units
- Fume Hood Systems (If applicable)
- Exhaust System
- Plumbing systems (domestic hot water, sinks, toilets, specialty systems, and other plumbing systems).

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- Facility Automation System/EMCS and related controls
- Building HVAC Controls/ EMCS

Electrical:

- Lighting Controls System
- Emergency Power System
- Power Distribution System
- Electromagnetic Interference and other shielding requirement compliance.
- Security systems
- Data and telecommunication systems

Process:

- Lab gases and Vacuum systems
- Process chilled water systems

Site

Civil Site Design

All projects shall be above grade and shall have positive drainage away from buildings.

Civil design shall be addressed early in the project to address grading and drainage issues, utility coordination, traffic control, and accessibility. (i.e. limit/ eliminate handrails where possible, provide positive drainage away from the building(s) at the entire perimeter and at all entries and openings.)

Fire Lane Routes

In consultation with the Owner, designate the fire lane route to the building in coordination with the existing fire lane for the campus. The Owner, the Architect, and the Civil Engineer will meet with the Clark County Fire Department (CCFD) to review the proposed route. Upon preliminary approval of the proposed route by the CCFD, the civil engineer will complete the design documents for submittal to the CCFD. If the CCFD proposes changes to the route, the Architect must meet with UNLV to discuss the changes before revising the documents.

Public Utility Equipment and Service/Access

In consultation with the Owner, designate the locations of equipment and screening methods for all equipment such as transformers, backflow devices, meters, etc. that service the building or campus. The Owner, Architect, and the Architect's sub-consultant will meet with each public utility that is providing service for the project to review the proposed design. Upon preliminary approval of the proposed route, equipment location and specifications by the public utility, the sub-consultant will complete the design documents for submittal to the public utility. If the public utility proposes changes to the design, the Architect must meet with the Owner to discuss the changes, before revising the documents. The Architect must locate this equipment, so it does not conflict with pedestrian and vehicular circulation and is set back from sidewalks and other open space.

Do not locate this equipment in or adjacent to the main mall quad, open space or pedestrian access areas.

Investigate utility availability, capacity, access and location to determine the impacts (cost, convenience, disruption) on the project and on the campus. Utilities include but are not limited to the following: Sanitary Sewer, Storm Sewer, Gas, Water (Fire and Domestic), Electricity, Emergency Power, Data, Telephone, Cable and Central Plant Services.

Coordinate all utility services with Owner Plant Capacity and Plant Investment Fee (PIF) program to ensure capacity and PIF concerns are addressed.

Coordinate all applications for service, design initiation, design review, service agreements and other utility procedural items with Owner.

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Accessibility

Public buildings and their related sites which are accessible to the public and/or offer employment to individuals with disabilities shall comply with all requirements of the latest adopted edition of the building code and with ADA, ADAAG, and ICC/ANSI regulations. Coordinate all access/accessibility items with other civil design issues as well as architectural, lighting, landscape and other design components.

All major building entries must be accessible. In consultation with Owner determine designated accessible route from the campus main walkways, nearest staff and student parking lots, and nearest transit stop to the main entries of the building. The project must provide adequate signage that designates the accessible routes. Slopes that meet sidewalk criteria (1:20 or less) are highly preferred to accessible ramps requiring landings and handrails. If these sidewalk criteria cannot be met, the Consultant shall review alternatives with the Owner prior to proceeding with the design.

Walkways, steps, ramps, and accessible routes shall be designed with slip-resistant surfaces as required by ADA, ADAAG, and ICC/ANSI regulations.

Site Lighting

Site lighting shall be restricted to that required for safety and function, and shall be shielded from adjacent properties and from the sky. Site lighting shall incorporate appropriately selected cut-off light fixtures that meet or exceed the sustainability initiatives, policies and requirements as outlined in these Design Guidelines.

Flight Path: McCarran International Airport

UNLV is located within the flight path of McCarran International Airport. Building heights must be within the limits set forth by the FAA. In conjunction with Owner determine building height limitations using FAA maps. Building design must address issues of noise and vibration so that the building programs are not adversely affected (See Appendix 5).

Site Design and Improvements

- Do not empty roof drains onto sidewalks. Where feasible, connect roof drains to subsurface storm sewer system.
- Concrete (not asphalt) shall be used for sidewalks
- Consider special areas for alternative hardscape materials.
- Site design shall ensure positive drainage and minimum erosion.
- Structural sections for access roads and parking areas shall be designed in accordance with the recommendations of the geotechnical report for the project and shall be coordinated with any Uniform Standards for appropriate use designations (i.e. structural, traffic, walkway, landscaping, etc.)
- Site design shall include appropriate consideration for on-site parking, traffic circulation, and site ingress and egress.
- Traffic control, pavement markings, and exterior signage shall comply with the guidelines listed in the most current edition of the Manual on Uniform Traffic Control Devices (published by the U.S. Department of Transportation).
- Trash receptacles, emergency generators, cooling towers and other similar equipment shall be enclosed or screened in accordance with the Owner's approved types, models, and specifications as noted in the Owner's Technical Specifications.
- Site furnishings, guardrails, and handrails shall be designed to discourage the use of skateboards, roller blades, etc. in accordance with the Owner's approved types, models, and specifications as noted in the Owner's Technical Specifications.

Transportation requirements must be considered for each project. Major considerations in this area include:

- All projects must provide a means of access in compliance with accessibility and other codes to accessible parking, within the campus network of accessible campus parking. Based on code requirements and approval by the Owner, this may include site improvements for accessible parking or accessible routes to existing accessible parking.

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- Project planning and budgeting must include provisions for parking replacement and new parking supply subject to specific conditions of the project. This may include all types and classifications of parking (i.e. student, faculty/staff, metered, accessible, etc...)
- All projects must coordinate with Owner's Shuttle services. This includes planning for accessible routes, shuttle stops/signage, shuttle directional signage and other provisions.
- All projects must consider access and provisions for public transit and alternative transit in consultation with the Owner. This may include coordination with any public transit routes on campus for vehicle and transit stop accommodation, provisions for carpools, alternative fuel vehicles, bikes, pedestrian access and other means of public or alternative transit.
- Parking layouts are required where existing parking is impeded or new parking added.

Site Amenities

- Provide fixed site amenities and furnishings. Plan for site amenities and furnishings that are part of the FF&E project package. Consider amenities in the vicinity. For instance, every building does not need a bike rack, but if there are none in the vicinity, consider locating them at the project site. Similar consideration will apply for trash receptacles, benches and other standard and special site amenities and furnishings.
- Recycle Bins: Recycle Bins shall be provided at appropriate locations and integrated into the landscape and exterior design as appropriate. Typically, they will be located at entries/exits as a minimum, but this must be coordinated with the Owner's Project Manager and in accordance with the Owner's technical standards.

Landscape

General Information

- Grading, dust control, weed control, curbs, gutters, streets, off-street parking, and sidewalks shall conform to local ordinances, design and site construction standards.
- Maintenance requirements shall be included in the specifications of selected planting/species.

Landscaping

- This is a desert environment, and one of the key goals for the Owner is to be sustainable. Drought-tolerant, low water use and native plants must be considered in all landscaping designs. Consultant shall meet with the Owner during the early design phase to review acceptable plant materials.
- Landscaping design shall be appropriate for the type of building, the environmental setting, and the needs of the building occupants. Plant selection shall be adaptable to USDA zone 9b or Sunset zone 11 and shall be approved by Owner prior to final design (See Appendix 6).
- Connect to the existing landscaping when proposing design solutions. Sitework and landscaping in projects should connect to adjacent projects and improvements in a consistent and sensible manner to maintain a coordinated campus environment. Meet with UNLV representative to ensure proper water pressure and volume is maintained so it does not affect existing landscape.
- Existing trees shall be preserved where practical.
- Grass/turf, if used, should not be planted up to the sidewalk to prevent overspray. Grass/turf shall only be considered where it provides functional benefits (i.e. events and activity space) or connects in a reasonable manner to adjacent existing campus grass/turf. These connections to adjacent existing grass/turf shall be accomplished in the most efficient and sensible manner to accomplish project objectives and connections while limiting the use of grass/turf.

Water Conservation

- Landscaping design shall minimize water use and maintenance.
- Irrigation systems shall be automatically controlled and drip irrigation shall be provided in tree and shrub areas. Irrigation controls must fully integrate with the existing system used on campus.
- Lawn sprinkler designs shall provide for head-to-head coverage. Irrigation systems shall be designed to ensure proper line size to accommodate water volume and pressure requirements of the system.

Design, Construction and Sustainability Standards

Exterior Signage

Wayfinding concept:

Projects will incorporate Owner's kiosk monuments with maps at the main building entry. Owner's kiosk monuments need to be considered at secondary building entries and main access paths to or from the project site (Refer to Appendix 3).

Building identification signage.

- All main building entries shall have Owner's Building ID signs with building and program names on sign header and slats.
- Buildings shall have building name signage clearly visible in 12" - 18" high letters at major building entries and approaches. Building names and signage shall be approved by Owner. The first letter shall be capitalized and 18" high with the rest in lower case in Bronze or Silver opposite the background.
- Building signage shall include the three-letter designation identification in all caps 12" - 18" high letters, coordinated with building names locations, entries and building access paths/approaches.

Building plaques:

- Building plaques shall be one piece cast bronze and shall be provided in accordance with the Nevada System of Higher Education Procedures and Guidelines Manual, Chapter 1, Section 1.
- In certain instances, unique building plaques, donor signage or other recognition may be required. All instances of these types of signage or plaques shall be approved by Owner (See Appendix 4).

Architectural Design Standards

General

Following information are general comments that should be addressed or taken into consideration on all of the Owner's buildings.

Service Access

Identify the service entry for buildings. Designate the service route from the nearest street or access to the service entry. Avoid pedestrian and vehicle conflicts. Consider campus deliveries including mail delivery, general commercial deliveries, trash pick-up, and hazardous material delivery and disposal. Design service access and service area for the largest delivery vehicle that will (regularly) service the building.

- Is a loading dock appropriate?
- Are roll-up doors required?
- Is a freight elevator required near the service entry?

Provide service access in a manner that is most consistent with the campus master plan and reduces or eliminates disruptions to pedestrian access, non-service access or general campus activity. Service access should be located, designed, and screened, to be discrete and non-disruptive to non-service campus activities.

Locate service access to provide direct access to spaces/functions within the building that require it. This may include, but not be limited to:

- Building receiving
- Mail
- Building technical services (electrical, IDF, mechanical areas)
- Freight/service-related elevators
- Other building elements.

Room Numbering

Submit room numbering plans to the Owner for approval, prior to finalizing design documents. Every room, (including corridors and building service rooms) will receive a room number. Owner must approve all room numbering plans.

Design, Construction and Sustainability Standards

Equipment and Trash Enclosures

All exterior mechanical or electrical equipment shall be screened from view. This includes rooftop equipment and ground-level equipment. The screening should be adequate to fully cover the equipment from ground level or adjacent building view. Screening must be reviewed and accepted by any applicable utility provider.

Trash enclosures shall be provided with each project unless waived by Owner. Trash enclosures must be screened from public areas, campus view corridors and building entries. Screening shall be provided from ground level views and any adjacent building views.

Building Services: Infrastructure

An integral part of the programming and designing the project is to plan for a well integrated infrastructure to support not only the building, but anticipated and programmed equipment, furniture and fixtures.

Aside from typical building services and infrastructure, the following items must be addressed during initial project planning:

- HVAC
- Plumbing
- Electrical
- Specialty services
- Other building services and infrastructure

Incorporate the above into every project, unless directed otherwise by the Owner.

As previously noted in these Guidelines, the planning for this infrastructure begins during programming. Space plan and furniture layouts during design shall take all infrastructure requirements into account.

- Data/phone
- Wireless
- Emergency power (when applicable)
- Emergency phones (where applicable)
- Security cameras (where applicable)

Building/Space/Room Design Guidelines

General

Consultant or contractor is to verify with Owner if central clock systems are to be included in projects, with clocks to be considered at a minimum in and directly outside of classrooms, class laboratories and lecture halls. Clocks may be needed in other areas, if required, including but limited to reception areas to suites, wet labs, corridors and other areas.

Building services (power, data, etc.) acoustics, lighting, sound/vibration attenuation, electrical interference attenuation/treatment, HVAC, structural and other performance requirements/measures are to be addressed for all spaces based on operational, equipment and user requirements. This is particularly important for spaces/equipment that have uses, operations and equipment that either require special consideration in these areas to function properly, or have uses, operations and equipment that lead to issues that require special treatment to not impact other areas of the building. Considerations here may include, but are not limited to:

- Mechanical, plumbing, vacuum, compressed air and electrical equipment/services
- Laboratory and class laboratory equipment
- Audio-Visual equipment/services
- Storage systems (standard, high-density, automated retrieval and other storage systems)
- Medical, dental and other clinical or health services equipment
- Other items with special requirements

Coordinate the specification, provision and installation of all toilet, washroom and related accessories with the Owner, to ensure operation criteria are addressed.

Radioactive-type building exit signs or other illuminated signs are not to be used.

Design, Construction and Sustainability Standards

Provide code required and Owner required fixed mounted, safety related devices per code, and consider access to these items to meet code requirements and functional access accounting for access control and locked/restricted access doors. Final location of these items are subject to Owner approval. These items are to be provided in the construction budget, and include but are not limited to:

- Fire extinguishers (semi-recessed or recessed cabinet, extinguisher type to be determined based on nature of fire risk in room/area)
- Eye washes and emergency showers with drains
- Automatic External Defibrillator (AED's) (one per every other floor per building, to be located in an easily accessible and visible public area, with building services necessary for AED function (i.e. power, data, telephone))

Mock-ups of typical exterior wall materials and finishes will be required as well as for unique or high performance requirement elements of the building (i.e. exterior finishes/systems, specialized casework, a standard module of a building with performance requirements where a mock-up will reduce potential for errors in the final product.) This should be included in drawings, specifications and in the construction budget.

Provide interior wall and corner protection in areas of building subject to heavy use and movement of materials, supplies and equipment.

All UNLV buildings are to be designed for wireless data services. Construction budget shall include conduit, cabling and terminations for all elements of a wireless data system.

In consultation with Owner, floor drains are to be provided where plumbing fixtures exists and there is a risk of flooding if a plumbing fixture malfunctions or generates high flow (i.e. eye showers, restrooms, mechanical areas with water service, areas with significant plumbing fixture counts, other conditions.)

Acoustical considerations are to be reviewed and addressed in terms of overall building performance, specific room/space performance, and adjacency of room/space performance. This applies to all acoustical performance issues/requirements, including but not limited to the performance of acoustics within a room/space to support function, the isolation of acoustics from a room/ space to support function, and the relationship between rooms/spaces (horizontally and vertically) to support acoustical performance/function. Consultant, vendor and contractor shall identify the schedule, function and performance requirements of rooms/spaces, for the full range of acoustical issues (i.e. frequency, volume, performance requirements, other requirements) and address these issues and performance standards to support the function and performance of the facility (i.e. classroom, auditoria, performance and media playback spaces functioning with the room, and not disturbing adjacent rooms, privacy of speech issues in rooms, critical acoustical isolation between adjacent rooms, other items).

Location of the mail room and specific requirements for number of mailboxes, as well as other spatial and mailroom arrangement requirements should be verified for each applicable project with the Owner.

Mailbox numbering, key specifications and procurement shall be coordinated with the Owner to ensure the campus uniformity.

Space Requirements:

At the end of this section are individual Space/Room Design Layout/Information Sheets. These space/room sheets illustrate the layout and features of some common/typically programmed spaces (but is not fully inclusive of all potential spaces) and provide typical square footages, suggested FF&E layouts as well as detailed information on power, data and other infrastructure requirements. Spaces may require further investigation during design; particularly for spaces likely to have more specific requirements based on use (i.e. offices and service spaces are more likely to be typical, whereas classrooms, labs and clinical spaces are more likely to require specific investigation on a project-by project basis).

The following table shall be used as a guideline in assigning office and support spaces in design. Where applicable and efficient for building planning, Consultant shall work with Owner to assign space allowances to typical building program elements that are repeated to allow flexibility/consistency with building planning

Design, Construction and Sustainability Standards

modules for building systems coordination (i.e. building structure, exterior window systems modules, etc...) Space assignment shall take into consideration future flexibility of space for potential building remodel as well. It is the goal that the minimum necessary space types be used to accomplish project space goals, accommodation of users and required FF&E in a space, and provide modular flexibility for future remodel or reimplementation of space as functions and users change.

These areas shall be verified with the Owner’s Project Manager during programming and design.

Space Assignment Guidelines: In consultation with the Owner, a planning module is to be established for the basis of space planning. 65 net square feet is considered a good starting space planning module for administrative and office space (excludes classrooms, laboratories and other special purpose spaces)

Office	Suggested Allowable Net Space (SF)
Senior Vice President	250
Associate Vice President/Executive Director	170
Dean	170
Associate Dean	145
Director/ Department Chair	145
Standard Office	90-120
Two-Person Office	120-145
Standard Cubicle	60-100
Student Workstation	30-35

Support Spaces

Custodial Closets	100 min.
MDF Rooms	140 min.
IDF Rooms	80 min.
Copy/work rooms	120

Spaces below largely depend on specific program intent, equipment/usage. Guidelines below are general in nature, and specific space assignments shall be verified during programming and design.

Department Conference	120-160
Breakout Space	130 min.
Classroom Minimum Size (30)	700 min.
Computer Lab (20-25)	400 min.
Lecture Hall (150)	3,200 min.
Lecture Hall (100)	2,200min.
Lecture Hall (80)	1,700 min.
Wet Lab	600 nsf per bay (subject to specifics of wet lab type)

Consultant shall prepare similar space/room specification sheets as part of the programming phase, with appropriate spaces and space features per project.

Specific Space Requirements

Below are a series of specific space requirements for projects at UNLV. These requirements are intended to highlight major points/elements and items relative to the design, performance and construction of these spaces. Specific project programming information may supplement these requirements. Spaces may exist in project programs that are not specifically addressed in these standards where supplemental program data may provide information for these spaces.

These standards are to be used in guidance for design, construction and performance of these spaces and as general information, for typical UNLV requirements:

Design, Construction and Sustainability Standards

- Offices: Show furniture and equipment layout on floor plans at Schematic Design, Design Development, and Construction Documents Phases. Provide separate floor plan for furniture and equipment. Demonstrate ADA clearances in offices with furniture shown to scale.
- Provide as much natural light as possible.
- Indirect lighting is preferred for artificial light.
- Provide 3-way switching w/ occupancy sensor.
- Floor Finish: Carpet or carpet tile (per Owner's approval).
- Base: Rubber.
- Walls: Paint: Corridors: Semi-gloss. Offices and Open Office Areas: Eggshell or Low Sheen. Storage/Utility Rooms: Semi-gloss
- Ceilings: Provide acoustical ceiling tile treatment: 2x4 lay-in w/ reflective tile as base option, or other to be approved by Owner. Paint: Flat finish (except in food preparation and kitchen areas).
- Doors: Wood stain grade doors (no lights), 15" min. door offset from wall to provide space for bookcase behind door.
- Show data and power locations on plans. Duplex power receptacle min. to be provided on each office wall (4 power receptacles per office min.), quad power receptacle preferable on return side of desk in place of duplex receptacle, quad data receptacle min. to be provided on desk and credenza wall locations (2 data receptacles per office min.)
- Signs: Provide Owner's standard room signs
- Window Treatments: Hand operable, fabric screen shade. Mechoshade or approved equal.
- Corridors in office areas: Double loaded corridors should terminate with natural light whenever possible. Doors should be offset across corridors (i.e. doors of spaces across a corridor should not align and should be fully offset for visual and acoustical reasons) to maximize privacy.
- Provide acoustical privacy in private offices. Preferable methods are through insulated walls and ceiling tiles/surfaces. Insulated/finished walls to bottom of deck may be used as well. Consideration of measures of acoustical privacy relative to building systems shall be considered as well (i.e. HVAC provisions and other.) Provisions for acoustical privacy shall have special consideration and measures (i.e. insulated and finished walls to bottom of deck, other measures to meet performance criteria) at areas of high acoustical privacy, i.e. counseling rooms, HIPAA compliant spaces, spaces where matters of high privacy are discussed, etc...
- Access control: Hard key unless otherwise requested by Owner.

Office and Administrative Areas

Individual departments have internal procedures that address security procedures and operations. A project's design should enhance these procedures and the capability of the department to properly secure their areas of responsibility. Coordinate closely through Owner's Project Manager with department and security representatives before renovating an office or administrative area.

Conference Rooms

Show furniture and equipment layout on floor plans at Schematic Design Phase. At Design Development and Construction Documents Phases, provide separate floor plan for furniture and equipment.

- Demonstrate ADA clearances with furniture shown to scale.
- Provide natural light as much as possible
- Indirect lighting is preferred for artificial light
- Provide 3-way switching w/ occupancy sensor
- Floor Finish: carpet or carpet tile: per Owner's approval
- Base: Rubber
- Walls: Paint: Semi-gloss or eggshell
- Ceilings: Provide acoustical ceiling tile treatment: 2x4 lay-in w/ reflective tile base option, or other to be approved by Owner.

Design, Construction and Sustainability Standards

- Doors: Wood stain grade doors (lites to be approved by Owner), 15" door offset from wall to provide space for bookcase behind door.
- Show data and power locations on plans. Duplex power receptacle min. to be provided on each wall (4 power receptacles min.), quad data receptacle min. to be provided on two wall locations min. Power and data receptacles shall be provided in floors to support equipment use and furniture layout.
- Signs: Provide Owner's standard room signs
- Window Treatments: Hand operable, fabric screen shade. Mechoshade or approved equal.
- Provide acoustical privacy in private offices. Preferable methods are through insulated walls and ceiling tiles/surfaces. Insulated/finished walls to bottom of deck may be used as well. Consideration of measures of acoustical privacy relative to building systems shall be considered as well (i.e. HVAC provisions and other.) Provisions for acoustical privacy shall have special consideration and measures (i.e. insulated and finished walls to bottom of deck, other measures to meet performance criteria) at areas of high acoustical privacy, i.e. counseling rooms, HIPAA compliant spaces, spaces where matters of high privacy are discussed, etc.
- Conference rooms typically have audio-visual systems in them, for visual systems/projection, audio systems, lecterns and other considerations to support classroom use. Audio-visual systems and their performance is to be coordinated with building services, acoustical, lighting and other systems.
- Provide key access control to all conference rooms. Coordinate with Owner where proximity card reader is required on conference rooms, and where conference room doors require 'tap to open, tap to lock' capability.
- Special Considerations: Consider donor signage or potential for future signage applications in design.

Lobbies

- Main entries should have vestibules with built-in recessed walk-off mats.
- Lobby floor finishes should be durable attractive (poured in place terrazzo is preferred. Terrazzo tile or other approved tile finish is acceptable.)
- Carpet, vinyl tile and exposed concrete are not desirable. In existing buildings, carpet may be required for acoustical reasons.
- Lobbies should have direct access to toilet rooms that are visually screened. Wayfinding is important in lobbies. Lied Library is an example of a building designed with wayfinding in mind. Provide building directories, wayfinding/directional signage, code required signage (exiting, accessibility and other) and other signage in construction budget.
- Provide building directories, wayfinding/directional signage, code required signage (exiting, accessibility and other) and other signage. Provide these items in construction budget.
- Stairs need to be visible from the lobby.
- Passenger elevators should be convenient to the lobby and well signed for accessibility.
- Provide a building directory in the main lobby and secondary entries as suitable.
- Provide a location for news stands for campus publications

Elements that should be considered when designing lobbies:

- Donor wall
- Seating
- Screened trash/recycling receptacles
- Data and power for lobby users
- Campus telephone
- Upgraded finishes for appearance and durability
- Monitors for building information
- Specialty lighting
- Reception or security counter
- Natural lighting
- Display cases
- Bulletin boards.

Design, Construction and Sustainability Standards

Potential areas near the lobby:

- Concession area
- Vending area
- Recycle bins

Window Treatments:

- Hand operable
- Fabric screen shade.
- Mechoshade or approved equal.

Classrooms (Including Class Dry Labs/Computer Labs and similar spaces)

General: Classrooms (Including Class Dry Labs/Computer Labs and similar spaces) can be very unique and custom designed spaces to support the activities and teaching methods that occur within them.

It is typical that these types of spaces may have unique requirements accordingly, and special needs for fixed furniture, equipment, building services, audio-visual equipment, HVAC service/tolerances/redundancy, access control, and other features.

Below are some general guidelines to support the requirements of these spaces that are subject to refinement, validation and further definition based on the specific function, requirements and activities of a particular space.

Floor Finish:

- Carpet tile.
- In consultation with Owner other materials such as VCT or seamless flooring may be necessary.

Base:

- Rubber

Walls:

- Paint: Semi-gloss, min.
- Apply acoustical treatment as required to provide an effective classroom environment.

Ceilings:

- Provide acoustical ceiling tile treatment.
- 2x4 lay-in w/ reflective tile min.
- Provide other finishes, such as painted drywall or other ceiling systems to address acoustical, lighting, A/V and other performance considerations.

Doors:

- Wood stain grade doors (w/ lite) Door size.

Show data and power locations on plans.

In consultation with Owner provide hard wired power and data at all fixed classroom furniture through furniture systems.

If furniture is not fixed, power and data is to be provided in both floors and walls to provide a reasonable 'grid' of power and data to support access to these services based on multiple potential furniture configurations.

Fixed classroom furniture and equipment is to be provided in the construction budget unless Owner approves otherwise.

Signs:

- Provide Owner's standard room signs.

Design, Construction and Sustainability Standards

Directories:

- In consultation with Owner provide monitor directories outside of classrooms for information, schedule and other display information, unless specifically waived by Owner.

Accessibility:

- Ensure accessibility standards are met in classrooms, including but not limited to audio-visual systems compliance, assisted listening systems, number, location and distribution of accessible seating locations, floor walks/ ramps/stairs, handrails, and other elements of accessibility.
- Integrate accessibility elements into the base design so that they are functional, meet requirements, and integrated into the design so that they are not 'afterthoughts' or appear/act as supplementary to the overall design.
- Integrate principals of universal design.

Classrooms are to have audio-visual systems in them, for visual systems/ projection, audio systems, lecterns and other considerations to support classroom use.

Audio-visual systems and their performance is to be coordinated with building services, acoustical, lighting, window treatments and other systems.

Sloped floors in classrooms need to be provided where size and configuration requires a sloped floor for sightlines and classroom function (i.e. typically over 50 students, subject to program verification).

Ceiling configuration needs to be considered to work with floor configuration and support classroom and classrooms systems functions (i.e. A/V systems, lighting, acoustics, service access, surface treatment and other considerations for function).

Provide electronic access control to all classroom doors, with 'tap to open, tap to lock' capability.

Window Treatments:

- Hand operable
- Fabric screen shade.
- Mechoshade or approved equal.

Special Considerations:

- Consider donor signage or potential for future signage applications in design.

Wet Labs (Including Research, Teaching and other Wet Labs and similar spaces)

General: Wet Labs can be unique and custom designed spaces to support the activities and research that occur within them.

It is typical that wet labs will have unique requirements accordingly, and special needs for fixed furniture, equipment, building services (i.e. power, water, RO/DI water, data, gas, compressed air, vacuum and other services), shielding, vibration tolerances, EMI resistance/levels, HVAC service/ tolerances/redundancy, access control, structural requirements and other features.

Below are some general guidelines to support the requirements of wet labs that are subject to refinement, validation and further definition based on the specific function, requirements and activities of a particular wet lab.

Floor/Base Finish:

- VCT, seamless surface, chemical, static, microbial or other resistance, other as required based on program, use, and equipment requirements.

Walls:

- Paint: Semi-gloss, min.

Design, Construction and Sustainability Standards

- Special/upgraded finishes to address chemical, static, microbial or other resistance, shielding requirements, or other as required based on program, use, equipment requirements.

Ceilings:

- Provide washable and chemical/stain resistant acoustical ceiling tile treatment.
- 2x4 lay-in w/ reflective tile min.
- Special/upgraded finishes to address chemical, static, microbial or other resistance, other as required based on program, use, equipment requirements.

Doors:

- Wood stain grade doors (w/ lite) 36" min. larger as required.
- Special upgraded finishes and performance to address chemical, static, microbial or other resistance, shielding requirements, or other as required based on program, use, equipment requirements.

Provide fixed furniture and equipment (lab benches, shelving/cabinets, carriers and other fixed systems) in labs and coordinate with building services (i.e. power, water, RO/DI water, data, gas, compressed air, vacuum and other services) to provide all required building services in a modular and regular manner (i.e. 3' on center, 6' on center, other).

Provide all building services (HVAC, power, water, RO/DI water, data, gas, compressed air, vacuum and other services) to support space use and to support equipment to be used in space.

Signs:

- Provide Owner's standard room signs.

Shielding:

- Provide shielding from electrical interference (EMI, RF and other types) or to contain any radioactivity or other items/activities requiring containment in the space (e.g. shielded walls), to support the operational requirements of equipment and activities in wet labs.

Vibration resistance/tolerances:

- Ensure vibration tolerances are met for equipment/instrumentation operation and to support research activities.

Accessibility:

- Ensure accessibility standards are met in wet labs.
- Provide electronic access control to overall clinic area (i.e. clinical area access should be controlled by card reader to manage patient and visitor access), and provide additional card readers as required to specific clinical spaces.

Window Treatments:

- Hand operable
- Fabric screen shade.
- Mechoshade or approved equal.

Special Considerations:

- Consider donor signage potentials and special signage for functional or warning purposes in design.
- Plan wet labs on a modular basis to work with furniture and equipment. Design with modularity to allow for future flexibility in space use, arrangement, assignment and provisions for furniture and equipment. This applies to many items in the wet lab design (structural bays, layout of bench and equipment areas, design of benches and their modularity/adjustability (layout, height, etc...) and other considerations.
- Lockable storage, in furniture and equipment and built-in casework, should be provided based on the user needs.

Design, Construction and Sustainability Standards

- Management and disposal of biohazards must be addressed, per the requirements of the operations needs of clinical facilities.
- Provide analysis of and provision for any chemical storage and use provisions (fire separations/ratings, control areas, maximum allowable chemical storage, etc....)
- Provide for and coordinate all lab safety provisions and requirements.
- Provide eye-wash, emergency shower and other safety equipment in clinical areas where chemicals, fluids, pathogen carrying materials or other such items or activities warrant safety equipment and provisions. Refer to Risk Management and Safety Design Considerations.
- Although important for all aspects of the project, design and construction and construction administration/verification to support specific technical requirements for equipment and activities is particularly critical to wet lab performance and function.

Clinical Spaces (Including Clinical Research, Teaching, Service and other similar spaces)

- Clinical spaces can be unique and custom designed spaces to support the activities and research that occur within them.
- It is typical that clinical spaces will have unique requirements accordingly, and special needs for equipment, building services (i.e. power, water, RO/DI water, data, gas, compressed air, vacuum and other services), shielding, vibration tolerances, HVAC service/tolerances/redundancy, access control, privacy, structural requirements and other features.

Below are some general guidelines to support the requirements of clinical spaces that are subject to refinement, validation and further definition based on the specific function, requirements and activities of a clinical space.

Floor/Base Finish:

- VCT, seamless surface, chemical, static, microbial or other resistance, other as required based on program, use, and equipment requirements.

Walls:

- Paint: Semi-gloss, min.
- Special/upgraded finishes to address chemical, static, microbial or other resistance, shielding requirements, or other as required based on program, use, equipment requirements.

Ceilings:

- Provide acoustical ceiling tile treatment.
- 2x4 lay-in w/ reflective tile min. May be required to be washable, and chemical/stain resistant based on specific space program/use.
- Special/upgraded finishes to address chemical, static, microbial or other resistance, other as required based on program, use, equipment requirements.

Doors:

- Wood stain grade doors (w/o lite standard) 36" min. larger as required.
- Special/upgraded finishes and performance to address chemical, static, microbial or other resistance, shielding requirements, or other as required based on program, use, equipment requirements.
- Lites in doors should be reviewed based on use.

Provide fixed furniture and equipment (shelving/cabinets, other fixed systems) in clinical spaces and coordinate with building services (i.e. power, water, RO/DI water, data, gas, compressed air, vacuum and other services) to provide all required building services in a manner to service clinical spaces.

Provide all building services (HVAC, power, water, RO/DI water, data, gas, compressed air, vacuum and other services) to support space use and to support equipment to be used in space.

Signs:

Design, Construction and Sustainability Standards

- Provide Owner's standard room signs.

Shielding:

- Provide shielding from electrical interference (EMI, RF and other types) or to contain any radioactivity or other items/activities requiring containment in the space (i.e. shielded walls), to support the operational requirements of equipment and activities in clinical spaces.

Vibration resistance/tolerances:

- Ensure vibration tolerances are met for equipment/ instrumentation operation and to support clinical activities.

Accessibility:

- Ensure accessibility standards are met in clinical spaces.
- Provide electronic access control to overall clinic area (i.e. clinical area access should be controlled by card reader to manage patient and visitor access), and provide additional card readers as required to specific clinical spaces.

Window Treatments:

- Hand operable
- Fabric screen shade.
- Mechoshade or approved equal.

Special Considerations:

- Consider donor signage potentials and special signage for functional, safety or warning purposes in design.
- Plan clinical spaces on a modular basis to work with furniture and equipment. Design with modularity to allow for future flexibility in space use, arrangement, assignment and provisions for furniture and equipment.
- Address all HIPAA, OSHA and other requirements for the operations of clinical spaces. This may include but not be limited to privacy, acoustical performance, records security, quality of finishes (ability to clean/disinfect, non-porous/resistant to bacterial growth, other items) and other considerations relative to specialty function/requirements for clinical spaces.
- Lockable storage, in furniture and equipment and built-in casework, should be provided based on the user needs.
- Management and disposal of biohazards must be addressed, per the requirements of the operations needs of clinical facilities.
- Provide analysis of and provision for any chemical storage and use provisions (fire separations/ratings, control areas, maximum allowable chemical storage, etc....)
- Provide for and coordinate all clinical safety provisions and requirements.
- Provide eye-wash, emergency shower and other safety equipment in clinical areas where chemicals, fluids, pathogen carrying materials, or other such items or activities warrant safety equipment and provisions. Refer to Risk Management and Safety Design Considerations.
- Although important for all aspects of the project, design and construction and construction administration/verification to support specific technical requirements for equipment and activities is particularly critical to clinical space performance and function.

Audio/Visual Guidance

- These standards for audio-visual FF&E are general in nature. Specific design of audio-visual systems is to be coordinated with Owner (See Appendix 2).
- All infrastructure and building services are to be coordinated with audio-visual requirements. The building services required to support audio-visual systems are to be included in the design and construction packages of the project.

Design, Construction and Sustainability Standards

- Security issues of audio-visual equipment are to be addressed. Outside of access control requirements for rooms, security provisions such as access controls, keyed hardware at lecterns, A/V closets/racks, audio-visual specific security/alarm devices, and other items shall be addressed.
- Coordinate any front-end network, equipment or other provisions with Owner to support function of audio-visual systems.
- Specialized or unique classroom, teaching or laboratory environments beyond the conventional types noted below may need additional provisions to support their function.

Classrooms

- Large (60 Seats or greater) and similar spaces/functions:
- Coordinate all lighting, acoustics/acoustical separation, access, building systems and other items for effective audio-visual systems function.
- Large single or dual ceiling or rear projection room mounted projectors. Provide capability to project unique or duplicate program material, and coordination with audio and controls to be effective in either arrangement.
- Large single or dual powered ceiling recessed projection screens sized based on room design for image clarity and site lines. Capability to project unique or duplicate program material, and coordination with audio and controls to be effective in either arrangement.
- Ceiling mounted or desk mounted document camera, per Owner's option.
- Fixed ceiling and wall mounted speakers as appropriate for all program materials/sources.
- Secured racks for head-end audio-visual equipment not contained in the lectern. Coordinate security/access provisions for closet or room-based rack with Owner.

Lectern per UNLV standard design (See Appendix 2) to include:

- Current spec rack mounted computer with 19" minimum widescreen monitor.
- DVD player.
- Fixed gooseneck microphone and 2 lapel / handheld microphones.
- Document camera controls.
- Powered screen or flat panel monitors controls.
- 7" minimum control panel (i.e. Creston), specified and programmed per Owner requirements.
- All input and output controls and sources at lectern.
- Laptop connections for audio and video.
- Remote control.
- Room lighting controls programmed per Owner requirements.
- Other room environment controls (i.e. blinds if powered, other items) programmed per Owner requirements.
- Head-end equipment to support function in rack or A/V closet (i.e. codecs, encoders, remote control systems, processors, control head-end, receivers, power conditioners, UPS, amplifiers, switches, mixers, other).

Classrooms:

- Small Less than 60 seats and similar spaces/functions:
- Coordinate all lighting, acoustics/acoustical separation, access, building systems and other items for effective audio-visual systems function.
- Single ceiling or rear projection room mounted projector
- Single powered ceiling recessed projection screen sized based on room design for image clarity and site lines, dual preferred if possible.
- Ceiling mounted or desk mounted document camera, per Owner's option.
- Fixed ceiling and wall mounted speakers as appropriate for all program materials/sources.
- Secured racks for head-end audio-visual equipment not contained in the lectern. Coordinate security/access provisions for closet or room-based rack with Owner.

Lectern per UNLV standard design (See Appendix 2) to include:

Design, Construction and Sustainability Standards

- Current spec rack mounted computer with 24" widescreen monitor
- DVD player
- Document camera controls
- Powered screen or flat panel monitor controls
- 7" minimum control panel (i.e. Creston), specified and programmed per Owner requirements
- All input and output controls and sources at lectern
- Laptop connections for audio and video, Auxiliary input at system processor
- Room lighting controls programmed per Owner requirements
- Other room environment controls (i.e. blinds if powered, other items) programmed per Owner requirements.
- Head-end equipment to support function in rack or A/V closet (i.e. codecs, encoders, remote control systems, processors, control head-end, receivers, power conditioners, UPS, amplifiers, switches, mixers, other)

Conference Rooms and similar spaces/functions:

- Coordinate all lighting, acoustics/acoustical separation, access, building systems and other items for effective audio-visual systems function.
- Single ceiling or rear projection room mounted projector, or wall mounted flat panel display, sized appropriately. Based on calculated viewing distance.
- Single powered ceiling recessed projection screen minimum sized based on room design for image clarity and site lines, or wall mounted flat panel display, sized appropriately. Based on calculated viewing distance.
- Fixed ceiling and wall mounted speakers as appropriate for all program materials/sources.
- Telephone line with teleconferencing telephone.
- Laptop audio/video link at conference table if applicable, wall or rack inputs if needed.
- Lectern per UNLV standard design (See Appendix 2) to include:
 - Current spec rack mounted computer with 19" widescreen monitor
 - DVD player
 - 5" minimum control panel (i.e. Creston), specified and programmed per Owner requirements.
 - Central input and output controls and sources at A/V source location
 - Powered screen or flat panel monitor controls
 - Room lighting controls programmed per Owner requirements
 - Other room environment controls (i.e. blinds if powered, other items) programmed per Owner requirements.
 - Laptop connections for audio and video.
- Coordinate all security/access provisions for A/V cabinet/closet with Owner.
- Head-end equipment to support function in cabinet mounted rack or A/V closet (i.e. codecs, encoders, remote control systems, processors, control head-end, receivers, power conditioners, UPS, amplifiers, switches, mixers, other)

Videoconference Facilities: All Room Types (Classrooms, conference rooms, other)

- Dual projection or monitors for sites and angles. Based on calculated viewing distance.
- One confidence monitor minimum (two preferred – one for distance material, one for local material) in rear, sized for effective viewing. Based on calculated viewing distance.
- 2 cameras minimum, near and far.

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- Presenter and audience microphones to support program-based needs (i.e. push to talk or other microphone systems to support videoconferencing functions).
- Head-end equipment to support video-conferencing functions.
- IDF and MDF Closets
- Provide one MDF and any additional IDFs as required to meet cable length requirements. The minimum space requirement for the MDF is 14' x 10' and additional IDFs must be at least 8' x 10', and at least 8 feet high ceilings. No false floors or ceilings.
- MDF and IDF rooms shall be separate spaces not intended for joint use or any other purpose. Co-location of any non-data related equipment (custodial, electrical, HVAC, facility, Marlock devices storage) is not acceptable. Contractor, sub-contractor, and vendors shall not use the MDF and IDF room as storage within 21 days of Substantial Completion.
- MDF and IDFs shall be directly accessible from a corridor or service hallway. MDFs and IDFs shall not be accessed through intermediary spaces (restrooms, electrical rooms, others) unless approved by Office of Information Technology and Project Manager. In some instances, MDFs are preferable to be accessed through doors to the exterior or service yards. This shall be coordinated with Office of Information Technology and Project Manager.
- MDF and IDF rooms shall have a separate HVAC thermostat and be air conditioned with a separate zone or air conditioning unit 24 hours a day, seven days a week.

Signs:

- Provide Owner's standard room signs.

Access control:

- Proximity card access.

Toilet Rooms:

- Sight lines should screen the toilet room interior from public view.
- Tile floors (12 x 12 is desirable, 6 x 6 is minimum size), tile walls at least to 6" above the partition height, preferably to the ceiling. Grout should be a medium to dark color. The floor and the wall grout should be the same color. The wall base should be a pre-manufactured cove base.
- Gypsum Board walls should be painted with washable semi-gloss paint.
- Provide at least one floor drain per toilet room and slope the floor to the drain.
- Ceiling hung toilet partitions (supported from the structure above the ceiling) are required. Make sure this is coordinated with the structural drawings. Partition material should be solid surface.
- Ceilings should be gypsum board painted with washable semi-gloss paint.
- Countertop material to be solid surface.
- Accessory shelves where faculty/students/staff can set their books/possessions while they use the sinks are desirable. They shall be 12" deep minimum.
- Integral sinks are not acceptable.
- Moisture resistant plywood backing is required in wet areas. (i.e. Dur-a-rock or equal). Provide a light fixture over each stall.
- A continuous recessed light fixture at the back wall of the stalls and over the mirrored wall of the sink area is preferred. Coordinate access and service provisions with Owner for ease of access.
- Lighting shall be carefully considered in toilet and restrooms to provide minimum required lighting levels per code and to be functional. Lighting shall also be specified and located for ease of access and maintenance.

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- Drinking fountains (wall mounted electric water cooler type) should be in the proximity of the toilet rooms.

Elevators

- Walls around elevators should be finished in hard durable surface (i.e. wall tile to match or coordinate with floor surfaces/tile or ceramic tile, other options). The surface should be cleanable, stain resistant and able to withstand impact from equipment.
- Equip elevators with an emergency telephone that connects directly to the Owner's Police Services Dispatch. Information concerning the approved types and models may be obtained from Owner's Communications Services through the Owner's Project Manager.
- Emergency telephones installed in elevators and areas of refuge telephones must be "hands free" type and ADA accessibility compliant, including such accessibility items such as visual signaling indicators for the hearing impaired.
- Doors should be stainless steel.
- Floors shall be rubber with a non-skid raised pattern in service or exterior elevators (i.e. garages) or upgraded flooring (i.e. terrazzo tile, ceramic tile, other materials) in all other elevators.
- Interior cabs shall be of metal, solid surface or other durable and high-quality finishes that will discourage and hide vandalism and provide an attractive elevator cab finish. Passenger elevators in UNLV's Greenspun Hall with metal mesh wall cab finish and terrazzo tile floor finish is a good example of a passenger elevator with durable, vandal-resistant and attractive finishes.
- Elevator controllers and door operators shall not be proprietary.
- Elevator equipment rooms, in addition to meeting all code requirements, shall have access to allow for equipment and technicians to reasonably service room and its equipment. Access to room shall be direct and shall be located in a discrete fashion to not appear as a publicly accessible room. Co-location of any non-elevator equipment (mechanical, electrical, data/telecommunications, facility/other storage, etc.) is not acceptable.
- Elevators may require proximity access control, either for elevator access (outside the elevator) or for specific floor access (inside the elevator). Proximity card readers in or at elevators may be required for access during business hours or after business hours. Coordinate requirements with Owner.
- Coordinate requirements for elevator equipment rooms. This may include location, access off service corridors (similar to other service spaces), proximity to elevator chase, building service requirements (power, data, telephone, HVAC/venting, other items) and other considerations.
- Elevator ceiling shall be finished with vandal resistant coating and/or surface.

Custodial Closets

- Provide minimum one per floor.
- The minimum requirement for any facility of 0 - 20,000 S.F. is 100 S.F. of custodial work space and equipment storage for every 20,000 S.F. of building space.
- In addition to the above, for all buildings of 50,000 S.F. or more, a 120 S.F. storage area is required, with lights, fixtures, 120V 20-amp outlets, and switches where needed.
- Custodial closets shall be separate spaces not intended for joint use or any other purpose. Co-location of any non-custodial equipment (mechanical, electrical, data/telecommunications, facility/other storage, etc.) is not acceptable.
- Custodial closets shall be directly accessible from a corridor or service hallway. Custodial closets shall not be accessed through intermediary spaces (restrooms, electrical rooms, others) unless approved by Owner.
- Signs: Provide Owner's standard room signs.
- Access control: Key unless otherwise requested by Owner.
- Provide HVAC/venting, power and other building services to address issues with any storage/venting of cleaning supplies or special considerations for custodial materials/equipment.

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Mechanical Spaces/Rooms

- Mechanical spaces shall have the floor painted with a two-part urethane epoxy.
- Mechanics spaces shall be separate spaces not intended for joint use or any other purpose. Co-location of any non-mechanical equipment (custodial, electrical, data/telecommunications, facility/other storage, etc...) is not acceptable.
- Mechanical spaces shall be directly accessible from a corridor or service hallway. Mechanical spaces shall not be accessed through intermediary spaces (restrooms, electrical rooms, others) unless approved by the Owner. In some instances, mechanical spaces are preferable to be accessed through doors to the exterior or service yards. This shall be coordinated with the Owner.
- Building HVAC controls (Honeywell) should be located in these spaces and not the electrical rooms or IDF rooms.
- Mechanical spaces and elements within shall be treated with sound, vibration and other attenuation measures to ensure they do not adversely impact the performance of the building and its spaces/elements/FF&E.
- All mechanical equipment is to be located in mechanical rooms. No mechanical equipment shall be located in rooms not specifically designated as mechanical rooms (i.e. storage areas and other areas.)
- Signs: Provide Owner's standard room signs
- Access control: Proximity card unless otherwise requested by Owner.
- Provide any standard or special building services to support mechanical room operations, conditions and other factors for performance. This may include but not be limited to considerations for power, data, telephone, HVAC/venting and other considerations to address unique issues and performance requirements.
- Housekeeping pads shall be provided for all equipment. When possible, conduit and piping penetrations into the mechanical space shall be made at the floor level and not the ceiling level. Floor sinks shall be in appropriate areas and sized for full flow. Floor sinks shall be below the level of the surrounding area to allow for gravity flow.

Electrical Spaces/Rooms

- Electrical spaces shall have the VCT static resistant flooring unless an alternate flooring material is approved by the Owner.
- Electrical spaces shall be separate spaces not intended for joint use or any other purpose. Co-location of any non-electrical equipment (custodial, mechanical, data/telecommunications, facility/other storage, etc.) is not acceptable.
- Electrical spaces shall be directly accessible from a corridor or service hallway. Electrical spaces shall not be accessed through intermediary spaces (restrooms, mechanical rooms, others) unless approved by the Owner. In some instances, electrical spaces are preferable to be accessed through doors to the exterior or service yards. This shall be coordinated with the Owner.
- Electrical spaces and elements within shall be treated with shielding, sound, vibration and other attenuation measures to ensure they do not adversely impact the performance of the building and its spaces/elements/FF&E.
- All electrical equipment and panels are to be located in electrical rooms. No electrical equipment shall be located in rooms not specifically designated as electrical rooms (i.e. storage areas and other areas.)
- IDF/data rooms are separate rooms from electrical rooms/spaces and shall be addressed per the Owner's data/telecommunications standards for all aspects (i.e. building services/infrastructure, finishes, security/access control and other items).
- Signs: Provide Owner's standard room signs
- Access control: Proximity card unless otherwise requested by Owner for Electrical Rooms. IDF rooms are to have proximity card access control.
- Provide any standard or special building services to support electrical room operations, conditions and other factors for performance. This may include but not be limited to considerations for power, data, telephone, HVAC/venting and other considerations to address unique issues and performance requirements.

Design, Construction and Sustainability Standards

Storage Spaces/Rooms

- Storage spaces shall have the VCT flooring unless an alternate flooring material is approved by the Owner. Owner may consider sealed concrete in storage rooms for 'building service' type functions.
- Walls: Paint: Semi-gloss, min.
- Ceilings: Provide acoustical ceiling tile treatment – 2x4 lay-in w/ reflective tile min. Security considerations may require hard ceilings.
- Doors: Wood stain grade doors (w/o lite) 36" min. larger as required. Consider metal doors w/o lite for specific applications.
- Storage spaces shall be separate spaces not intended for joint use or any other purpose. Co-location of other function in storage rooms (custodial, mechanical, data/telecommunications, facility/other storage, etc...) is not acceptable.
- Storage spaces shall be directly accessible from a corridor or service hallway. Storage spaces shall not be accessed through intermediary spaces (restrooms, mechanical rooms, others) unless approved by the Owner. In some instances, storage spaces are preferable to be accessed through doors to the exterior or service yards. This shall be coordinated with the Owner.
- Storage spaces shall be designed with module, sizing and building services in mind for potential future conversion to office space. See office requirements for additional information.
- Access control: Key unless otherwise requested by Owner.
- Signs: Provide Owner's standard room signs
- Storage rooms may have special requirements based on the contents to be stored in the room (i.e. security, temperature/humidity control, venting, etc.) Coordinate any special requirements with Owner.
- Provide built in storage items (i.e. casework, shelving, others) per Owner's requirements.

Copy/Work Rooms

- Copy/Work Rooms shall have the VCT flooring unless an alternate flooring material is approved by the Owner.
- Walls: Paint – Semi-gloss, min.
- Ceilings: Provide acoustical ceiling tile treatment – 2x4 lay-in w/ reflective tile min. Security considerations may require hard ceilings.
- Doors: Wood stain grade doors (w/o lite) 36" min. larger as required.
- Copy/Work spaces shall be separate spaces not intended for joint use or any other purpose. Co-location of other function in copy/work rooms (custodial, mechanical, data/telecommunications, etc...) is not acceptable. At times, storage functions may be accommodated in Copy/Work Rooms. If this occurs, Storage Area/Room design guidelines shall be coordinated.
- Copy/Work spaces shall be directly accessible from a corridor or service hallway. Copy/Work spaces shall not be accessed through intermediary spaces (i.e. offices, storage rooms, others) unless approved by the Owner.
- Copy/Work spaces/rooms shall be designed with module, sizing and building services in mind for potential future conversion to office space. See office requirements for additional information.
- Access control: Proximity card unless otherwise requested by Owner.
- Signs: Provide Owner's standard room signs
- Copy/Work space/rooms may have special requirements based on the activities and equipment requirements in the room (i.e. building services for equipment, venting, etc.) Coordinate any special requirements with Owner.
- Provide built in storage items (i.e. casework, shelving, others) per Owner's requirements.
- Coordinate with Owner the need for any lockable built-in items.

Parking Structures

- Parking structure shall include minimum stall size and aisle width requirements to comply with local regulatory requirements unless otherwise approved by Owner. Stall sizes shall be 8'-6" wide x 18'-0" deep and aisle widths shall not be less than 24'-0" wide, with a total bay width of 60'-0", unless approved otherwise in writing by Owner and the configuration of the parking lot. (REV 02)

Design, Construction and Sustainability Standards

- Parking structures shall be designed to effectively move traffic in and out of the structure and surrounding access. Service levels for vehicle access and egress shall be coordinated with Owner.
- Floor/Ground Finish: Concrete with striping
- Interior Finish: Concrete: Precast or cast-in place concrete with white or light colored Tnemec Paint. Paint shall be applied to all interior surfaces 4'-0" from lowest bottom edge of perimeter beam or spandrel minimum (e.g. to include ceiling beams, and 4'-0" down on columns from bottom edge of deepest perimeter beam or spandrel), including but not limited to interior sides of spandrel panels, beams, slab, columns and other surfaces.
- Interior Finish: Masonry (CMU): CMU masonry shall have a smooth face, upgraded finish (i.e. honed block) and shall be coated with an anti-graffiti coat per the Tab C standards.
- Interior Finish: Other: All material finishes in a parking garage must be durable, low maintenance and resistant to vandalism. They typically will be concrete (pre-cast or cast-in-place) or CMU masonry. Other materials are to be approved by Owner, whether they are significant in use or limited in use (i.e. upgraded finishes at circulation cores or other areas).
- Exterior Finish: Exterior finishes must be durable, low maintenance and resistant to vandalism. Acceptable exterior finish materials are concrete (cast-in-place or pre-cast), CMU masonry (smooth face, upgraded finish (i.e. honed block)), metal panels, durable and aesthetic metal infill panels for security. Exterior concrete shall be integral color unless otherwise approved by Owner. Materials shall be located in a manner so that vehicle and public interface are appropriate to the material location (i.e. metal panels shall not be located so that they can be damaged by vehicles or easily vandalized) and maintenance can be easily conducted. Refer to Building Materials section for more information, particularly on concrete finishes.
- Doors: Metal exterior paint grade doors. Lites in doors should be reviewed based on use and security.
- Provide all building services (HVAC, power, water, data, other services) to support facility use and to support equipment to be used in facility. Where rooms/elements are required to support these items (i.e. IDF rooms, electrical rooms, mechanical rooms, elevators/elevator equipment rooms, security equipment rooms, etc...) address the standards/requirements for those rooms.
- Provide fixed furniture and equipment (security cameras, directional signage, other signage, etc...) and coordinate with building services.
- Signs: Provide UNLV standard room signs at all rooms. Provide provisions on exterior of structure, two sides minimum, for electronic signage to be mounted to exterior at upper levels of garage. Provide all directional signs, interior and exterior, for vehicles and pedestrians (i.e. entry signage, accessible signage, vehicle wayfinding/directional signage, pedestrian vehicle/wayfinding signage, other signage). Coordinate all signage with power and data services to support signage operations.
- Accessibility: Ensure accessibility standards are met in parking garages. Coordinate provisions for accessible parking and accessible routes with overall campus parking and access system for locations, quantity, etc. All parking structures are to provide accessible parking.

Security/Safety:

- Provide proximity card access control all IDF/data, and rooms/spaces housing security equipment.
- Provide security cameras in parking structure construction scope and budget. Provide full coverage of parking structure interior and exterior perimeter and at each vehicular exit that read the exiting vehicular license plates.
- Provide emergency phone locations and infrastructure per site design requirement for security. Provide emergency phone locations and infrastructure at elevator locations on each floor and on stair locations on opposite end of elevator locations at a minimum.
- Lighting, both exterior and interior, must be carefully considered to provide adequate lighting for safety, wayfinding, security camera operation in night conditions, and other considerations. Significant consideration is to be given to lighting type (e.g. LED for sustainability or metal-halide for application.) Fluorescent lighting is not preferred and may be rejected.
- Sustainability:
- Consideration must be given to sustainability standards for parking structures and meeting these standards.

Design, Construction and Sustainability Standards

- As parking structures may have limited systems to consider for sustainability (i.e. limited HVAC and energy using systems), the elements and systems that parking structures do have must be more carefully considered to meet sustainability requirements, such as:
- All parking structures must be designed to accept future top-level parking canopies with photovoltaic (PV) arrays, unless specifically waived in writing by the Owner. (Some specific projects may require this item in the base requirements for the project). Provisions for future PV arrays must require building systems and elements (structural, power/conduit, secure inverter space, meter linkage plan, etc...) for a future 'bolt-in' simple installation of a PV system.
- Material specifications for the limited materials that exist in a parking structure must be considered carefully for sustainability. Items such as concrete mix composition (i.e. higher slag content in line with structural/material performance requirements), lighting fixture types (i.e. LED fixtures) must be considered in the design to meet sustainability standards.
- Lighting, both exterior and interior, must be carefully considered to provide adequate lighting for safety, wayfinding, security camera operation in night conditions, and other considerations.
- Provide concrete pedestrian walkways from all parking structure exits to the exterior. Provide managed and safe pedestrian access and movement within and outside of parking structures that does not conflict with vehicular movement.
- Special Considerations:
- Consider donor signage potentials and special signage for functional, safety or warning purposes in design.

Interior Signage

Wayfinding concepts.

- A wayfinding conceptual plan shall be presented as part of the design development phase submittal and review. Construction document submittals must include wayfinding elements to accomplish the approved wayfinding plan.
- Provide interior wayfinding signage and/or graphics as required to direct people within buildings. Building maps or floor plans may be installed at key locations. Directional signs and/or directories shall be installed on walls opposite elevators, and possibly at the intersection of several corridors. Signage must also be provided at key locations in the building to indicate destinations or other key building locations. Design and installation (i.e. mounting height, contrast, visibility, other factors) shall meet ADA guidelines for all signage.
- Room Signage:
- Every room shall have a wall mounted room sign or plaque, per technical specifications under **TAB C**. Signage shall contain room numbers, occupant name and room space identification as well as Braille symbols and meet all ADA requirements. All signage shall be approved by the Owner's Project Manager.
- Building Directory.
- Provide main directory near the main entrance or entrances of the building – primarily at major public access points.
- Donor plaques/naming opportunities.
- Review requirements for providing donor plaques or donor walls in a project with the Owner's Project Manager.
- Projects should include the posting of occupant load. IFC 1004.3 every room or space that is in an assembly occupancy shall have the occupant load of the room or space posted in a conspicuous place near the main exit or exit access doorway from the room or space. Posted signs shall be of an approved legible permanent design and shall be maintained by the owner or authorized agent. (REV 02)

Building Materials

General:

- The Owner requires to be involved in the building design and materials directly and will approve all building designs.

Design, Construction and Sustainability Standards

- Below is a listing of materials to guide design and construction so that consultants, contractors and vendors are aware of Owner's preferences, minimum requirements and restrictions.
- All materials shall be chosen, designed and specified to address issues of constructability, appearance, durability, longevity of performance and ease/efficiency of maintenance.
- The character of finish options for materials (especially but not limited to exterior building materials) is to be selected based on its ability to provide a consistent and high-quality finish and selections, quality and characteristics must be coordinated with the Owner.
- Some examples here may include, but are not limited to:

Concrete finishes:

- Concrete finishes shall be specified to address the natural qualities of concrete to provide a reasonably consistent finished surface and appearance and shall address inherent consistencies in concrete character (texture, color and other) and natural properties of fabricating, installing and ongoing maintenance/aging of concrete.
- At a minimum, smooth and fine concrete textures shall not be specified, and more textured concrete finishes shall be used to hide and imperfections acceptable based on the project specifications and the impacts of wear and aging of concrete.

Metal/metal panel finishes:

- Metal and metal panel finishes, colors, textures, reflectance quality, patterns, seam layouts and other characteristics shall be chosen, design and specified to address any potential or understood inconsistencies of metal/metal panel finishes, so the overall composition of metals and metal panels addresses any inconsistent finish issues or material quality to result in a cohesive and deliberate metal/metal panel finish and overall composition.
- Issues including but not limited to design, fabrication and installation tolerances with metal/metal panel colors, textures, seams, reflectance quality and variance amount pieces/panels and other issues shall be carefully considered and addressed.
- The completed project should result in a consistent finish, or, where a consistent finish cannot be achieved based on the material and its fabrication, the design shall account for inconsistencies in the material in a deliberate manner to result in an installation acceptable to the Owner.

Masonry, CMU, tile and other finishes:

- Masonry, CMU, tile and other similar finishes shall be thoroughly mixed on-site prior to installation where a similar masonry material (of the same finish specification) is being provided on project on continuous surfaces, and different deliveries, quarry pallets or fabrication runs of these materials are being provided. Mixing of these materials shall result in a consistent finish to continuous surfaces without any obvious differentiation of material, delivery pallet, quarry pallet, fabrication run or other inconsistencies.
- Similar measures and caution are to be taken with grout (and all components within, such as cement, water and other grout assembly components), coatings and other related finishes to ensure a consistent finish. Where design specifies a finish where material inconsistency (i.e. quarried material with significant variations in material appearance, or other) vendors shall work with Owner to achieve desired finish quality acceptable to Owner.
- Unless otherwise approved by Owner, these materials shall be installed with minimal surface projection or deviation.

Exterior Building Materials

- Preferred: sandstone tiles (mechanically fastened), brick to match Greenspun Hall, honed CMU block, metal panels such as those used on the Lied Library, cast-in-place concrete, and factory applied coatings for high-quality appearance, durability and longevity.
- Acceptable: smooth face block (with color and finish enhancements such as honing or other, i.e. no standard gray precision block), metal wall panels, mechanically fastened stone/tile, metal standing

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seam roof metal batten roof or similar and should complement main roof planes to be compliant with Roofing section of these standards.

- Not preferred: Stucco, EIFS, Composite Pre-cast panels, split face block, adhered tile, glass block, clay/concrete roof tile, Corten steel, wood, painted or stained materials including block, fabric structures (except as a site feature), tilt-up concrete panels.
- Other materials will be considered particularly where existing conditions warrant their use. Consider context with adjacent buildings/materials.
- Exterior masonry construction shall be sealed with an ultraviolet resistant, acrylic or siloxane-based sealer.
- All exterior concrete, stone, CMU or other porous materials/finishes shall be covered with a graffiti coating per Owner's Technical Standards in **TAB C**. Coating shall go to 12 feet above grade minimum on 'broken' surfaces to a break line, reveal or joint that provides a clean break and full height on wall surfaces with no easily identifiable break.
- Designs including exterior tile shall include specifications requiring appropriate special inspection of the exterior tile installation:

Glazing:

- Preferred: insulated clear glass.
- Not preferred: tinted, reflective, operable windows
- Exterior glazing should be shaded as appropriate. Shading needs to be designed to discourage pigeon roosting, through design features or anti-pigeon roosting measures to be approved by Owner (i.e. scent distribution systems or other measures). Exterior windows with and without shading devices need to be designed so that they can be easily maintained and accessed for cleaning.
- Window film: 3M Sn Control Window Film Night Vision 25.

Roofing:

- Membrane roofing systems shall be specified to be constructed of 60 mil minimum thickness polyvinyl chloride (PVC) membrane material.
- Other membrane material will not be considered equivalent to PVC membrane material. Membrane roofing systems other than PVC membrane material shall be specified only when specifically approved by Owner.
- Membrane roofing specifications shall include verbiage stating that patches shall be limited to a maximum of three patches on any 100 square foot area. Excessive patching or damage to the finished roof membrane shall be ground for Owner to require the replacement of the entire roofing membrane at the Contractor's expense.
- Roof slope, including crickets, for new roof construction shall be per code or exceed code at all points, but shall be a minimum of $\frac{1}{4}$ " per foot. Crickets need to be twice the opposite slope of the main body of the roof at all times.
- Re-roofing projects shall follow the same slope standards as new roofing systems. To the greatest extent possible, the roof slope shall be achieved by sloping the structural members.
- Slope variances will be considered by Owner only for re-roofing projects where existing conditions necessitate a lesser slope.
- Roofing systems shall be designed and specified to limit roof penetrations to single penetrations that are a minimum of 12" away from any other roof penetration, curb or bash flashing.
- Points of access to all roofs will be permanently installed eliminating the need for portable ladders. Roof access shall be handled in a discrete manner to provide access to all roofs. Roof access shall be through an internal building access method unless otherwise approved by Owner. Access to the roof through an elevator is preferred. Access to the roof through a stair tower is acceptable. Access to the roof through a ladder and access hatch is allowable with Owner's approval. Secondary roof areas may be access through discrete methods such as an access through a door/operable panel in a window system, wall hatch, or discrete ladder with approval by Owner. All roof access needs to consider getting staff and materials to the roof in a reasonable manner.
- Mechanical equipment shall be set on roof curbs. No wood sleepers will be allowed.

Design, Construction and Sustainability Standards

- The top of roof curbs, including curbs for skylights, shall be a minimum of eight inches above the finished roof, including crickets.
- Roof membranes shall be permanently protected with an appropriate walk pads or wearing surfaces in high traffic or service areas.
- Wood nailers and architectural metal coping (or other approved metal system) shall be used at the top of all parapet walls. As any alternative parapet top detail must be approved by Owner in writing.
- Roofing systems shall be designed and specified to meet the most stringent requirements of the following:
 - FM 1-75 requirements using systems which meet FM certifications.
 - Roofing systems shall be designed to provide a UL Class A rated roof assembly.
 - Plans and specifications shall include notation that restricts work on the finished membrane. Notation shall include:
 - No work including staging or access to other portions of the work shall be permitted on the finished membrane.
 - All roofing work shall commence at the furthest point from the workers access and progress back towards the access point.
 - If staging, access, or work is required on the finished membrane, the Contractor shall provide protection along the access path and under the work extending 48" beyond the required work area. Protection shall consist of 3/4" plywood over a heavy canvas tarp with sand bag ballasts as required to prevent the plywood from becoming airborne during strong winds.
 - The use the pitch pockets will not be allowed.
 - The Consultant's specifications shall require the Contractor to schedule and attend roofing coordination meetings and inspections as described in the Roofing Specification in **TAB C**. The meeting shall require the attendance of the general contractor, roofing contractor, sub-contractors scheduled to perform any work on the roof, the roofing manufacturer's representative, the Consultant, and the Owner's representative.
 - Roof parapet and screens shall fully screen rooftop equipment. Design documents shall show the outlines of all roof equipment and indicate parapets and screens to ensure all rooftop equipment is fully screened.
- Refer to Technical Standards: Section 07542: Polyvinyl-Chloride (PVC) Roofing for more specific detail on the Owner's requirements.

Hardware

- Mechanical Keys (Keys)
- All permanent cores and keys are to Schlage Everest 29 only. No substitutions will be allowed.
- All door locks and cylinder housings shall accept 7 pins small format interchangeable cores (SFIC).
- Hardware supplier shall meet with the Owner's Lock Shop through the Owner's Project Manager to determine the keying and hardware requirements of the project.
- No full glass (Herculite) style doors and related hardware are to be used.
- No surface or concealed vertical rod exit devices. Provide rim exit devices with key-removable mullions.
- No surface or automatic bolts are to be used on pairs of doors. Provide locksets on each door with a removable hollow metal mullion or a removable mullion.
- No magnetic locks are to be used.
- Refer to Technical Standards: **TAB C**. for all of the Owner's hardware requirements.
- Electronic Access Control
 - The UNLV standard electronic access system is to be used, no substitutions will be allowed. All exterior perimeter doors shall have an electric strike tied to the access control system at a minimum. The Owner's Project Manager will determine with the Owner's Lock Shop and End User groups which exterior perimeter doors shall have card readers. All exterior perimeter doors shall have conduit and infrastructure to accept card readers.
- If an entry is integral to student, faculty, staff or public access to a space or portion of the building (i.e. a set of doors in a bank of doors to a wing, classroom, etc.) they shall receive electronic access control

Design, Construction and Sustainability Standards

as well. All primary and secondary building exterior entries at a minimum shall have electronic access control devices installed.

- The Owner's Project Manager, working with the End User and the Technical Groups, will determine which interior doors are to receive electronic access control devices at start up and which interior doors are to receive conduit only for future electronic access control devices in compliance with room design guidelines and specific requirements
- All classrooms shall have electronic access control devices, hardware and programming to provide "tap to open, tap to lock" functionality where classrooms can have electronically controlled doors unlocked for set periods of time (i.e. a one-hour class) and locked after these unlocked periods of time, both based on programming and card presenting mechanisms.
- Define proper location of proximity card readers (i.e. easy to present card without obstructions in the way). Classroom doors should be tied together on access control system if more than one entrance (i.e. either card readers at each door tied together, or a strike at each door).
- Refer to Technical Standards: **TAB C**: Hardware for detailed requirements for the Electronic Access Control Systems

Security Systems

Emergency Phones and Intercoms

- The Owner's Communications Services is responsible for the purchase and installation of phones used throughout the University. They also establish the type, model, and manufacturer requirements. Coordinate with Owner's Communications Services through the Owner's Project Manager on all communications requirements. See **TAB C** for size and specifications of emergency phone pole and mount, as this pole must be fabricated and cannot be purchased.
- Coordinate emergency phone locations with UNLV Police Services and Owner's Telecommunications Services through the Owner's Project Manager. Outside the building, at a minimum, emergency phones should be located near the primary and secondary building entries. Emergency phones should also be located in parking and site areas.
- Emergency phones and intercoms are linked directly to the Owner's Police Services Dispatch. When activated, these devices solicit a police response.
- Inside the building, emergency phones may be installed in
 - Designated areas of refuge
 - Isolated areas inside academic and administrative buildings
 - Outside locations approved by the Owner's Police Services.
- The red emergency phones (with blue light) are weatherproof, are equipped with other special features, and are recommended for exterior use only.
- In addition to emergency phones, other devices (such as intercoms) may be used for communicating emergencies. The locations of these items shall be coordinated with the Owner.

Security Cameras

- A comprehensive camera recommendation plan will be developed in consultation with the UNLV Police Services, UNLV Office of Planning & Construction, and the requesting unit that may consist of both fixed and PTZ cameras where appropriate.
- All security camera systems and their elements must be non-proprietary or serviceable from several discrete vendors who serve the Las Vegas area.
- For both day and night, recorded images must be sufficient quality to enable UNLV Police to clearly identify persons of interest (clear image of face, physical and clothing characteristics, items carried, vehicle make and model) and the capture of events.
- Landscape architecture should consider the 10-year growth canopies of trees to ensure security cameras have an unobstructed view.
- Signage is required a main entrance to areas with security cameras where the sign can be readily seen by individuals entering the area.

Design, Construction and Sustainability Standards

- Security cameras and video management systems must meet security standards by UNLV's Office of Information of Technology. In addition, all security cameras and video, management systems must be patched with latest firmware/ software and security updates.
- Public Internet access to cameras and video management systems is prohibited. All cameras and video management systems should be placed on a secure private vlan and behind campus firewalls as prescribe by UNLV's OIT Network Development and Engineering department.
- Requesting unit responsible for cost of new equipment, associated infrastructure, on-going maintenance, repairs, replacements, and upgrades. Annual maintenance contract is required to ensure equipment is in good working order with clean and properly focused lenses.
- Contractor is to provide as-builts to UNLV's OIT Network Development and Engineering department at least 15 business days prior to physical installation of security cameras. As-builts shall indicate exact camera locations, panel terminations, cable routes. In addition, contractor is to provide physical MAC addresses of all security cameras. NDE will provide contractor IP address/ domain for all security cameras prior to physical installation of security cameras within 5 business days of receiving as-builts

MECHANICAL GENERAL DESIGN REQUIREMENTS

General

- Refer to Technical Standards, Section 15010 – Basic Mechanical Requirements for technical detail.
- HVAC, plumbing, and fire sprinkler systems shall be designed to comply with the requirements of the adopted codes and regulations listed, with the most current edition of following reference standards as applicable to each specific project:
 - ASHRAE Handbooks
 - ASHRAE Standards
 - International Energy Conservation Code and/or ASHRAE/IESNA Standard 90.1
 - SMACNA Duct Construction Standards
 - ASPE Data Books
 - Nevada Administrative Code Chapter 455C (Boilers, Elevators, and Pressure Vessels)
 - Other codes as applicable.

Energy Conservation

- Mechanical and plumbing systems shall be designed and documented to comply with the requirements of the International Energy Conservation Code and/or ASHRAE/IESNA Standard 90.1.
- In accordance with NRS 338.190, prior to the construction or renovation of any public building, a detailed life cycle cost analysis including the cost of operation and maintenance, must be completed. At the discretion of the Owner, a life-cycle cost analysis may be deleted on certain projects. The study shall identify measures for the conservation of energy (and shall consider the use of alternate non-fossil fuels when applicable). The analysis shall include comparisons of at least three different HVAC system types. The three different system types to be evaluated shall be reviewed and approved by the Owner prior to beginning the analysis. A separate narrative shall be provided outlining the building envelope insulating values (for walls, glass, roof, etc.) and specific HVAC system components (i.e. plate and frame heat exchangers, variable frequency drives, compensating type kitchen exhaust hoods, etc.) as they relate to energy conservation. Note: Plate and Frame heat exchangers are to be included in the design only after approval by the owner.
- All Buildings shall comply with the minimum building sustainability design standards as defined by Owner for each project (typically a 20% reduction in both energy and water consumption beyond the values allowed by ASHRAE/IESNA Standard 90.1-2004).
- Coordinate all energy conservation measures with sustainability requirements and policies.

HVAC Systems and Equipment

- HVAC systems and equipment shall be designed in conformance with all applicable sections of the ASHRAE Handbooks and ASHRAE Standards (e.g., ASHRAE Standards NO. 15, 55, 62, 90.1 etc.). The most current edition of all ASHRAE Handbooks and Standards shall be utilized.
- Preferred base line system: VAV Air Handling systems with VAV terminal units with reheat coils using

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the chilled water and heating hot water as a cooling and heating source. The Design shall be in agreement with ASHRAE 90.1-2007 and the ASHRAE AEDG for K-12 schools.

- All selected systems must incorporate 100% air side economizers
- Owner's Preferred systems. Water- or Air-cooled central plants. Plants should consist of constant volume primary, variable volume secondary systems. Those plants servicing multiple facilities should have variable volume secondary volume tertiary connections.
- Constant volume air handlers with 100% economizer air handlers for single zone systems.
- Variable volume air handling systems with terminal reheat systems for multiple zone systems.
- Acceptable systems: Water cooled packaged RTU's with VAV terminal units with reheat. Air cooled equipment is acceptable but not preferred and should be pre-approved by Owner. Owner reserves the right to reject any acceptable system offered in lieu of the preferred system.
- Non-acceptable systems: Multiple small RTU's and multiple water source heat pumps, maintenance intensive, and absorption chillers. (no gas pack RTU's are allowed without prior owner approval).
- Life cycle cost analysis shall be presented for each project including the first costs, utility costs and maintenance costs. Energy consumption should be evaluated in detail indicating all ECM's (energy conservation measures).
- All equipment and equipment rooms shall be designed to ensure adequate provisions for service, maintenance, and removal/replacement of equipment, filters, controls, etc. Special consideration shall be given to ensure proper clearances for maintenance and removal of chiller and boiler tubes, fan housings, fan shafts, and filters.
- Access to equipment for service and maintenance shall be thoroughly coordinated with Owner. Required clearance areas shall be specifically identified on the drawings (for equipment such as fan coils, variable air volume boxes, indoor air handling units, etc.). Coordinate with other disciplines to ensure that other trades (electrical, fire sprinkler, etc.) are made aware of the required clearances.
- Rooms containing electrical equipment (transformers, switchgear, telephone, data equipment, etc.) shall be thoroughly reviewed and coordinated with the architect, the electrical engineer, and the Owner to ensure that service clearances and cooling requirements are appropriately defined and addressed. Use building exhaust system for the electrical rooms whenever possible. Provide a dry cooler system for the cooling of the IDF rooms and data rooms in winter or heating season when the central plant cooling service is down.
- Project specifications shall limit the length of the flexible ducts to a maximum of 6 feet.
- Belts are preferred to be Poly-Chain. All belts to be rated for operations at 200 deg. F.
- Small motors not on VFDs up to 25 hp shall be ECM type.

Central Plant (Chilled Water)

- Where applicable, chilled water plant design should incorporate constant volume primary, variable volume secondary pumping. Where designated central plant each serviced building should incorporate a variable volume secondary/variable volume tertiary system.
- Condenser water systems should be constant volume except where soft start/slow ramp may be required to prevent inducing air into system.
- Locate chilled water plant equipment at ground level.
- New systems should incorporate 100% economizer at air handlers, Due to the limited beneficial use of plate/frame heat exchangers no new systems should incorporate with exception of the application of dissimilar media, such as chilled water and process system de-ionized water.
- Where building mechanical upgrade or retrofits occur, design should include evaluation of the existing air handler economizer capacity and the removal of any existing plate/frame heat exchangers.
- Utilize cross-flow induced draft cooling towers whenever possible/practical.
- Specify cooling tower hot and cold basins (wetted surfaces) to be all stainless-steel construction.
- Provide side-stream filters for condenser water and secondary chilled water system.
- Provide cooling tower basin sweep system (either centrifugal filter or air/dirt separator with motorized ball valve for automatic purge).
- For central systems servicing multiple facilities, only the central plant shall incorporate air separator, make-up water system, side-stream filter, and expansion tank should be in the central plant.

Design, Construction and Sustainability Standards

- Projects that incorporate multiple systems should be designed to provide full redundancy, chilled water, condenser water, and heating water.
- Systems should be designed to provide single pump operation with redundancy, and backup.
- All subsystems of an overall plant shall be able to isolate with manual hand valves.
- The chiller schedule should include the following information and/or options:
- The required minimum chiller efficiency: specifically the Integrated Part Load Value (IPLV)
- The required refrigerant (typically R-134a)
- Capability to unload to 10% of maximum capacity
- Suction service valves and compressor sound blankets
- The chiller must have the ability to interface with the DDC system for remote start/stop, status, and general alarm
- The chiller must have BACnet IP or MS/TP interface for remote communications and provide the ability for remote adjustment of the chilled water supply temperature.
- The compressor oil filters are to be replaced just prior to the end of the one-year warranty period by the chiller manufacturer's authorized service representative.
- Water chillers shall be energy efficient with the best kw/ton rating in the corresponding categories, listed in ASRAE 90.1.
- All refrigerants shall meet ASHRAE 15 and 34 and shall be classified as A1 refrigerants
- Refrigerant equipment rooms and chillers shall be acoustically covered, blankets, ceilings and walls such that STC-50 conditions are maintained.
- RER shall have floors and walls sealed water-tight with plenum rated materials. No fiberglass un-backed products are acceptable.
- All piping shall be suspended by acoustically isolated spring hangers.
- Floor supported, or suspended equipment shall be secured with seismic snubbers and/or seismic bracing.
- Provide acoustical, vibration and other attenuation/separation in all central plant areas to meet the operations and performance requirements of the building.
- All controls valves shall be energy valves, by Belimo.

Central Plant (Heating Water)

- Select boilers/pumps for 100% to 120% of design load (two boilers at 50% to 60% capacity each). No boiler is to have an IBR ≥ 1.99 MBH.
- Utilize high efficiency gas-fired copper fin-tube boilers (87% minimum combustion efficiency).
- Design/calculate heating water system utilizing a 180°F hws temperature.
- Select pumps for a minimum 20°F temperature difference (30°F is typically appropriate).
- Where applicable, heating water plant design should incorporate constant volume primary, variable volume secondary pumping. Where designated central plant each serviced building should incorporate a variable volume secondary/variable volume tertiary system.
- Equip boilers with contacts for remote start/stop and alarm monitoring. Monitoring devices shall communicate directly with campus EMS.
- Locate heating water plant equipment at ground level.
- Heating water systems should be designed with constant volume independent primary pumps sized for each boiler required flow and variable volume secondary. A bridge or de-coupler should be sized for total flow of primary system, based on all boilers combined capacity. The use of a temperature control 3-way valve should not be utilized.
- For systems with large expectant deltas, the use of condensing boilers should be evaluated.
- The boiler schedule should include the following information and/or options: List the required minimum boiler efficiency, contacts for remote start/stop, contacts for remote monitoring of alarm/failure status, and list the desired/required pressure relief valve pressure rating. (Also, the correct pressure regulation valve fill pressure in Psi)
- Boiler rooms shall have floors and walls sealed water-tight with plenum rated materials. No fiberglass un-backed products are acceptable.

Design, Construction and Sustainability Standards

- Provide acoustical, vibration and other attenuation/separation in all central plant areas to meet the operations and performance requirements of the building.

Air Handling Units (Variable Air Volume)

- Systems designed with fan walls should provide independent fan and overall air flow information, both supply and return.
- Systems without fan wall should provide air flow instrumentation, where feasible for the instrumentation to be installed and meet manufacturer's installation recommendation.
- All other air handlers should have the economizer dampers provide air flow information, such as Ruskin dampers, provide integral air flow information.
- Provide dual low leakage opposing blade outside air dampers all economizer and exhaust dampers.
- Provide backdraft damper(s) in exhaust air at each vav air handler.
- Each Building/Facility should be evaluated in the design phase for the requirement of CO₂ sensor(s). Those systems based on the evaluation requiring CO₂ sensor(s) shall be located in the occupied spaces and approved by UNLV and interfaced with UNLV BMCS.
- Baseline CO₂ readings will be required at commissioning to determine acceptable set points to reset minimum outside air requirements.
- Select cooling coils with an entering water temperature of no less than 45°F.
- The mechanical design should be of size requiring no additional cooling such as direct evaporative cooling cell decks. All cooling demand requirements should be satisfied with full 100% economizer and mechanical cooling systems. The design should not utilize additional cooling, such as direct evaporative cooling cell decks.
- Humidification should utilize pressurized RO misting systems. Pressurized stream systems are not acceptable.
- Direct drive fans are preferred. Direct drive fan wall systems are preferred where possible.
- Roof top air handlers shall be designed with internal pipe chase. Cabinet should be sized for sufficient room to include modulating valves, isolation hand valves, test ports/plugs, strainer (with sufficient room to remove strainer), and any instrumentation.
- Air handler units to provide externally accessible air-conditioned cabinet for variable frequency drives and control system insulated by weather. Door can be utilized with proper sized vent for relief.
- System design shall result in building pressurization of between .02" inwc and .05" inwc.
- Using air flow measurement, the delta between supply, exhaust and exfiltration should have the resulted building pressurization. Supply, exhaust, and return air flow instrumentation shall be displayed on the BMCs.
- Using building static pressure instrumentation, the instrumentation must be installed per manufacturer recommendation. Multiple floor/high-rise buildings require independent external reference for static pressure measurement per floor/system. Common outside reference is not acceptable. Each external reference requires a dampening loop to prevent wind effects.
- Energy recovery systems shall be utilized and implemented as much as possible on each project. Glycol circulation systems (preferred) or air heat exchangers systems are acceptable systems. Air to air heat exchangers must not have differential pressure loss where building static pressure or proper ventilation is compromised. Thermal energy wheel recovery systems are unacceptable and should not be utilized due to high maintenance costs.

Variable Air Volume Boxes (Terminal Units)

- Specify VAV boxes with maximum, minimum, and reheat cfm (100%, 20% & 50%, Respectively, all adjustable).
- Designate a 36" by 36" service/access area at each VAV box (boxes no more than 18" above ceiling).
- Require electrical disconnect, control enclosure, and reheat coil connections to be located on the same side of each vav box (to allow for access from a single service/access location).
- Each VAV (terminal unit) is to be provided with the cross-flow measuring device and discharge temperature sensor. Dampers are to be oval or opposed blade.

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- Schedule/specify VAV boxes for a total air pressure drop of no more than .60" w.c. (combined pressure drop thru both damper and reheat coil) and with reheat coils selected to ensure a discharge air temperature not lower than 85°F.
- Schedule/select terminal units with maximum, minimum, and reheat cfm values of 100%,20%, and 50% respectively.
- Schedule/select terminal units with a total air pressure drop of .60" w.c. or less (total pressure drop to include the combined air pressure drop thru both the damper and the reheat coil). Terminal units should also be selected with an inlet velocity between 1700 and 2300 fpm (2000 fpm plus or minus 15%) to ensure controllability at the minimum and reheat cfm set-points.
- Installation of VAV (terminal units) shall conform to ASHRAE recommendations based on SMACNA HVAC Systems Duct Design. All VAV (terminal units) should use hard duct, conical or 45-degree fittings.
- No VAV (terminal units) should use flexible duct from distribution to VAV (terminal unit), all supplies should be hard duct. Flexible duct can cause errors in velocity pressure (VP) sensor readings by the boxes flow sensors.

Fan Coil Units (serving data closets, server rooms, and IDF rooms)

- Dedicated fan-coil unit shall be utilized for all IDF rooms to maintain the room temperatures between 72°F and 75°F. Consultant is to confirm with Owner the room temperatures during design. IDF rooms shall be properly zoned to provide the alternate source of cooling during the winter/heating season when the central plant cooling service is shut down. Adequate back-up shall be designed (dry cooler or DX system) for winter operation.
- Provide a discharge air temperature sensor at each fan coil unit.

Electrical Rooms Ventilation

- Utilize exhaust system for all electrical rooms providing the adequate transfer ducts from the building R/A plenums. Provide fire dampers at all duct penetrations through fire rate walls.

Air Handling Units

- VFD and control panel compartment(s) must be conditioned with supply air.
- Clarify/note that air handling units are to be configured with a minimum of 18" between the heating coil and the cooling coil (to allow for installation of an averaging type temperature sensor between the coils). Provide at least one hinged access door to allow access to the space between the coils.
- Provide bell mouth supply air fittings.
- Provide factory-installed air vents at the top of each coil.
- Control valves shall be energy valves
- All air handle units should be configured to provide the least amount of static loss to the system. The utilization of turning vanes and radius sweeps should be kept to a minimum before the main distribution.
- Constant volume system should be utilized on single zone system and not incorporate in its distribution VAV (terminal units) or unequal sized spaces and loads.

Variable Frequency Drives

- Furnish VFD's with input and output line reactors (to limit harmonic distortion to 5% or less). For those systems where, existing input and output line reactors are present, new additions or replacements must have input and output line reactors.
- Locate all vfd's inside the conditioned building envelope or in an appropriately air-conditioned air handling unit compartment (conditioned compartment to be sized for vfd's and temperature control panel).
- Coordinate with the electrical engineer to ensure that electrical disconnects are required to be installed on the line side of each vfd (since installing a disconnect on the load side of a vfd can result in permanent damage to the vfd if the disconnect is opened with the vfd in operation).

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Miscellaneous

- Schedule fire/smoke dampers with an air pressure drop no greater than .05" w.c.
- All fire/smoke dampers are to provide full open and full close positive indication.
- The largest acceptable torque motor is to be utilized for all fire/smoke dampers to ensure the motors can overcome air flow conditions.
- A common alarm point, or zone alarm point, from the fire alarm system is to be monitored by the BMCS. All air handler systems are to delay no more than 45 seconds, a return to normal conditions to support the opening of the fire/smoke dampers.
- Provide pressure/temperature test ports at inlets and outlets of Hydronic equipment.
- Provide individual high torque actuators at all valves and dampers (no multiple control using linkage).
- All constant volume fan and pump motors shall be monitored for operational status using a current sensor.
- All modulating fan and pump motors shall utilize the variable frequency drive internal contacts for operational status.
- Air filter differential pressure sensors shall be analog type (to read and display actual pressure drop).

Plumbing Systems and Equipment

General:

- The minimum number of plumbing fixtures shall be determined in accordance with International Building Code Chapter 29.
- Plastic piping shall not be used inside any building, except for acid waste piping, deionized water piping, or other process piping when and if specifically approved by Owner. In cases where plastic piping is approved to be utilized inside a building the piping shall have a flame spread and smoke developed rating of 25/50 or less.
- In cases where plastic piping is utilized below a floor slab (to accommodate corrosive soil conditions or to accommodate other unusual design parameters) the requirements for bedding depth, bedding width, and bedding material shall be carefully evaluated, clearly specified, and the piping system installation shall be inspected and approved prior to covering. The transition from plastic to cast iron shall be made approximately three inches above the floor slab with flexible coupling.
- Wherever a plumbing pipe penetrates a concrete slab-on-grade the pipe shall be protected with a minimum of 1/2" thick insulation (typically closed cell elastomeric type insulation). Where site water table conditions warrant, pipe sleeves & watertight seals shall be specified at each penetration of a floor slab or foundation wall
- All plumbing fixtures shall be specifically designed to conserve water. Maximum water usage by specific fixture type shall be as follows
- Water Closets 1.28 gallons per flush
- Urinals 0.5 gallons per flush
- Restroom lavatories 2.2 gallons per minute (automatic shut-off at .25 gallons or less)
- Showers 2.0 gallons per minute
- Water closets shall be wall-mounted type (except in remodel construction where existing wall or chase space does not allow for wall-mounted type) unless written authorization is obtained from Owner allowing floor-mounted water closets.
- Accessible shut-off valves shall be installed to allow for isolation of groups of plumbing fixtures (such as at restrooms, kitchens, laboratories, and at each floor of a multi-story building).
- A shut-off valve and pressure reducing valve with full size bypass and pressure gauges shall be installed on the domestic cold-water riser in each building.
- Water hammer arrestors shall be provided as required to protect against noise and damage from water hammer (sizes and locations shall be in accordance with the ASPE Data Book or another recognized standard).
- The domestic cold-water service to each building shall incorporate a reduced pressure backflow preventer to protect the water supply from backflow. The reduced pressure backflow preventer shall be located inside the building whenever possible (to maximize access for service and maintenance and to

Design, Construction and Sustainability Standards

minimize the potential for freezing). Confirm required/acceptable location with the local water utility. Max. installation height is 5'-0" AFF

- The fire sprinkler water service to each building shall incorporate a double check detector assembly or a reduced pressure backflow preventer to protect the water supply from backflow. The selected device shall be located inside the building whenever possible at not more than 5' AFF or grade. Confirm required/acceptable location with the local water utility.
- When the water service configuration requires a reduced pressure backflow preventer located inside the building the design shall incorporate an adequately sized receptor and drain piping to ensure that a full discharge (from backflow preventer failure) or water will be directed to the exterior of the building. Device not to be more than 5' AFF.
- Provide for re-circulation of domestic hot water at a point immediately behind each bank of low-flow lavatory faucets such that no more than two feet of domestic hot water piping is un-circulated
- Provide a balancing valve at each domestic hot water re-circulating branch.
- Provide a seismic gas shut-off valve on the gas piping just prior to entering each building. Seismic gas valve as manufactured by Pacific Seismic Products (equipped with optional Model MS remote monitoring switch to be interfaced with the direct digital control system). Gas piping immediately adjacent to the seismic gas valve shall be secured to the building utilizing a unistrut channel brace.

Plumbing Equipment Schedules

- Specify on plumbing equipment schedule that motors 1 hp and larger are to be premium efficiency. Motors shall be TEAO or TEFC when not in an air stream.

Plumbing Plan Requirements

- Coordinate all utilities with the civil engineer and the civil drawings (including waste inverts).
- Clarify intended gas distribution pressure and pressure regulatory requirements.
- Provide a seismic gas shutoff valve immediately outside the gas service entrance to the building. Specify method of securing the adjacent gas piping to the building, with unistrut channel bracing.
- Depict and note that domestic hot water is to be re-circulated immediately behind each group of lavatories (within two feet of each faucet to ensure hot water availability within a reasonable time period at low flow faucets).
- Provide enlarged plumbing plans (or isometric diagrams) for restrooms, laboratories, central plants, and other areas with congested plumbing. Provide separate enlarged plans (or isometric diagrams) for domestic water piping and for waste and vent piping.
- Clarify provisions for draining the cooling tower (including dam for preventing rainwater from entering exterior drain box).

Fire Sprinkler Requirements

- Provide a separate fire riser room which is accessible from outside the building.
- Provide a separate fire sprinkler floor plan sheet to clarify/indicate the general fire sprinkler system requirements. That sheet should include as a minimum the fire riser location, a fire riser diagram, and the location of the inspector's test station (at a location that is substantially remote from the fire riser location).
- Review/coordinate fire department connection location with the local fire department and with the civil engineer.
- Adequate fire extinguishers shall be installed to meet code compliance as part of the project.
- Seismic Bracing for Mechanical Systems
- All equipment, ductwork, and piping shall be braced for the applicable seismic forces. Seismic bracing requirements shall be specifically identified on the plans.
- Seismic bracing specifications shall require compliance with all applicable codes and shall require compliance with the means and methods outlined in the National Uniform Seismic Installation Guidelines (NUSIG) manual, the International Seismic Application Technology (ISAT) manual, or an approved equivalent.

Design, Construction and Sustainability Standards

- All seismic calculations are to be submitted on the contract documents, stamped and signed by a professional engineer registered as a Structural Engineer in Nevada.

Mechanical/Roofing Coordination:

- Ductwork, piping, and conduit shall be routed below the roof on all new construction projects and to the best extent possible on all remodel projects. Any design requiring ductwork, piping, or conduit to be exposed above a roof requires written approval from the Owner.
- Air handling units located above the roof shall be specified with integral disconnects, integral receptacle outlets, and integral chases designed to accept all required piping and conduit.
- Mechanical design drawings shall incorporate the applicable details from the current Owner's Mechanical Roofing Coordination Details (current details are to be acquired from the Owner and are to be modified and incorporated into the design drawings as necessary for each project). The applicable mechanical roofing coordination details shall be reviewed with the Architect prior to incorporation into the design documents to confirm that the details are suitable for the project and to ensure conformance with the Architect's roofing system design requirements.

Ductwork Plan Requirements:

- Identify on the plans the designated service/access area at each terminal unit, fan coil unit, and fire-smoke damper utilizing a shaded area on the floor plan.
- Provide a detail clarifying that no piping, ductwork, conduit, and/or ceiling hangers are to be installed in the designated service/access area. The detail should also indicate that terminal units and/or fan coil units are to be installed no more than 18" above the ceiling (to facilitate ladder access).
- Provide a detail clarifying that terminal units are to be installed with a minimum 24" length of straight duct at the inlet (5'-0" maximum length) at the same size as the inlet connection and with a minimum 48" length of lined duct at the outlet.
- Coordinate access to all terminal unit and/or fan coil unit locations with light fixtures shown on the electrical drawings.
- Review all duct and pipe routing with the architect and the structural engineer to ensure that the ductwork and piping (including fire sprinkler piping) will fit into the available space above the ceilings after allowing for electrical conduit, light fixtures, etc.
- Locate duct static pressure sensors for control of supply fan vfd's on the appropriate ductwork plan.
- Review/coordinate fire/smoke damper locations with the architect and with the exiting plan. Route ductwork to minimize the required number of fire/smoke dampers.
- Provide a single line duct drawing identifying the design cfm, velocity, and pressure drop (per 100 feet) in each section duct (upstream of terminal units).
- All ducts shall be designed to withstand the greatest positive or negative pressure capability of the fan(s) serving the system.
- All supply ducts are to be insulated, minimum R-8 UNO.

Piping Plan Requirements:

- Piping and/or ductwork shall not be routed in the dedicated electrical space at or above electrical switchboards, distribution boards, motor control centers, in MDF or IDF rooms, above network equipment racks, telephone distribution boards.
- Locate fan coil units serving data/electrical rooms outside of the data/electrical room.
- Require that the bottom of all air handling unit pipe chases be insulated and sealed air and water tight.
- Provide location of differential pressure sensors for chilled water system and heating water system secondary pump vfd control (locate differential pressure sensors on the appropriate piping plans).
- Specify all valves as 2-way except for 3-way valves at one air handling unit at end of longest run.
- Indicate required type of balancing valve at all chilled water and heating water coils. Valves to be automatic pressure-compensating type valves. Preferred valves to be Energy Valved.
- Specify/note that temperature/pressure test ports are to be installed immediately at connections at each chiller and at each heating and/or cooling coil.

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- Provide a drain valve with a hose connection at the low point in the piping at both the cold side and warm side of the plate heat exchanger (to facilitate drain-down for removal and cleaning of port filters).
- List required chilled water system and heating water system fill pressure and expansion tank charge pressure.
- List required chilled water system and heating water system relief valve pressures.
- Provide a 12" high inverted loop in the condenser water return piping at each cooling tower (to prevent overflow of tower basin when condenser water pumps are shut off).
- Provide a venturi type flow sensor in the secondary chilled water supply and in the secondary heating water supply (to allow for assessment of potential problems with variable secondary flow). This requirement can be addressed by incorporating a Flow Design Model EF Accu-Setter venturi/valve combination. A more accurate alternative for applications requiring remote assessment via the ddc control system is a magnetic flow meter (Onicon Model F-3000, or equal).

Mechanical Load Calculations and Equipment Capacity

- Load calculations are to be prepared utilizing maximum occupant loads that are based on an assessment of the intended use for each space in the building (which is generally somewhat less than the occupant load determined as part of the architect's life safety or exiting analysis). Prepare and submit a written summary sheet (developed/provided by both the architect and the engineer) listing/comparing both the life safety exiting occupant load and the estimated maximum occupant load (utilized in cooling load calculations) for each space in the building.
- Provide a summary calculation of the continuous general exhaust cfm (from restrooms, janitor's closets, etc.) associated with the area served by each air handling unit. This information is utilized in the control sequences to clarify testing and balancing procedures for each air handling unit and is also utilized to evaluate the minimum outside air quantities required for building pressurization.
- Provide a summary calculation listing the total of all vav box maximum cfm values (separate total for each air handling unit) to allow for an assessment of the diversity between the total maximum air flow and the air handling unit supply fan cfm).
- Provide a summary calculation listing the total of all chilled water coil and all heating water coil gpm values (to allow for an assessment of the diversity between the total coil flows and the secondary pump gpm).
- Provide a summary/comparison sheet to list the capacity of each boiler and chiller as a percentage of the calculated building peak block heating and cooling loads.

MECHANICAL EQUIPMENT

General

- All HVAC, Plumbing and Fire Sprinkler shall comply with the requirements of the most current adopted editions of the following codes, regulations, and references:
- International Building Code (IBC)
- Uniform Mechanical Code (UMC)
- Uniform Plumbing Code (UPC)
- Uniform Fire code (UFC)
- National Fire Codes (NFPA Standards)
- B31.1 Power Piping Code
- ASHRAE Handbooks
- ASHRAE Standards
- International Energy Conservation Code (IECC)
- SMACNA Duct Construction Standards
- National Uniform Seismic Installation Guidelines
- ASPE Data Books
- NAC Chapter 618 (Boilers and Pressure Vessels)
- Americans with Disabilities Act
- The American National Standard for Accessible & Usable Buildings & Facilities
- Local codes and ordinances as may be applicable

Design, Construction and Sustainability Standards

- HVAC Systems and Equipment
- HVAC equipment shall be rated for an elevation of 2100 feet above mean sea level.
- Maintenance
- All equipment and equipment rooms shall be designed to ensure adequate provisions for maintenance. Special consideration shall be given to ensure proper clearances for maintenance of filters and removal of chiller and boiler tubes, fan housing, and fan shafts.

Electrical Requirements for Mechanical Equipment

- All motors over 1/2 horsepower shall be premium efficiency type. Motors shall be totally enclosed fan cooled (TEFC), IF in high heat or high humidity locations or outside installation. Minimum motor efficiencies at full load shall be as follows
- HP 86% 50.0 HP 94.1%
- 5.0 HP 89.5% 100.0 HP 95.1%
- 10.0 HP 91%
- All motors shall be inverter rated. Any motor that could possibly have a frequency drive installed at a future date shall be inverter rated.

Basic Materials and Methods

- All equipment, ductwork, and piping shall be braced for the applicable seismic zone. Seismic bracing requirements shall be specifically identified in the Contract Documents.

Heating Hot Water Boilers

- Hot water boilers shall be designed to provide 180 degrees F boiler water. Boilers shall be designed and constructed in accordance with ASME Boiler & Pressure Valve Code Section IV and designed for 250 degrees F and 160 psig.
- Burners shall be fully down modulating with 10:1 turn down ratio.
- Modular, gas-fired boilers up to 1,900,000 BTU/h that can communicate with UNLV EMS directly are non-condensing type, copper fin tube, 87% minimum thermal efficiency. Units shall be forced draft with modulating burners, and controls.
- The specifications for projects including a boiler shall require that the contractor apply for and obtain all required boiler inspections and operating permits (as required by the Nevada Industrial Relations Division, Occupational Safety and Health Enforcement Section, the contractor shall obtain an installation application prior to beginning any work and shall apply for a final inspection as required to obtain the boiler operating permit). Reference NRS 455C.
- All new gas burners on boilers will have an IRI (Industrial Risk Insurers) approved gas train.

Water Chillers

- Chillers shall comply and be tested in accordance with ARI 550/590. Pressure vessels shall be in accordance with ASME B&PV Code Section VIII. Units shall be factory assembled including evaporator, condenser, compressor, lubrication system, refrigerant charge and controls/wiring. Chillers shall be UL listed.
- The chiller shall have a graphic control panel with a stand-alone microprocessor to control the chiller. The display shall include the following:
 - Chiller liquid leaving temperature
 - Chiller liquid entering temperature
 - Condenser liquid entering temperature
 - Condenser liquid leaving temperature
 - Percent full load amps
 - Operating hours
 - Input kW
 - Evaporator pressure
 - Condenser pressure
 - Oil Sump Temperature

Design, Construction and Sustainability Standards

- Oil pressure
- Flow meters, magnetic type shall be provided in each chiller's evaporator and condenser water bundles
- Microprocessor shall be able to communicate directly with Owner's EMS.
- Compressor drives shall be VFD drives.

Cooling Towers

- Cooling towers to be designed and constructed in accordance with the Cooling Tower Institute
- and CTI 201.
- Cooling towers to be either cross flow design, 2-cell, induced flow type designed for outdoor use with all-around 316 stainless steel construction with PVC fill and mist eliminators. Low noise axial fan with V-belt drive. Where exposed to freezing conditions, cold water basin to have electric basin heaters.
- Cooling tower basin shall be equipped with a basin cleaning system consisting of PVC piping and nozzles. A tower filtration system for the condenser water system shall be provided in a form of full-flow air/ dirt separator with automatic drain valve and manual by-pass valve. Flame spread of all materials used shall be 25 or less.
- The cooling tower where required, shall have an OSHA-compliant handrail around the top and/or side where access is necessary and cage ladder to all platforms. Permanent access from grade to the platform shall be provided.
- All exposing piping shall be coated with 20 mil thick Mascoat, color selected by Architect. Equivalent ceramic coating is also acceptable.

HVAC Equipment: Spot Cooling Applications

- For high density cooling applications, such as computer/server rooms or other sensitive electronic equipment, that requires constant 24/7 cooling: the product allowed is Liebert precision air conditioning systems.

Heat Exchangers

- Plate and Frame Heat Exchangers
- The application of Plate and Frame Heat Exchangers should be limited to dissimilar media, such as chilled water/ de-ionized water process loops. The application of Plate and Frame Heat Exchangers for comfort cooling is unacceptable and air handling systems should provide 100% air side economizer when conditions exist.
- Justification for change:
- Due to the weather conditions typically experienced in Southern Nevada, Zone 3B, plate/frame heat exchange operation is very limited in operational hours and does not provide for beneficial use. The systems should be designed to sequence from full heating > economizer > mechanical cooling.
- For process systems or where dissimilar media, a Plate and Frame Heat Exchanger shall be sized for a 2-degree F approach. 304 stainless steel plates and nitrile, EPDM or BUNA N gasket. Flanged connections to be 150# ANSI raised faced flanges. Frames shall be epoxy painted carbon steel. Frame bolting to be stainless steel with carbon steel nuts. Provide in line conical stainless-steel strainer. Plate and Frame Heat Exchangers shall not be utilized for comfort cooling.
- Justification for change:
- Due to the weather conditions typically experienced in Southern Nevada, Zone 3B, plate/frame heat exchange operation is very limited in operational hours and does not provide for beneficial use. The systems should be designed to sequence from full heating > economizer > mechanical cooling.

Water Treatment

Design, Construction and Sustainability Standards

- All water treatment systems shall provide BACnet interface to the BMCS for monitoring. System should provide water quality and water usage data.

Justification for change:

- The BMCS shall monitor all new treatment systems provide historical and alarm data. Current BMCS system shall be utilized as a complete building management, operation, and monitoring system.

Air Handlers

- Roof top air handlers shall be built in accordance with AMCA and ARI standards and shall be factory assembled and tested. The exterior casing shall be 22 gauge steel or better with 2" thick acoustic panels. Unit shall have a C-channel steel base and 14-gauge floor plate. Unit shall have fully gasketed access doors same thickness as walls. Minimum door dimensions are 24" x 72". Finish shall be epoxy prime coat and acrylic finish. Centrifugal backward incline or air foil fans shall be steel or aluminum. Minimum bearing life to be AFBMA L- 10, @ 200,000 hours.
- Dampers shall be air-foil opposed blade, low leakage with end spring seals.

Unitary Air Conditioners

- Window or wall mounted air conditioners are not acceptable. Where space cooling is needed, and the building primary system cannot be used, split DX heat pump only cooling systems with a remote condenser shall be used.

Air Distribution Systems: Laboratory Ventilation Systems

- Ducts shall be sheet metal, per latest SMACNA standards.
- Pressure rating shall be equal to maximize positive or negative pressure of connected fans.
- All fittings shall be manufactured; fish mouth fittings are not allowed.

Piping Specialties

- Ball Valves shall be full-port.
- All dielectric separations shall be made with clear flow nipples. Bronze fittings are not an acceptable separation.

Centrifugal Pumps

- Centrifugal pumps shall be horizontal, end-suction type or horizontal in-line type. Impellers to be stainless steel, pump casings to be cast iron. Mechanical shaft seals shall be specified. All shaft bearings to be ball bearings with AFBMA L10 life of 200,000 hours. Suction and discharge connections to be 125# flat face flanges. Pump impeller shall be selected for best efficiency and be between 50% and 80% if the maximum impeller diameter.
- Pump speed shall be 1750 RPM, direct driven by squirrel cage, induction motor, TEFC type. Motors shall have a 1.15 service factor. All motors shall be premium eff., VFD drive rated, and selected as non-overloading.
- Pump accessories shall include a triple duty valve on the discharge and flexible connections on both the inlet and outlet connections. Pumps shall have a low point drain connection and high point air release connection, minimum 3/4" NPT.

Water Treatment

- All new water treatment chemicals shall be approved by UNLV prior to its introduction to the system.
- All new hydronic water pipe shall be initially cleaned before start-up of any equipment.

Design, Construction and Sustainability Standards

- No untreated water shall be allowed to remain in any closed or open loop system or its related equipment after leak tests have been completed.
- Specialized systems such as RO, DI, etc shall, after testing, remain in service with fluids being maintained at specified conditions.
- There shall be no pipe dead ends w/o a small 1" inch recirculation loop.

Testing, Adjusting, and Balancing

- **Who Performs:** Testing, adjusting and balancing (TAB) shall be performed by an independent testing agency. The project shall provide an allowance for Owner to hire an independent testing agency. The test and balance agency will visit the project during the installation of the HVAC system. TAB shall be a certified AABC firm.
- **Witnessing:** No work shall be done unless the TAB firm is accompanied by representatives of the owner's Facilities Management HVAC Shop. The TAB firm shall give the owner's Office of Planning and Construction three working days notice prior to beginning work. If the TAB firm fails to coordinate with Owner and performs work, this work shall be repeated, with UNLV representation, at no cost to Owner. The contractor may have representatives accompany the TAB.
- **Deficiencies:** Deficiencies uncovered during TAB shall be corrected at no cost to Owner

BUILDING AUTOMATION AND CONTROL SYSTEM

General

- The control system shall be based on Honeywell Control System. Each controller capacity shall be limited to no less than 25% spare capacity, to include point, module, and communications. Point's list and control strategies for various HVAC design items will be provided by the engineer for record for approval by owner at each phase of submittal. The control contractor is responsible to indicate and provide third party interface point information, such as Bacnet or Lonworks interface to chillers, boilers, air handlers, etc.
- Every building shall be evaluated for the use of Environmental Management and Control System (EMCS) and Building Management Controls System (BMCS). Final decision regarding the use of EMCS or BMCS shall be made by the Owner's Office of Planning & Construction.
- All Building Automation and Control System installed at UNLV must be fully compatible and transparent to the existing installed systems.
- The application of third-party servers, interfaces, and/or gateways are not acceptable. The new system cannot reside outside of the existing programming, running control system program in the background where the operating system is multi-tasking is unacceptable.
- All interface protocol connections must be evaluated and approved by owner's Facilities Management and EMS Controls representatives.
- Any system can be installed and run in the background on the existing servers. This does not allow for the integration for the two or more systems and in the case of central plants this disconnect, and dissimilar protocols can lead to inefficient operations and increased operating cost.
- The Honeywell Enterprise Building Integrator (EBI) shall provide the option to add Energy Management functions to monitor and report electrical, gas, water consumption and other energy consumable, billable usage. This ability to correctly monitor and report these consumptions and other energy consumable shall be demonstrated to Facilities Management personnel by the Contractor. Measurements, to insure accuracy and operability, shall be by independent instruments. All data retrieved by the system shall be capable of trending and historical data collection methods.
- The current system requires the addition of other technologies to do this function. These additional technologies should be indicated, as the recommend change indicates.
- There shall be no annual maintenance or licensing fees of any kind required to be paid by the Owner at any time during the ongoing use of the installed system and software. Licenses shall be issued and authorized as directed by Owner. Licenses shall be issued such that they can be modified by owner without the permission of the contractor and/or local system integrator. Specific license wording and format shall be provided as part of the contractor's submittals.

Design, Construction and Sustainability Standards

EMCS AND BMCS Standardization

- The UNLV campus uses Honeywell Enterprise Buildings Integrator and Excel 5000 Building Control Systems as the standard Environmental Management and Control Systems (EMCS) or Building Management Control System (BMCS). Owner's Facilities Management has standardized the campus EMCS and BMC', based on the equipment and technical support provided by Honeywell International, Inc. The UNLV campus standard is to be maintained, and represents the cost-effective method for campus operation, monitoring and maintenance.
- Each facility or building are monitored and controlled from an autonomous Excel 5000 control system. Each of all control systems interface to centralized server system, Enterprise Buildings Integrator. Operators in the Facilities Management EMS Control shop maintain, manage, and operate the control systems. All facilities control systems utilize TCP/IP connections to the Enterprise Buildings Integrator.
- All projects will be provided with the most current version of software and hardware for the EMCS BMCS. Multiple systems must have full access and archiving for all program changes. The EMCS must have full capability for saving of histories data.
- Where applicable and at the discretion of Facilities Management, other Building systems: Fire/Life Safety, Elevator alarm monitoring, Security, Sump alarms, Lighting, will provide interface to the EMCS or BMCS.
- All DDC panels, servers, client machines, MMI devices, interface equipment shall be in an environmentally controlled area. The environmental conditions provided for the occupant comfort are adequate for the DDC panels. Where indicated in the specifications or drawings, panels may be externally mounted in equipment exposed to ambient conditions, provided the device are rated for the conditions to be encountered, the panels are accessible, and are shaded. The area inside a roof or outdoor mounted air handler that does not provide adequate conditioned air for the devices is not an acceptable location. Janitorial closets, restrooms, and IDF rooms are unacceptable locations unless prior approval from UNLV Facilities Maintenance and the Office of Planning and Construction.

Sequence of Operation

- New construction projects will be provided specific sequence of operations for each building, provided by the engineer of record and reviewed by project management, State Public Works, Planning and Construction Management, and Facilities Management.
- Each building will be provided by the engineer of record with the sequence of operation for all phases of design development.
- At the completion of construction, if project design permits, a commissioning firm will conduct a thorough commissioning of the system and sequence of operation. A full report to include those systems/ components that failed and corrective actions taken, are to be provided to the owner.
- Those projects without a commissioning firm, the general contractor/ vendor is required to provide full documentation indicating the system is installed per specification, a complete check out and testing of the system and components is completed, indicating the design intent is met and to include the sequence of operations.

Communications

- Facility EMCS or BMCS shall utilize the campus network, TCP/IP connections. Contractor is required to work with the UNLV Office of Information of Technology Department to establish required connections between the EMCS or BMCS and the server system.
- Communications between DDC controllers shall be Bacnet MS/ TP (preferred) or Lonwork protocols.
- Intermediate devices, such as JACE, shall be battery backed up, memory large enough to prevent loss of data at the server system while updating, and have latest hardware/firmware.
- Special note regarding the interface of specific equipment, such as chillers, boilers, and/ or energy valves. These systems should communicate via Bacnet/ IP, the EMCS or BMCS should obtain specific data required for monitoring from the network.

Design, Construction and Sustainability Standards

- All third-party software and hardware must seamlessly communicate with the Honeywell EMCS systems via one of the protocols in 7.4.1.
- Obtain DHCP reservations and DNS names (if necessary) from the UNLV IT/NOC Department through the UNLV EMS Controls Shop. The project shall provide all work, equipment, and material to connect the building to the Building Control System located currently in the Campus Services Building.

Training

- Upon completion of the commissioning process, the Control Contractor shall provide formal training to the Owner's Facilities Management on the operation of all control system software features, shall provide a complete explanation of the control sequence for each item of equipment, and shall provide instructions on the operation and maintenance of all control devices.
- Formal training on programming and engineering will be provided for the Owner's EMS Controls Shop personnel.

Warranty Period Services

- The Contractor shall provide full service for the temperature control system for a period of one year after the date of Substantial Completion.
- The Contractor shall provide a scheduled monitoring and reporting service for the duration of the one-year warranty period.

ELECTRICAL GENERAL DESIGN REQUIREMENTS

General

- The most current editions of the following codes, regulations, and standards shall be used in electrical systems designs:
- National Electric Code
- National Electric Safety Code
- National Fire Codes (NFPA Standards)
- Uniform Building Code
- Uniform Fire Code
- Model Energy Code
- ASHRAE 90.1: Latest edition
- Lighting Handbook published by the Illuminating Engineering Society (IES)
- IEEE Recommended Practice Color Book Series published by the Institute of Electrical and Electronics Engineers
- Commercial Building Telecommunications Wiring Standard, EIA/TIA 568, published by the Electronic Industry Association and the Telecommunications Industries Association.
- Commercial Building Standard for Telecommunications Pathways and Spaces, EIA/TIA 569, published by the Electronic Industry Association and the Telecommunications Industries Association
- Nevada State Fire Marshal's Regulations
- Americans with Disabilities Act
- Local codes and ordinances as may be applicable
- All electrical equipment and equipment rooms shall be designed to ensure adequate provisions for service, maintenance, and removal/replacement of electrical equipment, panels, switchboards, transformers, generators, etc.
- All electrical equipment, light fixtures, etc. shall be securely anchored to resist earthquake loads.

Design, Construction and Sustainability Standards

- Electrical calculations are required for all aspects of the electrical systems. The minimum calculations required for each project are:
- Energy code Compliance calculations
- Lighting calculations for all spaces (interior and exterior) in accordance with ASHRAE 90.1-2007
- Feeder voltage drop calculations in accordance with ASHRAE 90.1-2007
- Short circuit calculation
- Service load calculations (Per NEC)
- Electrical circuits should be assigned and dedicated to differing elements of the electrical system and related elements (i.e. building controls, smoke detectors, duct detectors and other items) so that important and critical building systems are not designed to share electrical circuits among unique and different systems (i.e. the building controls systems should not be on the same circuits as duct detectors). Circuiting design must accommodate discrete operations of these types of systems on independent circuits.

Energy Conservation

- The electrical design shall take all steps economically feasible to insure the lowest energy consumption possible.
- Lighting design shall exceed the requirements of IECC by 20% by utilizing energy efficient lamp and ballast combinations. Incandescent sources will not be used.
- Buildings shall utilize 480/277-volt three phase distribution systems, unless otherwise approved by the Owner. Each building shall have its own service transformer.
- Coordinate all energy conservation measures with sustainability requirements and policies.

Electrical Equipment

- Electrical distribution equipment-switchboards, distribution boards, panel boards and dry-type transformers shall be located in interior rooms dedicated as electrical rooms. Exceptions must be approved by Owner.
- The main service entrance main disconnecting means must be provided with a shunt trip operated from the main electrical room exterior.
- All electrical distribution boards, motor control centers, panel boards shall have a minimum of 25% spare positions but as a minimum 6 poles.
- Dry type transformers shall be Energy Star compliant. Coordinate heat generation requirements with the project mechanical engineer. Transformer coil shall be copper.
- All equipment buses shall be copper.
- Provide means for harmonic suppression for equipment that are likely to have significant harmonic content.
- Power factor correction shall be utilized for suspected highly inductive/capacitive loads. Design to maintain a total building power factor of greater than 0.90 always.

Conduit/Raceways

- All conductors are to be enclosed by conduit or other suitable means, e.g., totally enclosed cable trays, surface raceways.
- Flexible conduit in lengths exceeding six feet in length are not to be used. AC or MC type cables shall not be used.
- PVC conduit shall be used only below grade.

Design, Construction and Sustainability Standards

- Fittings electrical metallic tubing (EMT) shall be galvanized steel, watertight, compression type. Rigid threadless and die-cast fittings are not permitted.

Conductors

- All conductors shall be copper.
- Minimum power and lighting conductor size is #12 AWG.
- Conductors shall be sized for voltage drop in accordance with ASHRAE 90.1-2007.

Lighting

- Special use areas or areas used for multiple purposes which may require unusual levels of illumination shall be reviewed with Owner and approved during the early stages of design.
- All fixtures to have LED lamps, rated for 70,000 hours useful life.
- Automatic lighting shutoff shall be provided in accordance with ASHRAE 90.1-2007. Lighting controls shall be provided for all building spaces unless otherwise approved by Owner. Lighting shall be controlled by motion sensors, multi-level switching, daylight dimming or on/off control, and/or time-scheduling devices as appropriate.
- Multiple lighting control override switches shall be provided throughout the building to accommodate custodians and occupants during after-hours building use. Number of switches, locations, and circuits/zones controlled shall be submitted to Owner for review, at each phase of the design process.
- In-ground exterior light fixtures shall not be specified.
- All MDF and IDF rooms light fixtures will not be placed on after-hours shutoff circuits. Lighting must be available on a 24/7 basis.

Grounding

- All circuit grounds shall be made up such that a continuous path is reliably maintained to a grounding electrode or system. The ground field (ufer, grids, plates, etc.) shall have a maximum resistance of 5 ohms.
- Special consideration shall be given to grounding of sensitive office equipment (computer, servers, data circuits, etc.)

Telephone and Data Systems

- In all new buildings, and where required as part of the project scope of work, the design shall provide for communications pathways and spaces for the elements of the communications systems including, but not limited to, multi-service communication systems, twisted-pair systems, coaxial cable systems, and optical fiber systems.
- Coordinate the extent and layout of conduits, raceways, conductors, and cables with the Using Agency and allow for significant but reasonable changes in use of the spaces served.
- Coordinate telephone and data systems with detailed Data/Telecommunication requirements per Tab C and Section 16741 standards.
- Coordinate design and building services in MDF/IDF rooms, server rooms and other data service rooms with Owner's OIT Department through the Project Manager.
- All projects are to have wireless capability. A wireless survey is to be conducted for wireless system design. Construction budget shall include all conduit and cable (power and data) necessary to support full wireless service and coverage. This may also include wireless services at site/exterior portions of the project.
- Coordinate all requirements by complying with UNLV standards for low voltage wiring.
- Contractor shall provide test results and labeling for all data cabling (copper, fiber etc) prior to substantial completion. Results to be submitted to the Owner in electronic format.

Design, Construction and Sustainability Standards

- The hard-wired emergency phones are Ramtel RR733 one button with enclosure. Coordinate with Owner for pole specifications.

Fire Alarm Systems

- New buildings shall be equipped with a fire alarm system when required by the International Building Code, NFPA 72, NRS, and/or NAC. All new fire alarms installed shall be Notifier with a NFS2-3030 panel and must be compatible with eVance software. Systems should be equipped with DVC audio, and be fully addressable. All systems shall be designed to meet Nevada State code requirements, not county or city. Each FACP location will have a data drop that has no less than 2 data jacks but will provide the number of networking lines necessary for communication.
- All conduit, conduit bodies, and boxes ran for fire alarms shall be in red color

Generator

- When a standby generator is required due to elevator or other mechanical loads, an exterior mounted-weatherproof generator set will be provided. If generator will also serve exit and egress lighting, natural gas shall be fuel choice whenever possible. It shall also have a sound attenuating enclosure.
- Emergency generators shall be specified for a combined mechanical and electrical efficiency of 80% or greater.
- Emergency generators shall be specified with the capability for recovery to 90% of the rated voltage and 90% of the rated frequency within 1 second (60 cycles).
- Provide integral 75% resistive load bank.
- Provide BACT analysis for any generators. Approval of generator during design, prior to ordering, fabrication and installation, must be coordinated through the Project Manager with Owner's Risk Management and Safety Department, Clark County Department of Air Quality Management and other applicable agencies.
- Location of generator needs to be coordinated with outside air intakes of new project, as well as surrounding buildings. Generators must be screened from view, with appropriate access, service and operational clearances provided.
- Provide emissions control equipment for regulatory requirements and to not disrupt the use of open spaces and adjacent facilities through emissions or odors from generators.

Testing of Electrical Systems

- Specifications shall include testing requirements (including documentation of test results) as are appropriate for the electrical systems utilized in the project. Testing and testing documentation requirements shall be in accordance with a recognized testing standard (such as those published by the International Electrical Testing Association, the Institute of Electrical and Electronics Engineers, or the James Biddle Company).

Metering

Measurements:

- Meters shall measure voltage and amperage of all phases, KW, KVA, Power Factor, accumulated KWH, peak KW demand for a 15-minute period, and harmonics/power quality as necessary.

Locations:

- Meters shall be installed on each main service of a building. Sub-meters shall be installed on motor control centers serving major HVAC equipment and other major services. In accordance with ASHRAE 90.1 standards

Communications:

- Provide and install all communications and network devices necessary to fully communicate with the existing campus metering network provided by SquareD/Powerlogic or equivalent. Communications are via the Campus LAN to the SquareD/Powerlogic software on the server in the Campus Services

Design, Construction and Sustainability Standards

Building. On multiple meter installations, on meter shall act as the master connection to the Campus LAN and all other meters shall be chained to the master. Since the system is Internet TCP/IP protocol based, DHCP reservations shall be obtained from the Owner's IT Department through the Owner's Office of Planning and Construction. If no Internet connection is available, the project shall provide all work and equipment required to connect the building to the central Campus Metering computer station located in the Campus Services Building.

Software:

- All systems must be fully compatible with the SquareD/Powerlogic networked system. All interfaces and protocols must be transparent to the user/owner. Any software modifications or adds must be approved by Owner and will be installed and fully tested and operational.

Meter Selection:

- Meters shall be selected using SquareD/Powerlogic or equivalent with the following schedule. 1000 to 6000 amps use Square D CM3350 or equivalent. 300 to 1000 amps use Square D PM850 or equivalent. Less than 300 amps use Square D PM710 or equivalent. All meters must be compatible with and communicate with the UNLV MODBUS system which is the SquareD/Powerlogic System Manager Software. Final meter selection shall be approved by Owner.

RISK MANAGEMENT AND SAFETY DESIGN CONSIDERATIONS

General

Risk Management and Safety General Building Considerations:

- Fire/Life Safety
- Sprinkler Systems (drains)
- Fire Alarm Systems
- Fire Extinguishers (type, location, access, compliance with code)
- Smoke Detectors (type, location, access, compliance with code)
- Egress (stairways, exits, Emergency Lighting)
- Stair Design (size, tread, differentiate steps)
- Fire Rated Walls (compliance with code)
- Automatic External Defibrillator Locations and building services
- Occupational Safety
- Accessibility and access safety issues – i.e. Stairway/Ramp Handrails, and Mezzanine areas (handrails, guardrails, and toe boards).

Lighting:

- Location, quality, coverage, other factors.
- Code required signage, i.e. exit signs, room occupancy signs, building evacuation signs, NFPA required signs, other factors.

Ventilation Systems:

- Air Handling Vis-à-vis Hoods and exhaust fans
- Other factors

Floors and slabs:

- Appropriate surfaces, slip resistant properties, drain covers flush.

Building surfaces and equipment:

- Accessibility for cleaning, servicing, maintenance, and repair.

Lab:

- Chemical Safety
- Hoods

General Chemistry

Design, Construction and Sustainability Standards

Organic:

- Stainless steel or another solvent resistant hood

Metals:

- Polypropylene or other polymer-based acid resistant hood

Radiochemistry:

- Iodine/No Iodine (filtration)
- Stainless Steel Hoods for Radiochemistry

Perchloric Acid Chemistry:

- Welded/smooth Stainless
- No nooks or crannies for perchloric to hide
- Wash down system

Eyewashes, Safety Showers, Sinks, Drains:

- Locations, water/drain service, other considerations.
- Provide code analysis for chemicals to be used/quantities, maximum use and storage of chemicals, and code requirements (fire separations/ratings, required control areas, egress, and other considerations) to meet code requirements.
- Chemical storage, management and disposal and impact of building systems/elements (Biosafety cabinets (vented/non-vented), chemical collection/disposal and design/materials of sewer system, neutralization as necessary, text sample collection boxes on sewer system for chemical management verification, other considerations.)
- NFPA Diamonds

Lab:

- Biological Safety
- Biosafety Levels (I, II, and perhaps III)

HEPA Filtration Systems

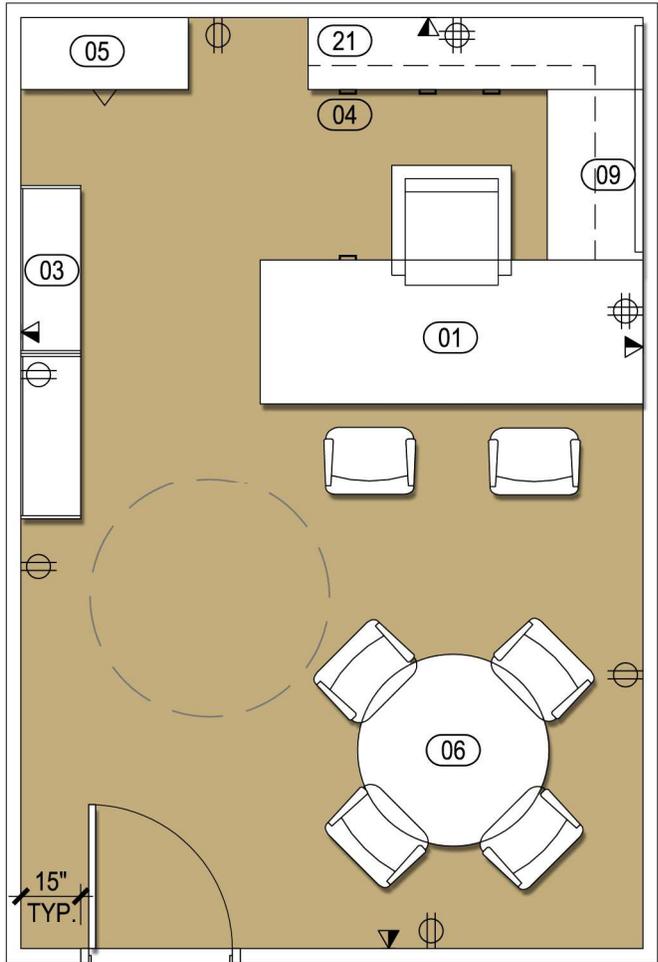
Biosafety Cabinets

Eyewashes, Safety Showers, Sinks, Drains:

- Locations, water/drain service, other considerations.

END OF TAB B SYSTEMS NARRATIVE

Space/Room Design Guidelines



Key:

- Receptacle
- Quad Receptacle
- Data/Phone
- Floor Receptacle
- Floor Data/Phone
- Media Outlet

Furniture Symbols:

- 01 Desk with return (where shown)
- 02 Conference table
- 03 Bookcase
- 04 Credenza
- 05 Filing Cabinet
- 06 Table with chairs
- 07 Flat screen TV
- 08 Storage shelving
- 09 Whiteboard/tackboard
- 10 Overhead projector and screen
- 11 Lockers
- 12 Printer/fax
- 13 Lectern with AV/lighting control
- 14 Server rack
- 15 Backer board
- 16 Mop/broom rack
- 17 Copier
- 18 Small refrigerator
- 19 Fixed classroom tables in construction scope
- 20 A/V rack, lockable and ventilated
- 21 Upper storage cabinets with tackable surfaces on doors

Space Type: Office: Dean

Square Footage: 170

Acoustical Issues: Isolation, noise reduction

Access: Key

Adjacency: Office suite

Communications: As shown

Flooring: Carpet

Natural Lighting: Controlled

Audio/Visual:

Walls: Low sheen paint

Artificial Lighting: Direct/Indirect with task lighting

Movable Equipment: N/A

Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred

Fixed Equipment: N/A

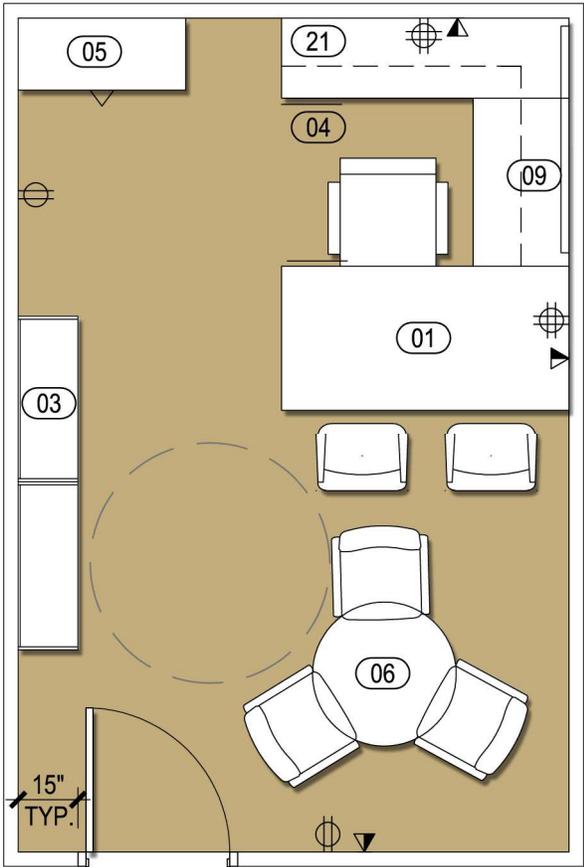
Casework: N/A

Heating and Cooling: Typical

Other Requirements: Tackboard under upper cabinets

Design, Construction and Sustainability Standards

Space/Room Design Guidelines



Key:

- Receptacle
- Quad Receptacle
- Data/Phone
- Floor Data/Phone
- Floor Receptacle
- Media Outlet

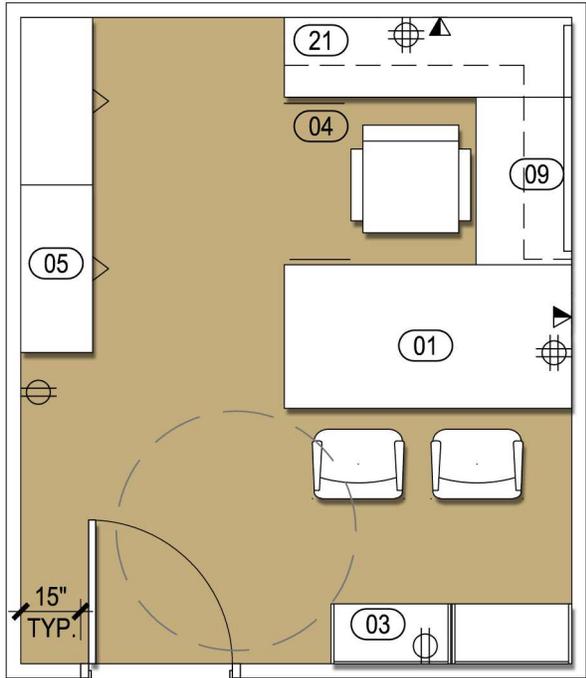
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- 14 Server rack
- 15 Backer board
- 16 Mop/broom rack
- 17 Copier
- 18 Small refrigerator
- 19 Fixed classroom tables in construction scope
- 20 A/V rack, lockable and ventilated
- 21 Upper storage cabinets with tackable surfaces on doors

Space Type: Office: Associate Dean

Square Footage: 145	Acoustical Issues: Isolation, noise reduction	Access: Key
Adjacency: Office suite	Communications: As shown	Flooring: Carpet
Natural Lighting: Controlled	Audio/Visual:	Walls: Low sheen paint
Artificial Lighting: Direct/Indirect with task lighting	Movable Equipment: N/A	Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred
	Fixed Equipment: N/A	Casework: N/A
	Heating and Cooling: Typical	Other Requirements:

Space/Room Design Guidelines



Key:

- Receptacle
- Quad Receptacle
- Data/Phone
- Floor Data/Phone
- Floor Receptacle
- Media Outlet

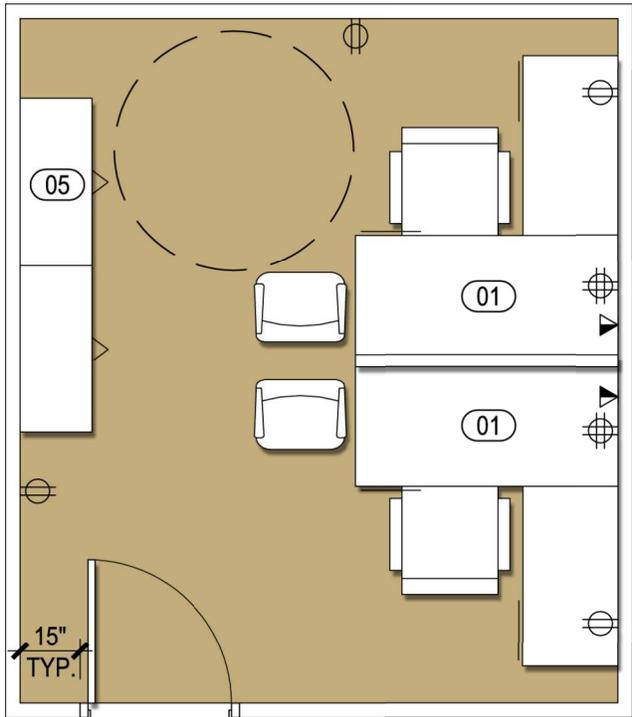
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- 11 Lockers
- 12 Printer/fax
- 13 Lectern with AV/lighting control
- 14 Server rack
- 15 Backer board
- 16 Mop/broom rack
- 17 Copier
- 18 Small refrigerator
- 19 Fixed classroom tables in construction scope
- 20 A/V rack, lockable and ventilated
- 21 Upper storage cabinets with tackable surfaces on doors

Space Type: Office: Director/Department Chair

Square Footage: 145	Acoustical Issues: Isolation, noise reduction	Access: Key
Adjacency: Office suite	Communications: As shown	Flooring: Carpet
Natural Lighting: Controlled	Audio/Visual:	Walls: Low sheen paint
Artificial Lighting: Direct/Indirect with task lighting	Movable Equipment: N/A	Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred
	Fixed Equipment: N/A	Casework: N/A
	Heating and Cooling: Typical	Other Requirements:

Space/Room Design Guidelines



Key:

- Receptacle
- Quad Receptacle
- Data/Phone
- Floor Data/Phone
- Floor Receptacle
- Media Outlet

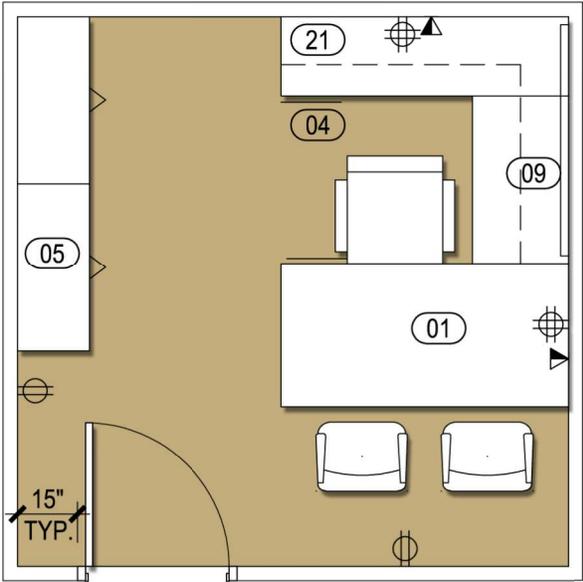
Furniture Symbols:

- 01 Desk with return (where shown)
- 02 Conference table
- 03 Bookcase
- 04 Credenza
- 05 Filing Cabinet
- 06 Table with chairs
- 07 Flat screen TV
- 08 Storage shelving
- 09 Whiteboard/tackboard
- 10 Overhead projector and screen
- 11 Lockers
- 12 Printer/fax
- 13 Lectern with AV/lighting control
- 14 Server rack
- 15 Backer board
- 16 Mop/broom rack
- 17 Copier
- 18 Small refrigerator
- 19 Fixed classroom tables in construction scope
- 20 A/V rack, lockable and ventilated

Space Type: Office: Two Person Office

Square Footage: 120-145	Acoustical Issues: Privacy, noise reduction	Access: Key
Adjacency: Office suite	Communications: As shown	Flooring: Carpet
Natural Lighting: Controlled	Audio/Visual: N/A	Walls: Low sheen paint
Artificial Lighting: Direct/Indirect with task lighting	Movable Equipment: N/A	Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred
	Fixed Equipment: N/A	Casework: N/A
	Heating and Cooling: Typical	Other Requirements:

Space/Room Design Guidelines



Key:

- Receptacle
- Quad Receptacle
- Data/Phone
- Floor Data/Phone
- Floor Receptacle
- Media Outlet

Furniture Symbols:

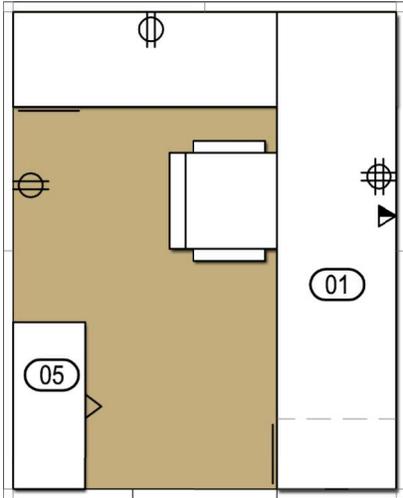
- 01 Desk with return (where shown)
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- 03 Bookcase
- 04 Credenza
- 05 Filing Cabinet
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- 08 Storage shelving
- 09 Whiteboard/tackboard
- 10 Overhead projector and screen
- 11 Lockers
- 12 Printer/fax
- 13 Lectern with AV/lighting control
- 14 Server rack
- 15 Backer board
- 16 Mop/broom rack
- 17 Copier
- 18 Small refrigerator
- 19 Fixed classroom tables in construction scope
- 20 A/V rack, lockable and ventilated
- 21 Upper storage cabinets with tackable surfaces on doors

Space Type: Office: Standard Office

Square Footage: 90-120	Acoustical Issues: Privacy	Access: Key
Adjacency: Office suite	Communications: As shown	Flooring: Carpet
Natural Lighting: Controlled	Audio/Visual: N/A	Walls: Low sheen paint
Artificial Lighting: Direct/Indirect with task lighting	Movable Equipment: N/A	Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred
	Fixed Equipment: N/A	Casework: N/A
	Heating and Cooling: Typical	Other Requirements:

Design, Construction and Sustainability Standards

Space/Room Design Guidelines



Key:

-  Receptacle
-  Quad Receptacle
-  Data/Phone
-  Floor Data/Phone
-  Floor Receptacle
-  Media Outlet

Furniture Symbols:

- 01 Desk with return (where shown)
- 02 Conference table
- 03 Bookcase
- 04 Credenza
- 05 Filing Cabinet
- 06 Table with chairs
- 07 Flat screen TV
- 08 Storage shelving
- 09 Whiteboard/tackboard
- 10 Overhead projector and screen
- 11 Lockers
- 12 Printer/fax
- 13 Lectern with AV/lighting control
- 14 Server rack
- 15 Backer board
- 16 Mop/broom rack
- 17 Copier
- 18 Small refrigerator
- 19 Fixed classroom tables in construction scope
- 20 A/V rack, lockable and ventilated

Space Type: Office: Standard Cubicle

Square Footage: 60-100

Acoustical Issues: Privacy

Access: Key if a private office or several systems furniture located in a lockable room. Provide key access to storage for systems furniture and support

Adjacency:

Communications: As shown

Flooring: Carpet

Natural Lighting: Optional

Audio/Visual: N/A

Walls: Low sheen paint

Artificial Lighting: Direct/Indirect with task lighting

Movable Equipment: N/A

Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred

Fixed Equipment: N/A

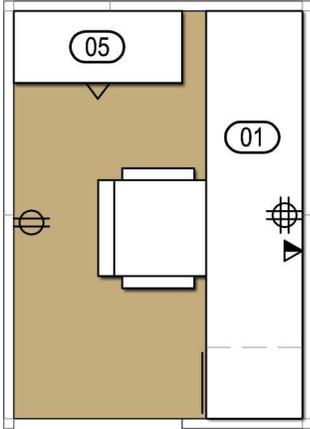
Casework: N/A

Heating and Cooling: Typical

Other Requirements: Verify electrical requirements in system furniture

Design, Construction and Sustainability Standards

Space/Room Design Guidelines



Key:

- Receptacle
- Quad Receptacle
- Data/Phone
- Floor Receptacle
- Floor Data/Phone
- Media Outlet

Furniture Symbols:

- 01 Desk with return (where shown)
- 02 Conference table
- 03 Bookcase
- 04 Credenza
- 05 Filing Cabinet
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- 07 Flat screen TV
- 08 Storage shelving
- 09 Whiteboard/tackboard
- 10 Overhead projector and screen
- 11 Lockers
- 12 Printer/fax
- 13 Lectern with AV/lighting control
- 14 Server rack
- 15 Backer board
- 16 Mop/broom rack
- 17 Copier
- 18 Small refrigerator
- 19 Fixed classroom tables in construction scope
- 20 A/V rack, lockable and ventilated

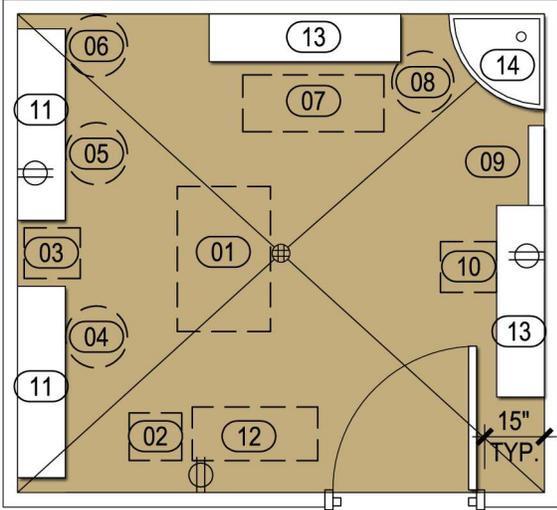
Space/Room Design Guidelines

Space Type: Office: Student Workstation

Square Footage: 30-35	Acoustical Issues: Open	Access: Key if a private office or several systems furniture located in a lockable room. Provide key access to storage for systems furniture and support
Adjacency: Grouped	Communications: As shown	Flooring: Carpet
Natural Lighting: Optional	Audio/Visual: N/A	Walls: Systems walls
Artificial Lighting: Direct/Indirect with task lighting	Movable Equipment: N/A	Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred
	Fixed Equipment: N/A	Casework: N/A
	Heating and Cooling: Typical	Other Requirements: Verify electrical requirements in system furniture

Design, Construction and Sustainability Standards

Space/Room Design Guidelines



Key:

- Receptacle
- Quad Receptacle
- Data/Phone
- Floor Data/Phone
- Floor Receptacle
- Media Outlet

Furniture Symbols:

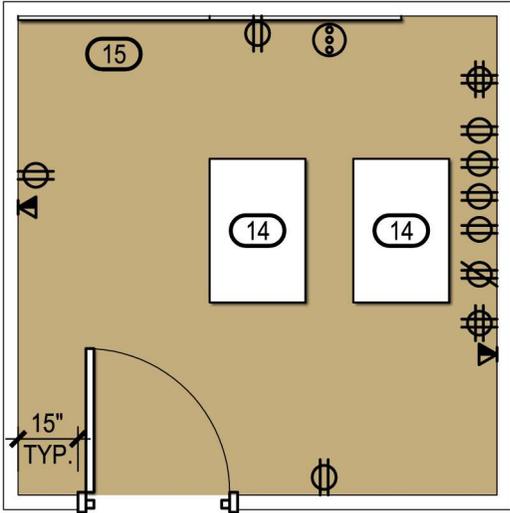
- 01 Floor machine
- 02 Wet/dry vacuum
- 03 Carpet drying fan
- 04 Vacuum back pack
- 05 Burnisher
- 06 Floor machine
- 07 Carpet extractor
- 08 Trash Barrel
- 09 Mop rack
- 10 Mop bucket
- 11 (4) 4' long shelves at 24" a.f.f.
- 12 Custodial cart
- 13 (2) 4' long shelves at 48" a.f.f.
- 14 Floor sink

Space Type: Support: Custodial Closet

Square Footage: 100 min.	Acoustical Issues: N/A	Access: Key
Adjacency: Central to served area	Communications: N/A	Flooring: Sealed concrete or VCT
Natural Lighting: Not required	Audio/Visual: N/A	Walls: Semi-gloss paint, FRP
Artificial Lighting: Service	Movable Equipment: See above	Ceiling: Gyp. Board, painted
	Fixed Equipment: Shelving (3/4" Plywood with p-lam finish and proper blocking), Broom/mop storage	Casework: N/A
	Heating and Cooling: Typical. Provide venting for cleaning agents and chemicals - coordinate switching with Owner and sustainability provisions	Other Requirements: 1 Custodial Closet per 20,000 SF of building. Buildings over 50,000 SF a 120 SF Supply Storage is required

Design, Construction and Sustainability Standards

Space/Room Design Guidelines



- Key:**
- Receptacle
 - Quad Receptacle
 - Data/Phone
 - Floor Data/Phone
 - Floor Receptacle
 - Media Outlet
 - Hardwire 50 AMP Circuit

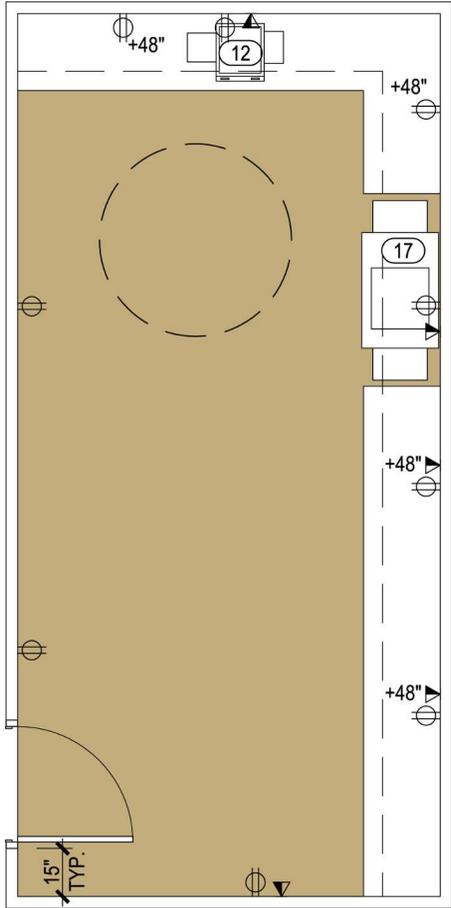
- Furniture Symbols:**
- 01 Desk with return (where shown)
 - 02 Conference table
 - 03 Bookcase
 - 04 Credenza
 - 05 Filing Cabinet
 - 06 Table with chairs
 - 07 Flat screen TV
 - 08 Storage shelving
 - 09 Whiteboard/tackboard
 - 10 Overhead projector and screen
 - 11 Lockers
 - 12 Printer/fax
 - 13 Lectern with AV/lighting control
 - 14 Server rack
 - 15 Backer board
 - 16 Mop/broom rack
 - 17 Copier
 - 18 Small refrigerator
 - 19 Fixed classroom tables in construction scope
 - 20 A/V rack, lockable and ventilated

Space Type: Support: IDF/MDF Room

Square Footage: 80-100 min.	Acoustical Issues: N/A	Access: Marlok with backup keyed hardware
Adjacency: Central to served area	Communications: As shown	Flooring: Low dissipative VCT
Natural Lighting: No	Audio/Visual: N/A	Walls: Semi-gloss paint
Artificial Lighting: Service w/ glare reduction	Movable Equipment:	Ceiling: Optional
	Fixed Equipment: Server rack – anchored to floor	Casework: N/A
	Heating and Cooling: Dedicated HVAC. Provide discrete support cooling system	Other Requirements: Access to cable trays. Fire treated backer board
		Sleeve 4" conduits into room – exact location to be coordinated with IT.

Design, Construction and Sustainability Standards

Space/Room Design Guidelines



- Key:**
- Receptacle
 - Quad Receptacle
 - Data/Phone
 - Floor Data/Phone
 - Floor Receptacle
 - Media Outlet

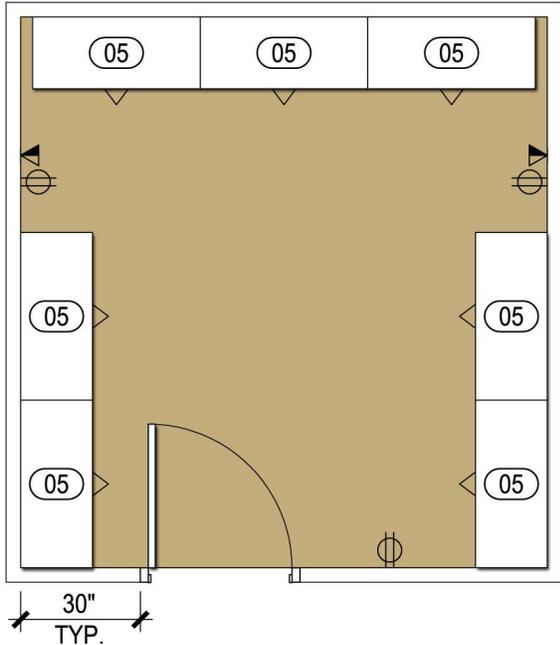
- Furniture Symbols:**
- 01 Desk with return (where shown)
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 - 04 Credenza
 - 05 Filing Cabinet
 - 06 Table with chairs
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 - 11 Lockers
 - 12 Printer/fax
 - 13 Lectern with AV/lighting control
 - 14 Server rack
 - 15 Backer board
 - 16 Mop/broom rack
 - 17 Copier
 - 18 Small refrigerator
 - 19 Fixed classroom tables in construction scope
 - 20 A/V rack, lockable and ventilated

Space Type - Support - Copy/Work Room

Square Footage: 120	Acoustical Issues: Noise reduction	Access: Key
Adjacency: Office suite	Communications: As shown	Flooring: Low dissipative VCT
Natural Lighting: Optional	Audio/Visual:	Walls: Low sheen paint
Artificial Lighting: Direct/Indirect	Movable Equipment: Printer, fax, copier	Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred
	Fixed Equipment:	Casework: Plastic Laminate with solid surface top. Provide lockable built in cabinets per Owner's request
	Heating and Cooling: Controllable, Zoned for Space, with venting based on material storage, off-gassing, equipment emissions and sustainability provisions	Other Requirements: Space should be able to be converted to two 130 sf. standard offices

Design, Construction and Sustainability Standards

Space/Room Design Guidelines



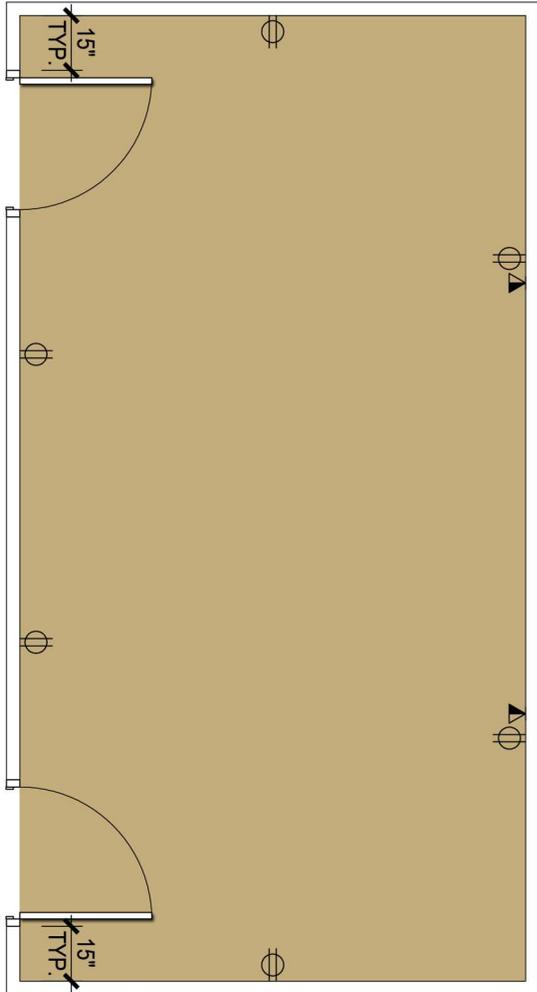
- Key:**
- Receptacle
 - Quad Receptacle
 - Data/Phone
 - Floor Data/Phone
 - Floor Receptacle
 - Media Outlet
- Furniture Symbols:**
- 01 Desk with return (where shown)
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 - 03 Bookcase
 - 04 Credenza
 - 05 Filing Cabinet
 - 06 Table with chairs
 - 07 Flat screen TV
 - 08 Storage shelving
 - 09 Whiteboard/tackboard
 - 10 Overhead projector and screen
 - 11 Lockers
 - 12 Printer/fax
 - 13 Lectern with AV/lighting control
 - 14 Server rack
 - 15 Backer board
 - 16 Mop/broom rack
 - 17 Copier
 - 18 Small refrigerator
 - 19 Fixed classroom tables in construction scope
 - 20 A/V rack, lockable and ventilated

Space Type: Support: File Room

Square Footage: 80-100 min.	Acoustical Issues: Noise reduction	Access: Key
Adjacency: Office suite	Communications: As shown	Flooring: Low dissipative VCT
Natural Lighting: Optional	Audio/Visual: N/A	Walls: Low sheen paint
Artificial Lighting: Direct/Indirect with task lighting	Movable Equipment: N/A	Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred
	Fixed Equipment: N/A	Casework: N/A
	Heating and Cooling: Typical	Other Requirements:

Design, Construction and Sustainability Standards

Space/Room Design Guidelines



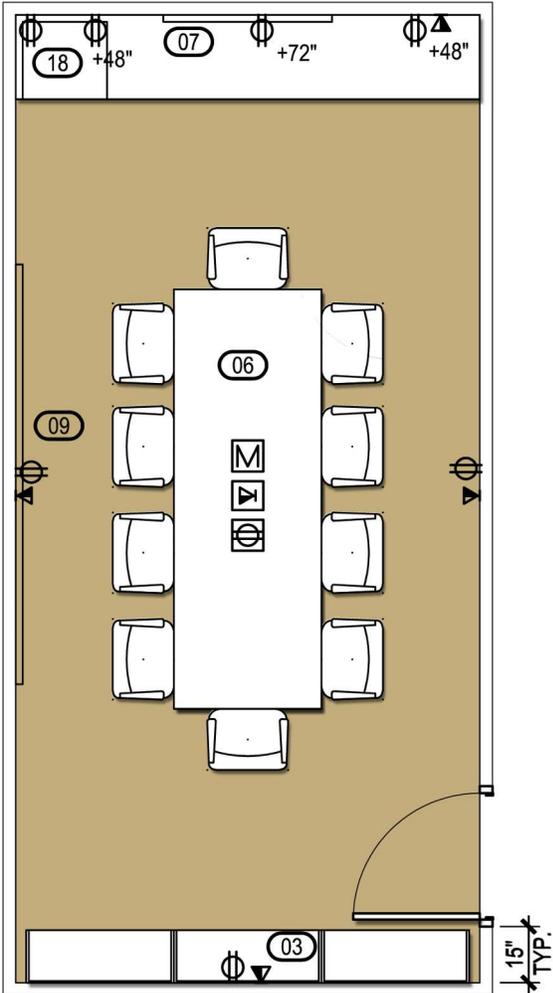
- Key:**
- Receptacle
 - Quad Receptacle
 - Data/Phone
 - Floor Data/Phone
 - Floor Receptacle
 - Media Outlet

- Furniture Symbols:**
- 01 Desk with return (where shown)
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 - 04 Credenza
 - 05 Filing Cabinet
 - 06 Table with chairs
 - 07 Flat screen TV
 - 08 Storage shelving
 - 09 Whiteboard/tackboard
 - 10 Overhead projector and screen
 - 11 Lockers
 - 12 Printer/fax
 - 13 Lectern with AV/lighting control
 - 14 Server rack
 - 15 Backer board
 - 16 Mop/broom rack
 - 17 Copier
 - 18 Small refrigerator
 - 19 Fixed classroom tables in construction scope
 - 20 A/V rack, lockable and ventilated

Space Type: Support: Storage Room

Square Footage: 120	Acoustical Issues: Noise reduction	Access: Key
Adjacency: Office suite	Communications: As shown	Flooring: Low dissipative VCT
Natural Lighting: Optional	Audio/Visual: N/A	Walls: Low sheen paint
Artificial Lighting: Direct/Indirect with task lighting	Movable Equipment: N/A	Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred
	Fixed Equipment: N/A	Casework: N/A
	Heating and Cooling: Typical	Other Requirements: Space should be able to be converted to two 130 sf. standard offices

Space/Room Design Guidelines



Key:

- Receptacle
- Quad Receptacle
- Data/Phone
- Floor Data/Phone
- Floor Receptacle
- Media Outlet

Furniture Symbols:

- 01 Desk with return (where shown)
- 02 Conference table
- 03 Bookcase
- 04 Credenza
- 05 Filing Cabinet
- 06 Table with chairs
- 07 Flat screen TV
- 08 Storage shelving
- 09 Whiteboard/tackboard
- 10 Overhead projector and screen
- 11 Lockers
- 12 Printer/fax
- 13 Lectern with AV/lighting control
- 14 Server rack
- 15 Backer board
- 16 Mop/broom rack
- 17 Copier
- 18 Small refrigerator (under counter)
- 19 Fixed classroom tables in construction scope
- 20 A/V rack, lockable and ventilated

Space Type: Support: Conference Room

Square Footage: 120-160

Acoustical Issues: Isolation, noise reduction

Access: Key

Adjacency: Office suite

Communications: As shown

Flooring: Carpet

Natural Lighting: Optional, controlled with blackout

Audio/Visual: Sound system, multimedia outlet

Walls: Low sheen paint, chair rail

Artificial Lighting: Direct/Indirect, dimmable

Movable Equipment: Small refrigerator

Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred

Fixed Equipment:

Casework: Plastic laminate with solid surface counter. Provide lockable built in cabinets per Owner's request.

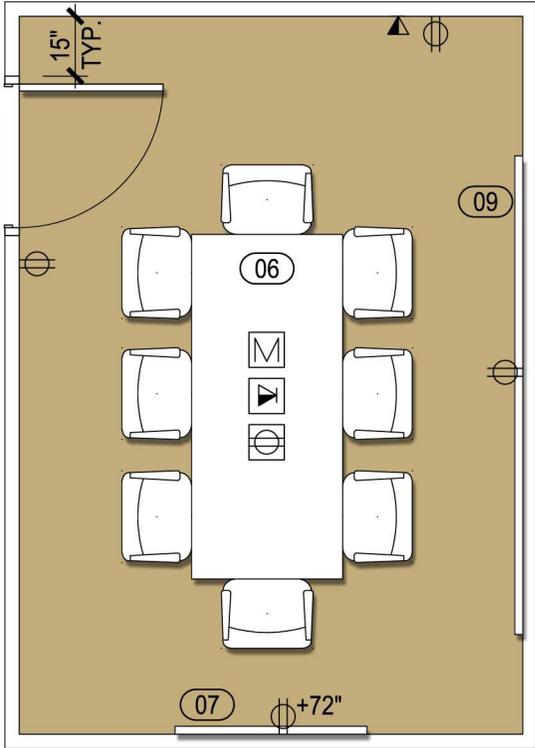
Heating and Cooling: Controllable, Zoned for Space

Other Requirements: Space should be able to be converted to two 130 sf. standard offices

Option: Projection Screen in lieu of flat screen TV.

Design, Construction and Sustainability Standards

Space/Room Design Guidelines



- Key:**
- Receptacle
 - Quad Receptacle
 - Data/Phone
 - Floor Data/Phone
 - Floor Receptacle
 - Media Outlet

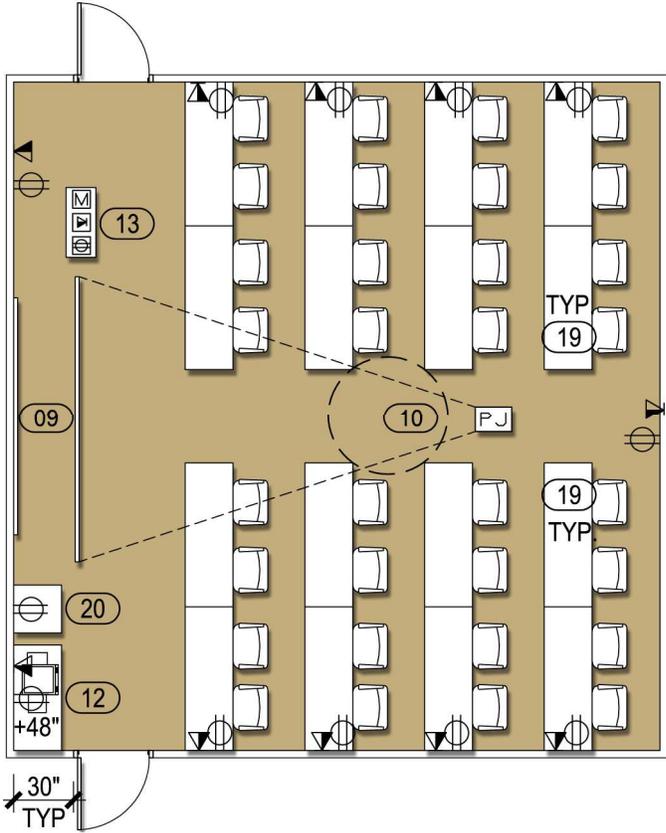
- Furniture Symbols:**
- 01 Desk with return (where shown)
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 - 07 Flat screen TV
 - 08 Storage shelving
 - 09 Whiteboard/tackboard
 - 10 Overhead projector and screen
 - 11 Lockers
 - 12 Printer/fax
 - 13 Lectern with AV/lighting control
 - 14 Server rack
 - 15 Backer board
 - 16 Mop/broom rack
 - 17 Copier
 - 18 Small refrigerator (under counter)
 - 19 Fixed classroom tables in construction scope
 - 20 A/V rack, lockable and ventilated

Space Type: Classroom: Breakout Space

Square Footage: 130 min.	Acoustical Issues: Isolation, noise reduction	Access: Key
Adjacency: Computer lab, classrooms, lecture halls	Communications: As shown	Flooring: Carpet
Natural Lighting: Controlled	Audio/Visual: Sound system, multimedia outlet	Walls: Low sheen paint, chair rail
Artificial Lighting: Direct/Indirect, dimmable	Movable Equipment:	Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred
	Fixed Equipment: whiteboard/tackboard	Casework:
	Heating and Cooling: Controllable, Zoned for Space	Other Requirements:

Design, Construction and Sustainability Standards

Space/Room Design Guidelines



- Key:**
- Receptacle
 - Quad Receptacle
 - Data/Phone
 - Floor Data/Phone
 - Floor Receptacle
 - Media Outlet

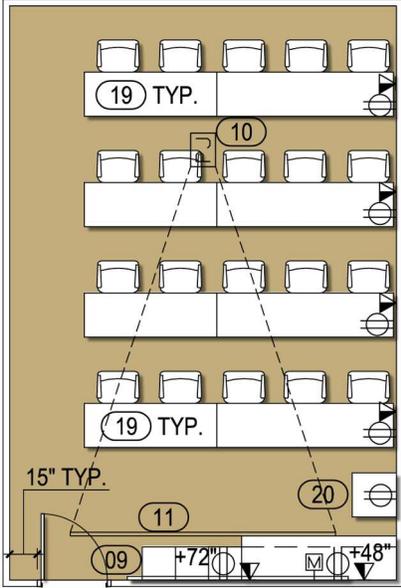
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 - 03 Bookcase
 - 04 Credenza
 - 05 Filing Cabinet
 - 06 Table with chairs
 - 07 Flat screen TV
 - 08 Storage shelving
 - 09 Whiteboard/tackboard
 - 10 Overhead projector and screen
 - 11 Lockers
 - 12 Printer/fax
 - 13 Lectern with AV/lighting control
 - 14 Server rack
 - 15 Backer board
 - 16 Mop/broom rack
 - 17 Copier
 - 18 Small refrigerator
 - 19 Fixed classroom tables in construction scope
 - 20 A/V rack, lockable and ventilated

Space Type: Classroom: 30 Person Classroom

Square Footage: 700 min.	Acoustical Issues: Isolation, noise reduction	Access: Marlok - Swipe Open/Swipe Closed
Adjacency:	Communications:	Flooring: Carpet
Natural Lighting: Optional, controlled with blackout	Audio/Visual: Sound system, multimedia outlet, video conference - coordinate videoconference needs with Owner	Walls: Low sheen paint, chair rail, corner guards
Artificial Lighting: Direct/Indirect, dimmable	Movable Equipment: Lectern, printer	Ceiling: Lay-in, 10'-0" height
	Fixed Equipment: Projector, retractable screen	Casework:
	Heating and Cooling: Controllable, Zoned for Space	Other Requirements: Coordinate with Owner if moveable classroom tables with floor data and power are an acceptable alternative

Design, Construction and Sustainability Standards

Space/Room Design Guidelines



- Key:**
- Receptacle
 - Quad Receptacle
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 - Floor Data/Phone
 - Floor Receptacle
 - Media Outlet

- Furniture Symbols:**
- 01 Desk with return (where shown)
 - 02 Conference table
 - 03 Bookcase
 - 04 Credenza
 - 05 Filing Cabinet
 - 06 Table with chairs
 - 07 Flat screen TV
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 - 11 Lockers
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 - 14 Server rack
 - 15 Backer board
 - 16 Mop/broom rack
 - 17 Copier
 - 18 Small refrigerator
 - 19 Fixed classroom tables in construction scope
 - 20 A/V rack, lockable and ventilated

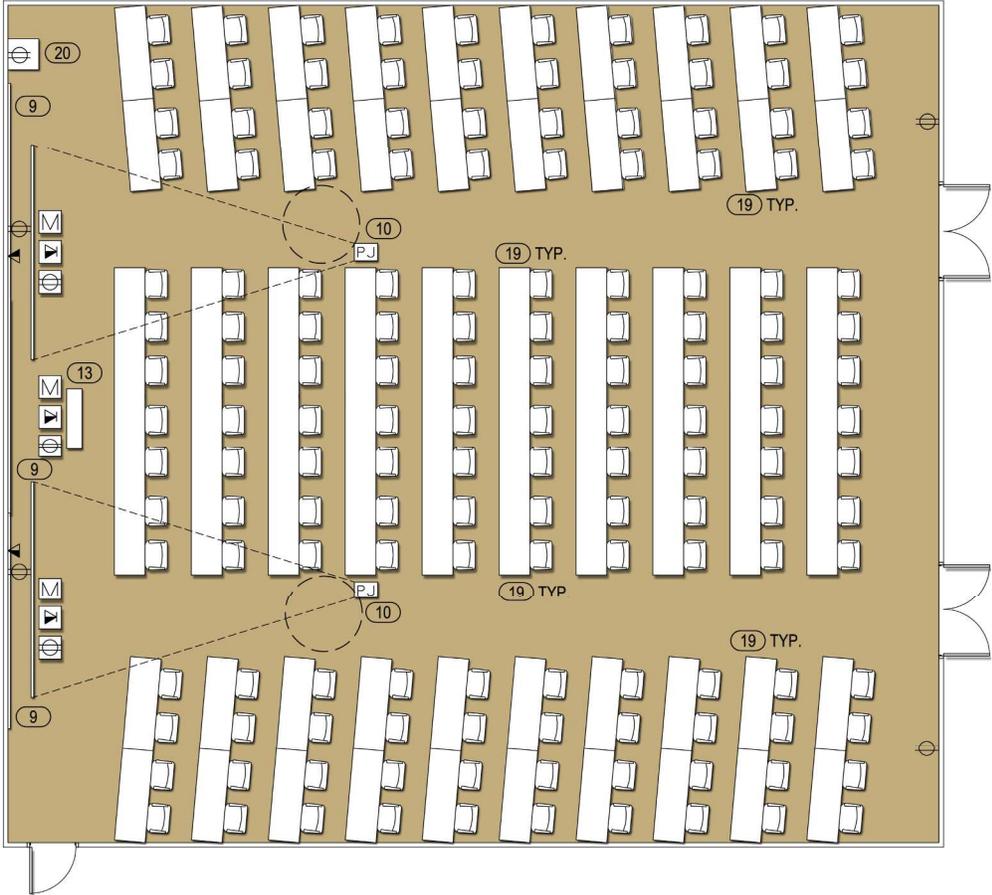
Space Type: Classroom: 20-25 Person Computer Lab

Square Footage: 400 min.	Acoustical Issues: Isolation, noise reduction	Access: Marlok
Adjacency:	Communications: As shown	Flooring: Low dissipative VCT
Natural Lighting: Optional, controlled with blackout	Audio/Visual: Sound system, multimedia outlet, video conference - coordinate videoconference needs with Owner	Walls: Low sheen paint, chair rail, corner guards
Artificial Lighting: Direct/Indirect, dimmable, low glare	Movable Equipment: Printer	Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred
	Fixed Equipment:	Casework: Plastic laminate with solid surface counter
	Heating and Cooling: Controllable, Zoned for Space	Other Requirements: Coordinate with Owner if moveable classroom tables with floor data and power are an acceptable alternative.

Design, Construction and Sustainability Standards

Space/Room Design Guidelines

Refer to 20-25 Person Classroom for Typical Keynotes

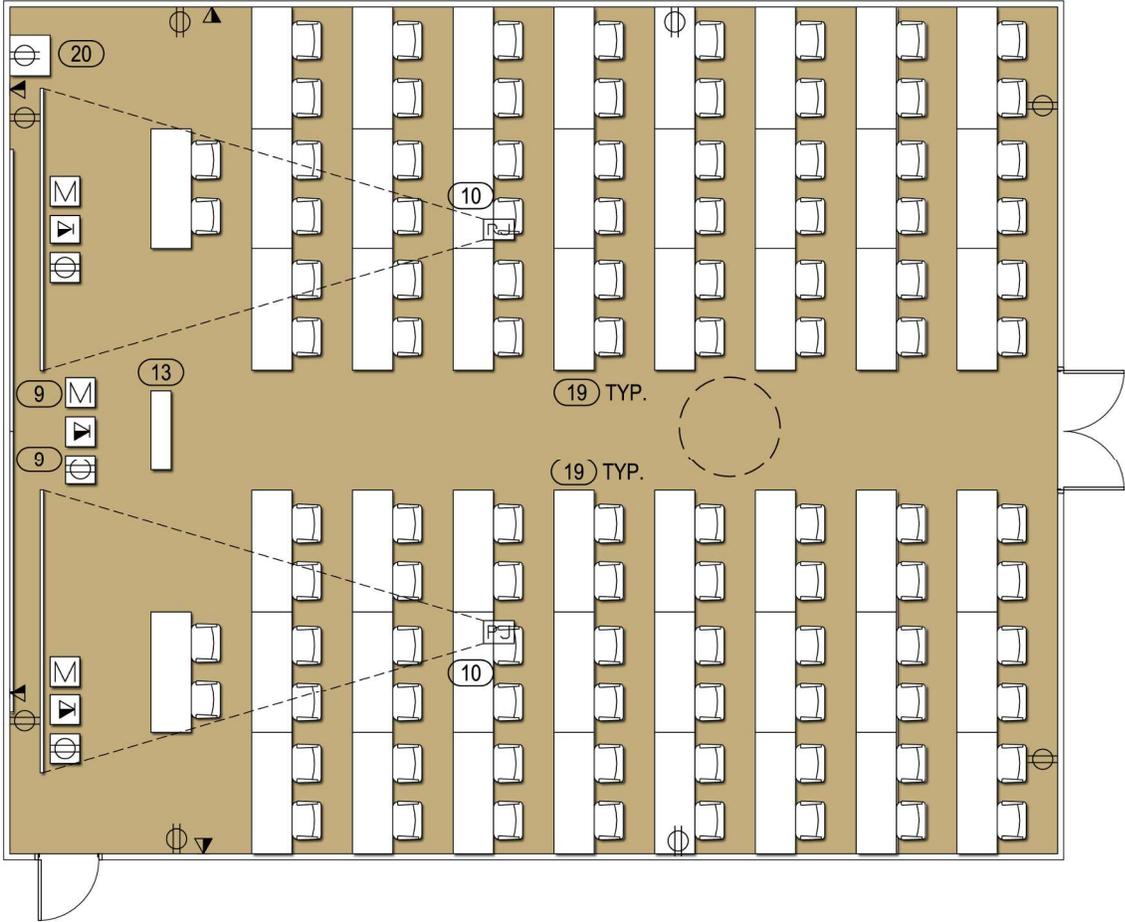


Space Type: Classroom: Lecture Hall (150)

Square Footage: 3,200 min.	Acoustical Issues: Isolation, noise reduction	Access: Marlok - Swipe Open/Swipe Closed
Adjacency:	Communications: As shown	Flooring: Sloped, carpet, sealed concrete under seats
Accessibility: Meet all special accessibility criteria	Audio/Visual: Sound system, multimedia outlet, video conference-coordinate videoconference needs with Owner	Walls: Low sheen paint, chair rail, corner guards
Natural Lighting: Optional, controlled with blackout	Movable Equipment: Lectern	Ceiling: 12'-18' minimum height, design ceiling and provide height to coordinate with lighting, acoustical, A/V and other provisions
Artificial Lighting: Direct/Indirect, dimmable, low glare	Fixed Equipment: Projector, retractable screen	Casework: N/A
	Heating and Cooling: Controllable, Zoned for Space	Other Requirements: Fixed classroom tables in construction scope. Provide power to each table and provide conduit for future data.

Space/Room Design Guidelines

Refer to 20-25 Person Classroom for Typical Keynotes



Space Type: Classroom: Lecture Hall (100)

Square Footage: 2,200 min.

Dimensions: 54'-0" x 44'-0"

Scale: NTS

Adjacency:

Accessibility: Meet all special accessibility criteria

Natural Lighting: Optional, controlled with blackout

Artificial Lighting: Direct/Indirect, dimmable, low glare

Acoustical Issues: Isolation, noise reduction

Communications: As shown

Audio/Visual: Sound system, multimedia outlet, video conference-coordinate videoconference needs with Owner

Movable Equipment: Lectern

Fixed Equipment: Projector, retractable screen

Heating and Cooling: Controllable, Zoned for Space

Access: Marlok - Swipe Open/Swipe Closed

Flooring: Sloped, carpet, sealed concrete under seats

Walls: Low sheen paint, chair rail, corner guards

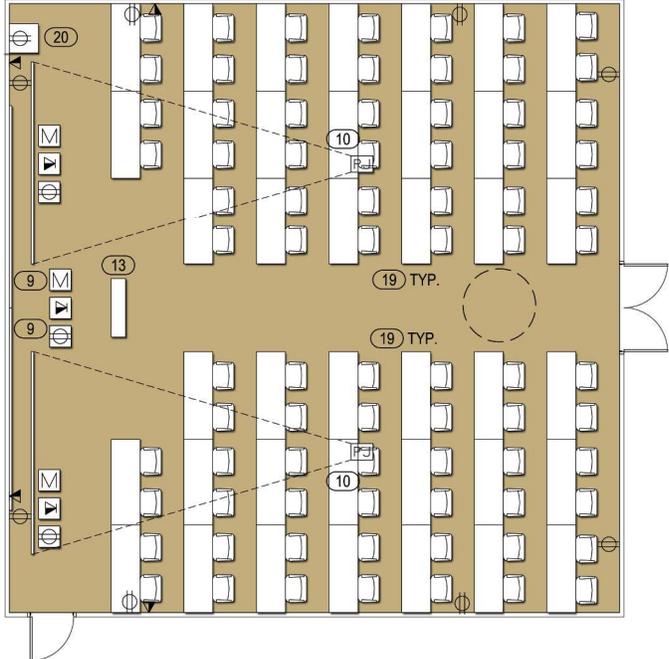
Ceiling: 12'-18' minimum at lowest point - design ceiling and provide height to coordinate with lighting, acoustical, A/V and other provisions

Casework: N/A

Other Requirements: Fixed classroom tables in construction scope. Provide power to each table and provide conduit for future data.

Design, Construction and Sustainability Standards

Space/Room Design Guidelines



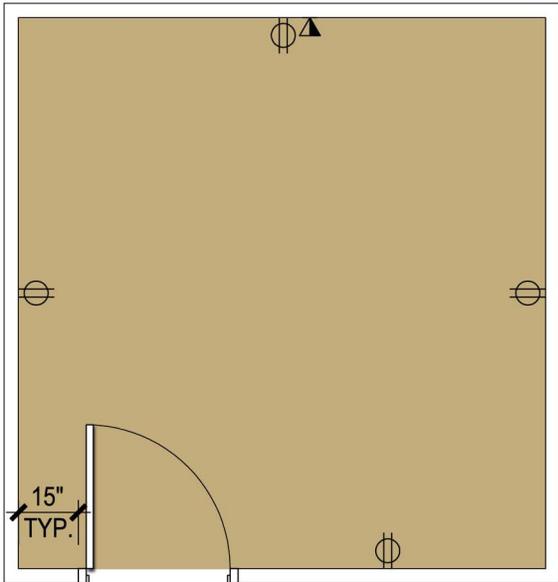
- Key:**
- Receptacle
 - Quad Receptacle
 - Data/Phone
 - Floor Data/Phone
 - Floor Receptacle
 - Media Outlet

- Furniture Symbols:**
- 01 Desk with return (where shown)
 - 02 Conference table
 - 03 Bookcase
 - 04 Credenza
 - 05 Filing Cabinet
 - 06 Table with chairs
 - 07 Flat screen TV
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 - 09 Whiteboard/tackboard
 - 10 Overhead projector and screen
 - 11 Lockers
 - 12 Printer/fax
 - 13 Lectern with AV/lighting control
 - 14 Server rack
 - 15 Backer board
 - 16 Mop/broom rack
 - 17 Copier
 - 18 Small refrigerator
 - 19 Fixed classroom tables in construction scope
 - 20 A/V rack, lockable and ventilated

Space Type: Classroom: Lecture Hall (80)

<p>Square Footage: 1,700 min.</p>	<p>Acoustical Issues: Isolation, noise reduction</p>	<p>Access: Marlok - Swipe Open/Swipe Closed</p>
<p>Adjacency:</p>	<p>Communications: As shown</p>	<p>Flooring: Sloped, carpet, sealed concrete under seats</p>
<p>Accessibility: Meet all special accessibility criteria</p>	<p>Audio/Visual: Sound system, multimedia outlet, video conference-coordinate videoconference needs with Owner</p>	<p>Walls: Low sheen paint, chair rail, corner guards</p>
<p>Natural Lighting: Optional, controlled with blackout</p>	<p>Movable Equipment: Lectern</p>	<p>Ceiling: 12'-0" minimum at lowest point - design ceiling and provide height to coordinate with lighting, acoustical, A/V and other provisions</p>
<p>Artificial Lighting: Direct/Indirect, dimmable, low glare</p>	<p>Fixed Equipment: Projector, retractable screen</p>	<p>Casework: N/A</p>
	<p>Heating and Cooling: Controllable, Zoned for Space</p>	<p>Other Requirements: Fixed classroom tables in construction scope. Provide power to each table and provide conduit for future data.</p>

Space/Room Design Guidelines



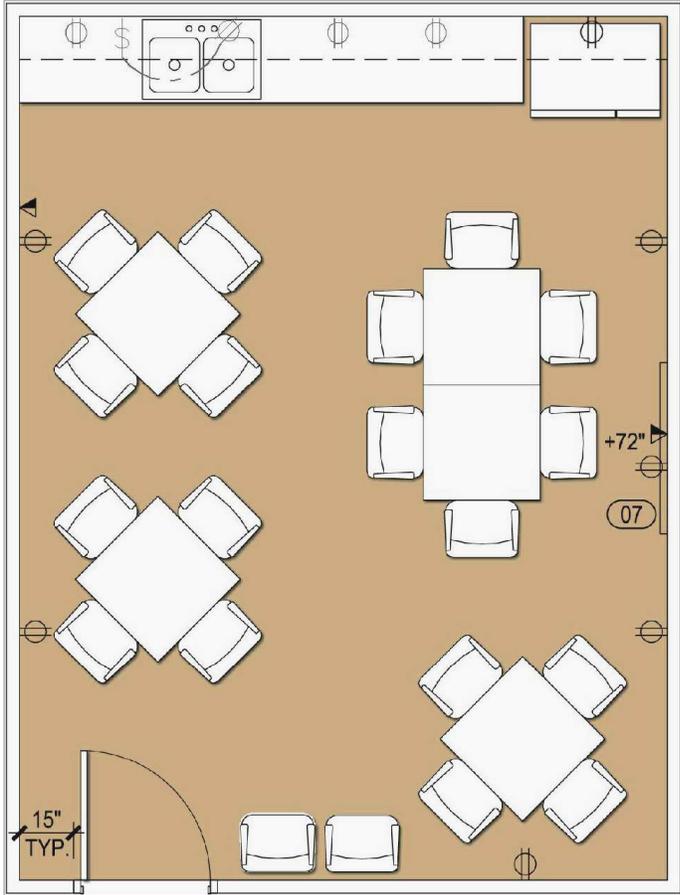
- Key:**
- Receptacle
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 - Data/Phone
 - Floor Data/Phone
 - Floor Receptacle
 - Media Outlet

- Furniture Symbols:**
- 01 Desk with return (where shown)
 - 02 Conference table
 - 03 Bookcase
 - 04 Credenza
 - 05 Filing Cabinet
 - 06 Table with chairs
 - 07 Flat screen TV
 - 08 Storage shelving
 - 09 Whiteboard/tackboard
 - 10 Overhead projector and screen
 - 11 Lockers
 - 12 Printer/fax
 - 13 Lectern with AV/lighting control
 - 14 Server rack
 - 15 Backer board
 - 16 Mop/broom rack
 - 17 Copier
 - 18 Small refrigerator
 - 19 Fixed classroom tables in construction scope
 - 20 A/V rack, lockable and ventilated

Space Type: Support: Facilities Storage Room

Square Footage: 120 min.	Acoustical Issues: Noise reduction	Access: Key
Adjacency: Office suite	Communications: As shown	Flooring: Low dissipative VCT
Natural Lighting: Optional	Audio/Visual: N/A	Walls: Low sheen paint
Artificial Lighting: Direct/Indirect with task lighting	Movable Equipment: N/A	Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred
	Fixed Equipment: N/A	Casework: N/A
	Heating and Cooling: Typical	Other Requirements: Space should be able to be converted to a 130 sf. standard office

Space/Room Design Guidelines



Key:

- ⌘ Electrical Switch
- ⊕ Receptacle
- ⊕ Quad Receptacle
- ⊕ Data/Phone
- ⊕ Floor Data/Phone
- ⊕ Floor Receptacle
- ⊕ M Media Outlet

Furniture Symbols:

- 01 Desk with return (where shown)
- 02 Conference table
- 03 Bookcase
- 04 Credenza
- 05 Filing Cabinet
- 06 Table with chairs
- 07 Flat screen TV
- 08 Storage shelving
- 09 Whiteboard/tackboard
- 10 Overhead projector and screen
- 11 Lockers
- 12 Printer/fax
- 13 Lectern with AV/lighting control
- 14 Server rack
- 15 Backer board
- 16 Mop/broom rack
- 17 Copier
- 18 Small refrigerator
- 19 Fixed classroom tables in construction scope
- 20 A/V rack, lockable and ventilated

Space Type: Support: Faculty Lounge

Square Footage: 200 min.

Adjacency: Office suite

Natural Lighting: Yes

Artificial Lighting: Direct/Indirect, dimmable

Acoustical Issues: Isolation, noise reduction

Communications: As shown

Audio/Visual: Sound system, multimedia outlet

Movable Equipment: Refrigerator, microwave

Fixed Equipment: Sink with 1 hp garbage disposal

Heating and Cooling: Controllable, Zoned for Space

Access: Key

Flooring: Low dissipative VCT

Walls: Low sheen paint, chair rail, corner guards

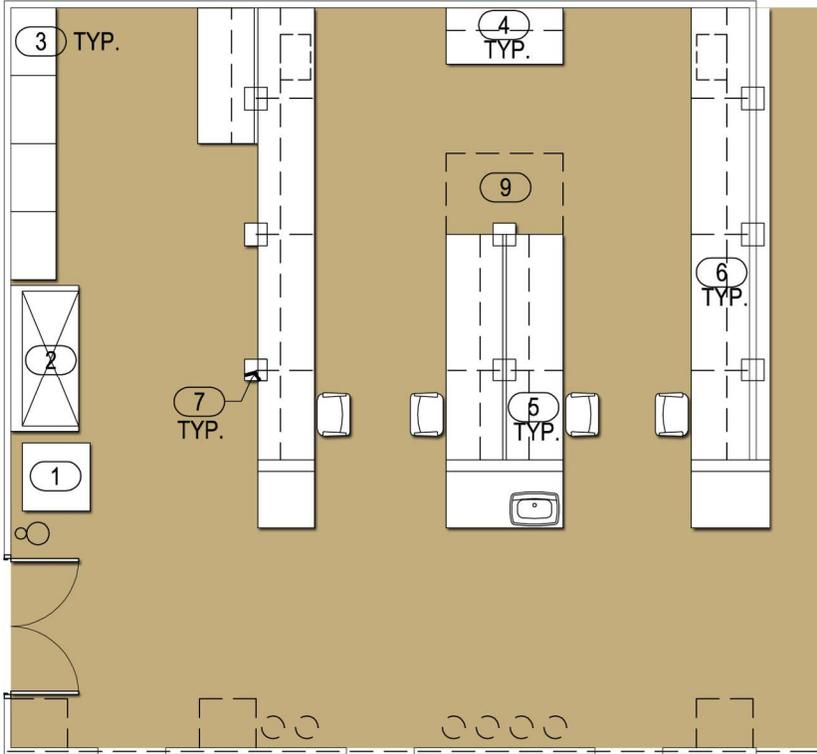
Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred

Casework: Plastic laminate with solid surface counter

Other Requirements: Provide power/data for flat screen TV.

Design, Construction and Sustainability Standards

Space/Room Design Guidelines



Key:

- Receptacle
- Quad Receptacle
- Data/Phone
- Floor Data/Phone
- Floor Receptacle
- Media Outlet

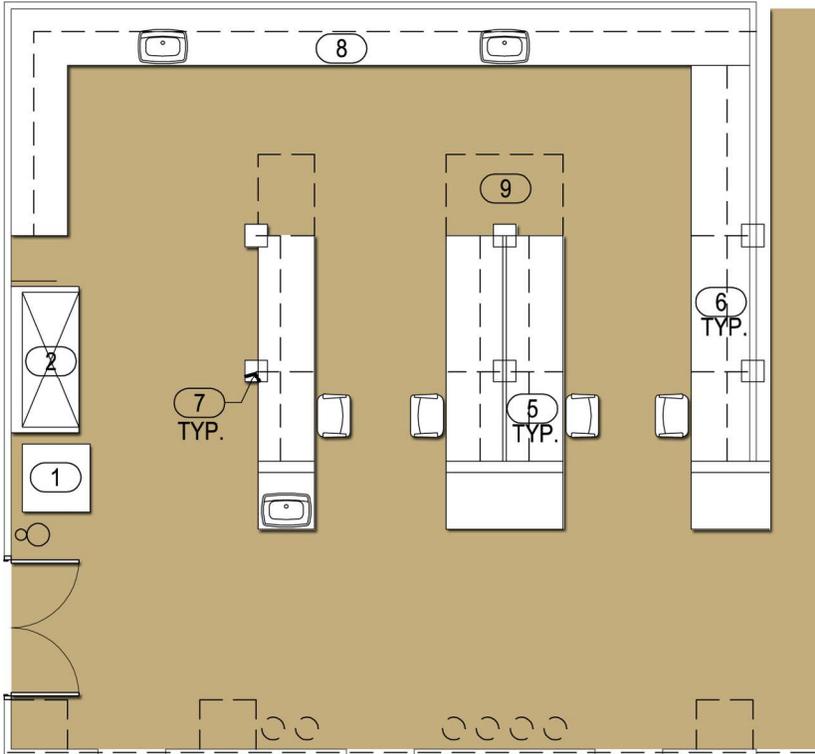
Furniture Symbols:

- 01 Flammable Storage Cabinet
- 02 Fume Hood
- 03 3' Wide Storage Cabinet
- 04 Mobile Storage Cab. w/ Shelves
- 05 4' Mobile Desk
- 06 6' Mobile Bench
- 07 OH Utilities
- 08 Bench & Storage Cab. w/ Shelves
- 09 Equipment Area

Space Type: Wet Lab: Open Lab Module Option 1

Square Footage: 1080 min.	Acoustical Issues: Isolation, noise reduction	Access: Key
Adjacency:	Communications: As shown	Flooring: Low dissipative VCT
Natural Lighting: Yes	Audio/Visual:	Walls: Low sheen paint, corner guards
Artificial Lighting: Direct/Indirect, dimmable	Movable Equipment:	Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred
	Fixed Equipment: Fume Hood, Sink, Flammable Storage Cabinet	Casework: Plastic laminate with solid surface counter. Provide lockable built in cabinets per Owner's request
	Heating and Cooling: Controllable, Zoned for Space	Other Requirements:

Space/Room Design Guidelines



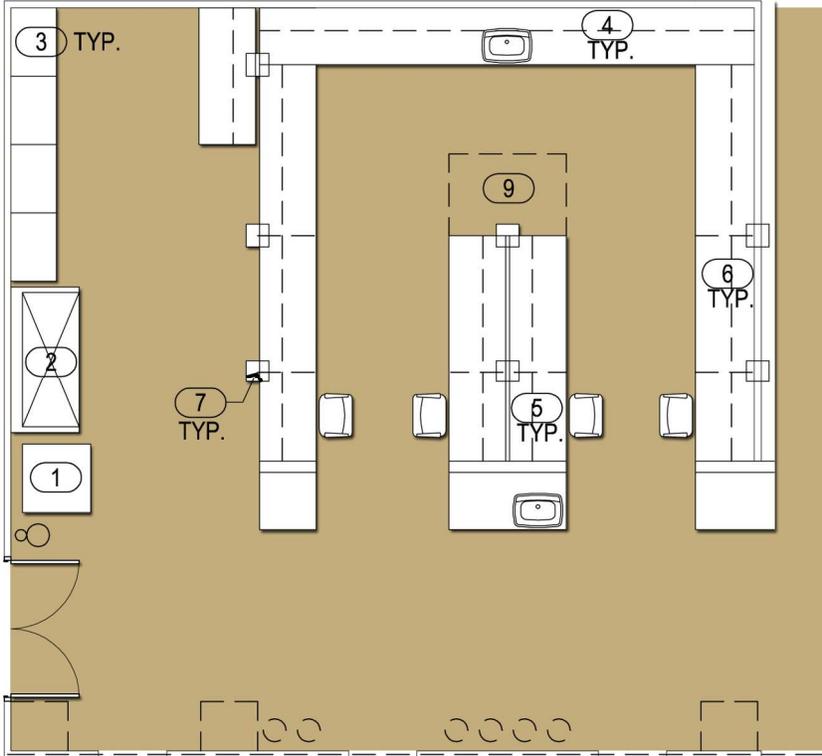
- Key:**
- Receptacle
 - Quad Receptacle
 - Data/Phone
 - Floor Data/Phone
 - Floor Receptacle
 - Media Outlet

- Furniture Symbols:**
- 01 Flammable Storage Cabinet
 - 02 Fume Hood
 - 03 3' Wide Storage Cabinet
 - 04 Mobile Storage Cab. w/ Shelves
 - 05 4' Mobile Desk
 - 06 6' Mobile Bench
 - 07 OH Utilities
 - 08 Bench & Storage Cab. w/ Shelves
 - 09 Equipment Area

Space Type: Wet Lab: Open Lab Module Option 2

Square Footage: 1080 min.	Acoustical Issues: Isolation, noise reduction	Access: Key
Adjacency:	Communications: As shown	Flooring: Low dissipative VCT
Natural Lighting: Yes	Audio/Visual:	Walls: Low sheen paint, corner guards
Artificial Lighting: Direct/Indirect, dimmable	Movable Equipment:	Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred
	Fixed Equipment: Fume Hood, Sink, Flammable Storage Cabinet	Casework: Plastic laminate with solid surface counter. Provide lockable built in cabinets per Owner's request
	Heating and Cooling: Controllable, Zoned for Space	Other Requirements:

Space/Room Design Guidelines



Key:

- Receptacle
- Quad Receptacle
- Data/Phone
- Floor Data/Phone
- Floor Receptacle
- Media Outlet

Furniture Symbols:

- 01 Flammable Storage Cabinet
- 02 Fume Hood
- 03 3' Wide Storage Cabinet
- 04 Mobile Storage Cab. w/ Shelves
- 05 4' Mobile Desk
- 06 6' Mobile Bench
- 07 OH Utilities
- 08 Bench & Storage Cab. w/ Shelves
- 09 Equipment Area

Space Type: Wet Lab: Open Lab Module Option 3

Square Footage: 1080 min.	Acoustical Issues: Isolation, noise reduction	Access: Key
Adjacency:	Communications: As shown	Flooring: Low dissipative VCT
Natural Lighting: Yes	Audio/Visual:	Walls: Low sheen paint, corner guards
Artificial Lighting: Direct/Indirect, dimmable	Movable Equipment:	Ceiling: Lay-in, 9'-0" minimum, 10'-0" preferred
	Fixed Equipment: Fume Hood, Sink, Flammable Storage Cabinet	Casework: Plastic laminate with solid surface counter. Provide lockable built in cabinets per Owner's request
	Heating and Cooling: Controllable, Zoned for Space	Other Requirements: