The University of New Mexico

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SRS Design Guidelines

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In accordance with all applicable environmental, health & safety (EH&S) laws and regulations, SRS provides the following additional list of requirements that the designers of new & remodeled UNM facilities must incorporate into their scope of work, if applicable. This list is only intended to be an aid regarding requirements that, if all listed, would take volumes to include in specific detail. This list does not release the obligation to fully comply with the specific details of the multitude of EH&S laws & regulations that may apply to the design and construction of facilities at UNM.

Architect-Engineer services shall comply with the specifications or other technical guidance furnished by the University of New Mexico; shall comply with the applicable requirements for all facility designs with regard to any facility, facility addition, or alteration or facility lease. The architect-engineer service shall ensure the professional quality, technical accuracy, and coordination of all designs, drawings, specifications and other services furnished. Design will require an analysis of hazards associated with the renovation or demolition of existing structures, such as hazardous material removal (e.g., lead-based paint and asbestos-containing materials), site preparation, trenching and excavation, heavy equipment and machinery use, materials handling equipment, lock-out/tag-out, power tools, walking and work surfaces, confined spaces, HVAC systems, exhaust ventilation for contaminants (including hoods), quality and quantity of makeup air supplied to work areas, etc. Documents required may also include, but not be necessarily limited to, environmental documents required to operate the facility, construction permits, and contracts.

I. Environmental Compliance

A. Air Quality(Outdoor)

1. Combustion Equipment – CSI Divs. 11, 22, 23 or 26
    a. Provide SRS with maximum horsepower or heat input, and air emission rates at least 4 months before construction to allow time to obtain the required air quality permit prior to equipment purchase or installation.
    b. Specify only EPA-compliant equipment, and with "low-NOx" emissions whenever possible.
2. Chemical Emissions – CSI Div. 9
    a. Only "low-VOC" architectural coatings, sealants, adhesives & solvents shall be specified.

The list above stems from UNM's Title V Operating Permit and 20.11 NMAC requirements as available from the City of Albuquerque Environmental Health Dept. Air Quality Division and their website.

B. Chemical Safety – CSI Divs. 11, 22, 23 or 26

1. Bulk chemical storage
    a. For drums or other containers of hazardous or otherwise regulated liquids in quantities larger than 10 gallons, secondary containment is required for on-site storage or dispensing operations.
    b. Appropriate electrical grounding provisions must be made for all flammable liquid storage areas and dispensing stations.
    c. Areas or rooms used for storage or use of hazardous or otherwise regulated liquids in quantities larger than 5 gallons shall not have floor drains. Existing floor drains in such areas should be plugged.

d. Areas or rooms used for storage of flammables and fuels will have appropriate fire suppression systems. Flammables shall be stored in original containers or safety cans, and stored in cabinets remote from egress paths.
e. The quantities of flammable liquids stored in a single control area should be limited to the minimum feasible for maintaining daily operations; if use of large quantities of flammable liquids is anticipated, a dedicated flammable liquid storage area should be provided in accordance with the controlling codes.
f. Chemical storage areas shall have plumbed eyewash and deluge showers.
g. Chemical storage shelving, including that used for hazardous waste storage, shall be provided with a lip or guard, unless within a hazardous material storage cabinet.
h. Chemical storage shelving materials must be of substantial construction and constructed of materials that are compatible with the hazardous materials stored.
i. The area underneath sinks may not be used for chemical storage, except for cleaning supplies similar in nature and hazard to ordinary household cleaners.

2. Areas or rooms used for chemical storage shall have appropriate ventilation, separation from adjacent occupied areas by an appropriate rated fire separation, and fire suppression systems appropriate with the hazards of the materials to be stored.
3. Fixed piping for hazardous materials must be constructed in accordance with the appropriate fire and building codes for the occupancy and hazard class of the material.

The list above stems from requirements in various parts of 40 CFR, 29 CFR and UNM's Pollution Prevention Agreement MOU with the City Public Works Dept.

C. <u>Sustainability</u> – Various CSI Divs., see below

1. Roof drains should direct water into plantings or be used for other beneficial reuses whenever possible before discharge to the storm sewer. – CSI Divs. 2, 7, 22 or 23
2. Room lighting should be controlled by motion sensors and should turn off 5 minutes after the last occupant leaves. – CSI Div. 16
3. Restroom water faucets should turn off automatically after 4 seconds – CSI Div. 22
4. Buildings and windows should be positioned to take advantage of natural lighting, natural heating and natural ventilation sources whenever possible. – CSI Div. 8 or 23
5. Heating units should be insulated to conserve heat. – CSI Div. 23
6. Heating or air conditioning units should be the most energy efficient units available – CSI Divs. 23 or 26

The list above stems from requirements in the Pollution Prevention Act of 1990.

D. <u>Waste Water</u> – CSI Divs. 22

1. Facilities producing significant useful gray water should be designed and constructed with segregated waste plumbing to facilitate later connection to future campus water reuse system.
2. New acid neutralization systems should not be installed and existing acid neutralization systems should be removed during major building remodels.(Unless required by funding source)
3. Plumbing systems for process units that utilize hazardous materials must be designed with appropriate controls to positively prevent the accidental discharge of hazardous or toxic process chemicals to the sewer. In addition, if a process upset could automatically shut off the discharge, provision must be made for the re-routing of the effluent to a safe storage unit.
4. Each project plan involving waste water engineering should include a written statement describing the means and methods adopted or considered for reducing, reusing, or recycling water. Where an approach is considered but found to be infeasible, a short statement describing the approach and the reasons for rejection should be included.

The list above stems from 19.27 NMAC, 20.7.3 NMAC and UNM's Pollution Prevention Agreement MOU with the City Public Works Dept., 2002.

E. Storm Water Quality – CSI Divs. 1 or 2

For projects disturbing greater than1 acre of soil or pavement, the designer shall allow space for, or design in, sufficient storm water retention to minimize discharge of sediment laden storm water during construction. For final site design, retain on-site all storm water discharge in excess of natural pre-development discharges for up to a 2-inch rain event or whatever the current CABQ Development Process Manual (DPM) requires.

These requirements stem from UNM's NPDES Permit requirements and associated Clean Water Act regulations in 40 CFR Parts 122, 123, 124 and several others available at the EPA's http://cfpub.epa.gov/npdes website.

II. Fire Safety

This is provided as the standard policy for UNM construction and renovation projects as it relates to safety. Required and recommended practices in this policy are derived from the National Fire Protection Association (NFPA) Standards and the International Fire Code (IFC). The New Mexico State Fire Marshal's Office has adopted the IFC as standard requirements for construction and life safety. Issues listed below as **"UNM Requirement"** indicate UNM requirements exceeding code standards. Various CSI Divs. 1, 2 7, 8, 9, 10, 12 or 22

A. Project Reviews

1. Safety and Risk Services (SRS) must be coordinated with during all stages of the programming, planning, review and construction phases.
2. Areas which cause the greatest concerns are: construction material, fire detection and/or suppression systems, life safety devices, and emergency egress from the facility as well as access to the facility for emergency response.
3. All NFPA, IBC, IFC and other applicable code references are to be used (not all referenced in this document, i.e. NFPA has over 248 separate standards). The architectural and engineering team will utilize the most currently adopted standard(s) for UNM projects. Specific but not all inclusive UNM Requirements are noted below.
4. When in conflict with other recognized, adopted or required codes or standards, the most stringent requirement will apply. This includes standards written for the purpose of receiving grants, compliance with Federal standards for department operations, OSHA, NIH, DOH, TJC or other standards. The entity requiring such must submit the written standard for review prior to start of the design stage of the project.
5. SRS requires written replies to all project reviews submitted. These should be from the project manager, architect, or the engineer prior to the next review meeting.
6. A final set of shop drawings (as-builds) for all fire suppression, fire alarm and other special safety systems will be provided to SRS after completion of work.

B. Construction Materials

1. All interior finish materials shall comply with NFPA 101. Class A or B material will be used.
2. Documentation of flame spread ratings will be made available and provided to SRS upon request. (NOTE- requests may be made if a questionable material is noted during the specification review or during construction site visits).

C. Site Surveys

1. Site surveys will be conducted and information from the survey(s) used to determine building separation requirements, access for emergency vehicles, access for emergency crews to the building, drainage of firefighting water in relation to other exposures and access to emergency devices.
2. In addition to requirements of 1 above, plans must show the location of all buildings, electrical transformers, parking areas, vegetation etc., which could become fire exposures as well as items of safety concern. Items specifically required to be on the site drawings are:
    a. Buildings, to include the site of construction and all exposures whether new or existing,
    b. Electrical substations light and power poles,
    c. Parking areas, both ground level, above and/or below ground.
    d. Fire hydrants or other water supplies for firefighting, existing and new.
    e. Street or elevated emergency vehicle access to the building with road or access width.
    f. Drainage {for Firefighting water and hazardous materials spills},
    g. Connections and devices for fire suppression systems,
    h. Terrain and landscaping proposals,
    i. Overhead obstructions with height of obstruction.
    j. Bollards, benches, statues, gates, fences, arches etc. which may affect emergency access to the building.

D. Design Criteria

1. Design criteria must include the following on all new construction and renovation projects at UNM.
    a. Square footage of each room.
    b. Occupancy calculations shall include the occupancy load of each room.
    c. Occupancy hazard class.
    d. Projected fire/fuel load (i.e. storage, chemicals, flammables, dead loads for heavy equipment above ground level etc.).
    e. IBC/IFC requirements for detection, suppression, special systems and extinguishers.
    f. Compartmentalization requirements and locations, fire walls, smoke barriers, fire doors/windows etc.
    g. ADA (Americans with Disabilities) AOR (Area of Rescue) requirements and location(s).
    h. Required atrium smoke removal criteria and location(s).

E. Normally Unoccupied Spaces

1. This includes electrical closets (over 50 sq. ft. and accessory to the room it serves), trash rooms, IT rooms, storage and other normally unoccupied areas (noted as spaces below). **(UNM Requirement)**
2. Due to the inherent hazards of these types of areas, additional protection must be included for early detection of a fire and quick suppression in order to prevent the spread of fire from what is normally an unoccupied area.
3. All unoccupied spaces will be protected with a smoke detector and sprinkler head regardless of the protection requirements of the rest of the building. Both systems will be connected to the buildings fire alarm system. A heat detector (no higher than 135^{o}F) may be substituted, if necessary due to steam production from the custodial sink, with prior written approval by SRS. If the facility is fully protected by a sprinkler system no smoke detector is required.
4. The space will be constructed of a one-hour fire barrier, regardless of the construction requirements of the rest of the building. Exception/ Closets under 50 sq. ft. and considered an accessory area to the space it is serving.
5. The space door will be solid core (or fire rated metal) and be labeled for at least 20 minutes unless a higher requirement is called for by code, with a self-closing device.
6. Doorstops will not be installed on any fire rated door. NOTE- magnetic hold open devices may be installed per NFPA 101 and 80 and connected to the fire alarm system.
7. Ductwork that enters/opens into the closet will require a smoke activated fire/smoke damper.

F. Exit Lighting

1. All Exit lighting on UNM will be standardized. The standardization will apply to the Exit sign housing, lettering and color. All EXIT signs will meet the size criteria of NFPA 101. All the signs will incorporate the GREEN colored lettering. **(Standardization of color is a UNM Requirement)**
2. Exit lighting will be internally illuminated with backup power, which will provide 1½ hrs. of continuous power in the event of building power failure. In the rare exception, where Exit signage cannot be internally illuminated, the sign must be fully illuminated by emergency lighting for 1½ hours.
3. Exit signs with attached emergency light packs will be acceptable.
4. Exit sign using radioactive materials are not authorized for use in any UNM facilities.

G. Storage Rooms

1. The criteria for storage rooms will comply with the same protection and separation requirements as Custodial/Trash room or Normally Unoccupied Spaces (as listed above). Detection/protection requirements will be required for all classifications of storage contents, construction and separation. In all cases, the minimum requirements will be smoke detection and wet pipe fire sprinkler systems connected to the fire alarm panel.
2. During the design stage, consideration will be given to the type of storage. If flammables are to be stored, proper separation between flammables and combustibles will be maintained.
3. If high rack, closed rack or pile storage is to be designed, consideration will be given to the requirements of specialized suppression system design. All shelving shall assure a clearance of 18 inches from the bottom of the sprinkler head to the highest point of storage.
4. Modifications to standard sprinkler installation (i.e. side wall, in rack for high pile, library stack area in-aisle protection, etc.) must be pre-approved by SRS.
5. A minimum of three (3) feet of aisle space is required between rack and stack storage. **(UNM Requirement)**
6. Recycling – (Considered as temporary storage of disposable materials).

a. Recycling containers shall not be placed in corridors, stairwells, under stairs or in lobbies.
b. Sufficient room for recycling containers should be considered first in such areas as copy, authorized storage or other such rooms where the building occupants have ready access to the containers.
c. Storage alcoves shall be permitted in corridors, lobbies and hallways to hold recycling bins provided the following are designed into the project.
    1. Alcoves shall be wide/deep enough to hold 3-40 gallon square bins.
    2. Alcoves shall have fire rated, self-closing or automatic closing doors, fire rated walls/ceiling/floor.
    3. Alcoves shall have fire sprinkler and smoke detection installed regardless of the fire protection requirements of the rest of the building.

H. Architectural Woodwork

1. All flame-retardant material on wood construction or finish materials will require manufacturer documentation. Contractor-applied spray or paint-on retardant materials will not be authorized on UNM property.

I. Doors and Windows

1. All fire rated assemblies, doors and frames, will have the appropriate label (provided by the manufacturer) indicating its fire rating. This manufacturer applied label must be attached to the side of the door. The label will not be covered/painted or otherwise obscured.
2. Self-closing devices and other associated hardware will be installed on all fire rated doors. The devices will be manufactured and installed as an Under Writers Laboratory (UL) listed unit. Self-closing hinges, which meet the intent of NFPA 80, may be used with prior approval from SRS and/or the AHJ.
3. Doorstop devices will not be installed on any fire rated door. If the user requires/requests an open flow of traffic through the area with a fire rated door, normally required to be kept closed in an emergency, magnetic door hold open devices may be incorporated and must be connected to the building fire alarm system (per NFPA 80 & 101). The magnetic devices must release when any part of the fire alarm/notification system is activated. All magnetic devices will incorporate smoke detection on both sides of the door.
4. Visual panels in doors may be used when needed for safe travel through a high traffic area. The visual panel will be limited to a maximum of 144 square inches and be installed by the door manufacturer. The panel and frame must be stamped as a fire rated unit equal to the rating for the door.
5. Window panels in fire rated walls must be stamped by the manufacturer, as meeting the fire rating requirements of the adjacent door/wall. The stamp must be visible when installed. Windows or glass -panels cut from a stamped panel will not be authorized.

J. Portable Fire Extinguishers

1. Unless otherwise noted in the plan review, all extinguishers will be placed in either wall mounted, recessed or flush mounted cabinets.
2. The standard for placing fire extinguishers is NFPA10. UNM follows this code.
    a. Construction projects, extinguishers should not have less than a 2A:10BC rating.
    b. Business and all light/ordinary hazard areas should have 5 pound. 2A:10BC rated fire extinguishers.
    c. Mechanical rooms and rooms with flammable liquids should have 10 pound. 4A:80BC rated extinguishers.
    d. Elevator equipment rooms should have 10 pound. 4A:80BC rated extinguishers.
    e. Computer rooms or other areas with high value equipment should have 2A:10BC Halotron or suitable alternative type extinguishers.
    f. Automotive and Industrial areas should have 20 pound. 10A:120BC rated extinguishers.
    g. Areas, including laboratories which utilize flammable liquids, should have a 10 pound 4A:80BC extinguishers.
    h. Commercial food preparation areas should have both a 6 liter class K fire extinguisher and a 10 pound 4A:80BC extinguishers.
    i. Areas that involve combustible metals such as magnesium and sodium should have both a 30 pound wheeled class D fire extinguisher and a 10 pound 4A:80BC extinguisher.

3. No extinguisher with less than a 2A-10BC rating will be accepted for UNM projects. Exceptions – 2A-10AC is acceptable for business occupancies and CO_2, extinguishers which do not carry an "A" rating and will be used only in specific coverage areas. The general area will still be covered by an extinguisher with a 2A-10BC rating.
4. The cabinet's style and features will be specified during plan reviews of each project. UNM does not specify a particular style, but each cabinet will have the following features. **(UNM Requirement)**
    a. Be of a size which will accommodate a 2 1/2 gallon water extinguisher, a 15 lb. Halotron or a class C water mist extinguisher if necessary.

b. Window port for visual inspection of the pressure gauge.
c. The outside of the cabinet will have, in contrasting color to the cabinet, the words FIRE EXTINGUISHER regardless of the type/size of the visual panel.
d. The door will be a straight pull-to-open type without a locking mechanism unless specified by SRS for a specific application.

K. Mirrors

Mirrors will not be placed in corridors, stairways or near exits where the reflection may cause confusion to the occupants during evacuation.

L. Elevators

1. Construction safety devices, fire protection shall comply with the American Society of Mechanical Engineers (ASME) A17.1, Safety code for Elevators and Escalators. Additional required sources include NFPA 1, The Fire Prevention Code, NFPA 13, Fire Sprinkler Code and NFPA70, the National Electric Code.
1. All elevator shafts will incorporate fire sprinkled shafts (top and bottom of the hoist way) and machine rooms regardless if the elevator is electric or hydraulic.
2. The elevator will incorporate fire department recall for all elevators which travel over 25 feet (i.e. 2 floors) above or below the level of exit discharge in total length.
3. If there are multiple elevators in the facility only one designated elevator in a facility will be required to have firefighter recall. The location will be designated by SRS. Requirements for more than one elevator to be fitted with recall devices will be made on a case-by-case basis.
4. Smoke detection will be installed at each level within 5 ft. outside the elevator door, if the elevator travels more than 25 ft. (i.e. 2 floors) and requires elevator recall/fire fighter operations devices. .
5. Smoke and heat detection for shunting of power will be installed in each machine room.
6. Elevators with travel distances of more than 25 ft., smoke protected lobbies must include smoke protected lobby enclosures. The enclosure may be designed with lobby doors or overhead smoke guards.
7. Elevators lobbies with doors must meet the same criteria as emergency egress doors for construction, hardware, and may be self or automatic closing.
8. Elevators with overhead smoke guards will incorporate a key operated re-wind switch and a manual over ride device to reset the smoke guard.
9. Elevators designed for emergency egress will have the exit discharge from the elevator lobby to a fire rated corridor with direct access to an exterior exit.
10. Signage will consist of written/visual signs to include ADA brail, "IN CASE OF FIRE, USE NEAREST STAIRWAY DO NOT USE ELEVATOR". The signage will be posted in a conspicuous location. Signage will not be placed near or under bulletin boards or in other areas where hanging material will obscure the signage.
11. An elevator recall key will be provided in a secure and appropriate location as designated by SRS.
12. Elevators with hoist way shafts exceeding 3 stories or more in height will incorporate automatic opening ventilation hatch. The hatch will be activated by smoke detection within the hoist way only.

M. Identification of Fire Suppression Piping

1. Marking of the pipe will be in conspicuous locations at the supply side, intermittently throughout the system where inspection of the piping may be required and at the discharge (Inspectors Test Valve and Auxiliary drain valves) side of the system.

N. Fire Barrier (fire stopping)Penetrations

1. All fire barrier penetrations shall be properly fire stopped in accordance with NFPA, IBC and IFC standards.

O. Fire/Smoke Dampers (FSD)

1. All UNM Facilities, when required to install damper protection within fire rated assemblies will utilize the “fire/smoke damper” (FSD) combination device per NFPA 80. The FSD will meet the requirements of construction and operation to resist passage of smoke and fire.
2. All FSD will be operated by smoke detection installed in accordance with NFPA 72. Fusible links will NOT be acceptable for any UNM project.
3. Access Doors. All FSD will incorporate access doors for inspection. The access doors will:
    a. Be of fire rated construction when penetrating a fire rated wall or ceiling.
    b. Be rated for fire/smoke seal when penetrating a fire/smoke rated wall or ceiling.
    c. Have access doors of adequate size for inspection access.

d. Be labeled "fire/smoke damper" on the outside of the access door and/or the access tile or ceiling area as appropriate and determined by SRS.
e. Incorporate smoke detection activation on both sides of the damper. Area smoke detection is permitted for multiple damper operations provided the detection device is in the air-stream for all dampers affected.

4. FSDs will be operated by a duct type smoke detector/tube device.
5. FSD will be installed per their Under Writers Laboratory (UL) listing. Particularly vertical vs. horizontal installation will be verified by manufacturers test documentation.
6. All FSDs will be tied into the building fire alarm system as addressable nodes. Activation of any fire damper will initiate a supervisory signal unless it is an area detection device (all area smoke detectors will initiate a general fire alarm condition regardless of devices they control).
7. Additional requirements concerning fire/smoke dampers are found in the UNM Alarms "Fire Alarm Specifications Guideline".

P. <u>Fire Alarm Detection and Protection Systems</u>

1. All UNM Facilities will incorporate an appropriate fire alarm and detection system in accordance with NFPA 70, 72 and the UNM Alarms "Fire Alarm Specifications Guideline".
2. Fire sprinkler systems will comply with all aspects of NFPA 13 and SRS guidelines. Modifications and approvals must be reviewed and approved by SRS
3. All new construction will comply with NFPA and the IBC requirement that all structures will incorporate full fire sprinkler systems. Sprinklers in conjunction with full smoke/heat detection or other suppression systems will be considered on an individual basis.
4. In addition to the standards and guidelines noted above, the following are required on all UNM projects.
    a. All UNM Facilities will incorporate standard fire alarm and pull station devices. Deleting pull stations in fully sprinkled buildings is not permitted.
    b. Class I or II fire hose cabinets will not be installed in any UNM facility. Class III cabinets for fire department standpipe connections will be permitted. Fire hose cabinets will not be used as a means to waive the requirement for sprinkler or fire extinguisher protection.
    c. All fire protection systems will receive a 100% device/operational test, performed by the installing contractor and witnessed by a SRS representative. The test will include activation of each pull station, smoke detector, flow/tamper switch, alarm notification device and connection through the fire alarm panel to Campus Police dispatch.
    d. All systems will be the addressable type. Each device will report in as a separate address. The contractor will be responsible for programming the address according to the needs of UNM Alarms.
    e. All sprinkler systems will incorporate code compliant backflow devices.
    f. The architect must consider the location of future furnishings when locating fire alarm/notification devices. Consideration will be given to furnishings obstructing the devices.
    g. Special system installation will be determined on the overall protection requirements of the facility.
        a) Only Wet Chemical hood systems will be installed in commercial cooking facilities.
        b) Standard pendent/upright wet sprinkler systems will be used in all facilities unless justified recommendations for alternative systems are presented.
        c) FM 200 or like alternative systems will be used in computer rooms requiring such protection. Alternative systems such as water mist will be considered on a case-by-case basis.
    h. Fire Department connections will be installed in a location, which will provide the quickest/easiest access to fire department vehicles. The FDC must be place so no more than 100 ft. of fire hose is required to make connection between the FDC and the pumper, as determined by SRS. For new facilities located on the inner campus away from city streets, fire access lanes will be incorporated into the project to assure emergency vehicles can access the building FDC.
    i. The architect must consider the location of furnishings when locating fire alarm pull stations and other emergency equipment/devices in the plans. SRS will make the final determination of these locations.
    j. Use of special systems (FM 200, clean agent, water mist, pre-action etc.) will be determined on the overall protection requirements. Only WET Chemical systems will be used in cooking facilities when required. The manufacturer must have received prior approval of their fire alarm system before their system will be considered for use. For prior approval; submittals shall include system operation description, equipment cut sheets, and typical wiring diagrams.

Q. Natural Gas

1. Consideration should be given to installation of an emergency gas shut off valve to specific areas such as laboratories, classrooms and or a central shut off valve, which can be accessed by the occupants in an emergency. The valve would be in a conspicuous location and be in a break-glass box to provide security from malicious actions.
2. All gas piping must be labeled as to the contents of the piping.
3. Gas piping shall not be run through HVAC duct work or have pressure relief valves, inspection ports or any other part of the system which could produce a leak, near any air intake or ventilation vent/port.

R. Painting and Identification of Pipe and Equipment

1. All piping and equipment will be properly identified according to ANSI 13.1-9Y1 which identifies color coding requirements.

III. OSHA Compliance

1. A ground fault circuit interrupter (GFCI) will protect all electrical outlets within 6 feet of a water source.
2. All skylights will incorporate skylight guards, handrails or other guarding mechanism that meets OSHA standards.
3. Proper anchorage points (meeting OSHA and ANSI Standards) shall be installed on rooftops for use during window washing operations or roofing operations, as deemed necessary by SRS and the Physical Plant Department.
4. Safety eyewash units shall be installed where chemicals will be used. SRS recommends deck mounted drench hose units are placed near sink units. See Section V. for additional information.
5. Roof Drains will not direct outfall across sidewalks or other pedestrian areas where freezing weather could create slip and fall hazards. Roof drains will be directed to landscape areas or away from the pedestrian path.

IV. Industrial Hygiene

A. Hazardous Materials – CSI Div. 7, 9, 11, or 12

1. Installation and/or application of lead-based paint and asbestos-containing materials are prohibited. Architect must certify that only lead-free and asbestos-free construction materials are specified in the construction drawings, unless an exception is requested and granted for special applications. For instance, as one exception, lead materials remain generally permissible for ionizing radiation shielding purposes.
2. If an exception to this section is proposed, SRS must be notified in writing as early as possible.

B. Indoor Air Quality – CSI Div. 7, 9, 11, 12, or 23

1. Identify and document all heating, ventilating, and air conditioning (HVAC) system design requirements, assumptions, and criteria. The following information shall be documented:
    a. Indoor design conditions for each building space: Temperature, Relative humidity by season, Pressure relationship between adjacent areas
    b. Outdoor design parameters: Dry bulb and wet bulb temperatures, Relative humidity, Prevailing wind direction by season
    c. Building space information: Type, Occupancy densities, Activities, Use patterns
    d. Internal loads for each building space
    e. Any odorous or hazardous pollution sources for which additional measures, e.g., local exhaust, additional dilution ventilation, are required.
    f. Criteria utilized to determine outside air requirements for each building space.
    g. Classification of air assumptions for exhaust and recirculation air streams shall be in accordance with ASHRAE.
    h. Air cleaning and filtration efficiencies and filter area.
    i. Means by which outdoor air quality has been assessed and outdoor air contaminants of concern (if any) and air filtration requirements determined to establish outdoor air intake location(s).
    j. Criteria used to determine locations of air devices (e.g., supply, return, exhaust, etc.) to ensure proper dilution and mixing of air within each building space.
    k. Means by which and locations where outdoor air can be measured and balanced.
    l. Means by which temporary exhaust can be provided in the future to control strong source contaminants during shell space construction.

m. Applicable codes, standards, regulations, etc.
n. Narrative describing the design and operation of the HVAC systems during occupied and unoccupied periods.
o. Description of HVAC system control sequence of operation and identification of control system set points.
p. Minimum and maximum flow rates for terminal units.
q. Description of building envelope construction, including locations of vapor and air retarders.
r. HVAC calculations, including cooling load, heating load, and exhaust flow rate calculations.
s. Certifications by Architect that construction materials used were specified in construction documents to be non-asbestos, non-lead-based paint containing and low-VOC.

2. Integrate prudent design principles and features as indicated in the following paragraphs.
    a. Locate outdoor air intakes away from known sources of contaminants, including, but not limited to, exhaust and vent outlets, plumbing stacks, emergency generator exhaust stacks, loading dock areas, flue stacks, and areas where people might congregate to smoke.
        i. Outdoor air intakes should preferably not be located at ground level. If outdoor air intakes must be located at ground level, a secured zone around the air intake should be provided.
        ii. Preferred location of outdoor air intakes is high on the side of the building. Above roof level is acceptable if it is possible to avoid known contaminant sources.
    b. Locate exhaust and vent outlets away from operable windows, doors, outside air intakes and property line.
    c. Bird screens shall be located over outdoor air intakes.
        i. Bird screens shall be constructed of galvanized or stainless steel. Bird screens shall be ¼-inch mesh.
        ii. Bird screens shall be accessible for cleaning.
    d. Outdoor air intakes shall be protected from rain entrainment by louvers, mist eliminators, or rain hoods.
    e. Provide access doors to the following components for inspection and cleaning purposes: outdoor air intakes or plenums; upstream and downstream surfaces of cooling and heating coils; air washers; evaporative sections and coolers; other heat exchangers; air cleaners; drain pans; fans, filters, damper sections, humidifiers; and air flow measuring stations (other than unit flow sensors).
        i. Access doors shall be factory-fabricated, readily operable, and airtight.
        ii. Access doors shall be clearly indicated on the design drawings.
        iii. Access doors shall be clear of all obstructions and provide full access.
        iv. Air handling unit access doors shall be full man-doors or as large as equipment will allow.
        v. Ductwork access doors shall be as large as ductwork will allow. If possible, ductwork access doors shall have a minimum size of 18-inches by 18-inches; 24-inch by 24-inch access doors shall be provided where possible. Hard ceiling or wall access doors shall be fire-rated and have a minimum size of 24-inches by 24-inches.
    f. Air handling equipment shall be designed for no water droplet carryover. This requires air-handling equipment to have draw-through cooling coils having a maximum face velocity of 400 fpm properly and evenly distributed across the face of the cooling coil.
    g. Drain pans shall be pitched towards the drain and shall be appropriately trapped.
    h. Generally, the use internal exposed thermal insulation is strongly discouraged in HVAC systems, including plenums.
        i. Supply ductwork shall be wrapped on its outside surface with thermal insulation.
        ii. Internal exposed thermal insulation shall not be installed in medical areas, clean rooms, or high velocity ductwork.
        iii. Internal exposed thermal insulation may be used in acoustically critical applications where the University of New Mexico Safety and Risk Services Department (UNM SRS) written permission has been obtained.
        iv. If permitted, internal exposed thermal insulation shall be elastomeric closed cell, cleanable, non-biodegradable and impermeable to water or moisture, and secured with welded pins and non-flammable low-VOC odorless adhesive. Internal exposed thermal insulation must have metal nosing or sleeves over leading edges at fan discharge, around access door openings, and at any point where the insulation is preceded by internally un-insulated duct. Internal exposed thermal insulation shall be kept away from intake screens, mist eliminators, louvers, and rain.
    i. Air handling equipment and ductwork shall not be constructed of porous or semi-porous materials, e.g., concrete masonry units (CMU) or gypsum wallboard (GWB).
    j. Potable water shall be used in direct evaporative humidifiers, air washers, and evaporative coolers.
    k. Provide humidification only when absolutely necessary or when it is a special project requirement.
        i. Utilize steam-to-steam-type humidifiers only.

l. Provide continuous water bleed or automatic periodic drain combined with chemical water treatment to control scale and microbial growth in air handling systems designed to recirculate water from an open storage tank or sump of an evaporative cooler, air washer, or evaporative section of air handling equipment.
    i. If water treatment chemicals are used they shall not enter the air stream or must be acceptable for use in evaporative equipment and approved for this use by UNM SRS.
    ii. Continuous bleed or automatic drain systems are required to change out water at least once every two weeks with discharge routed to the sanitary sewer or saline tolerant landscaping.
m. Filters shall be selected as appropriate for the application.
    i. Filters for air handling equipment whose flow rate exceeds 4,500 CFM shall have a minimum sixty percent (60%) efficiency pre-filters and final filters with 80-85% minimum efficiency when passing a three (3) micron particle.
    ii. Filters for all other air handling equipment shall have a minimum efficiency of sixty percent (60%) when passing a three (3) micron particle.
    iii. Filter area shall be based on 400 fpm face velocity.
    iv. Filter rack shall be constructed to allow no bypass of air.
    v. Multi-section filters will be sealed frame to frame with duct tape or other sealant to minimize blow-by.
n. Strongly recommend the use of sanitization and purification UVC protection on coils
o. Supply ductwork located in a return air plenum, chilled water supply and return piping, and domestic cold water piping below 55 degrees F shall be properly insulated to prevent condensation from forming; alternately, it may be equipped with accessible condensate catchment pans sloped to drain.
p. Insulation subject to damage or a reduction in thermal resistivity if it were to become wet shall be enclosed in a vapor retarder.
q. Outdoor air intake controls shall maintain no less than ninety percent (90%) of the design outside air flow rate at all times.
r. Air handling system controls shall include an "optimum start-stop" provision to ensure that acceptable temperature, humidity, and ventilation is provided prior to daily space occupancy.
s. Construction of the building envelope shall comply with all applicable code requirements relating to the control of water and water vapor penetration, air filtration, and entry of radon and other soil gases.
t. HVAC systems shall be designed to provide at all times no less than the minimum total amount of outdoor air required for ventilation by Table 2 of ASHRAE 62-1999.
u. Zone minimum airflow rates shall provide minimum outdoor air ventilation airflow rates during space occupancy.
v. Mechanical rooms shall not be used as air plenums. Air routed through mechanical rooms shall use hard ductwork only.
w. Utility fans serving fume hoods shall have a 3,000 feet per minute minimum discharge velocity in a vertically upwards direction and shall discharge at a minimum of ten (10) feet above the adjacent roof line and minimum of 5 feet above nearby intakes. For further information, refer to ANSI/AlHA Z9.5.
x. Direct evaporative cooling may be used in air handling equipment only after UNM PPD Engineering written permission has been obtained.
y. Direct evaporative cooling equipment:
    i. Must have an appropriately sized and interlocked exhaust/relief fan to minimize humidity build up.
    ii. Must have no filter bypass.
    iii. Must be completely accessible, both upstream and downstream, for inspection and cleaning.
    iv. Must have no water droplet carryover. Manufacturers' recommendations for maximum allowable face velocities must be followed.
    v. Must have filters upstream that have a minimum sixty- percent (60%) efficiency when passing a three-(3) micron particle.
    vi. Must have an automated water treatment system to prevent scale formation and anti-microbial growth that utilizes potable make-up water, blow-down, and water treatment chemicals.
    vii. Must use water treatment chemicals that do not enter the air stream or must be acceptable for use in evaporative equipment and approved for this use by UNM SRS.

V. Laboratories

A. Objectives

1. The primary objective in laboratory design is to provide a safe environment for laboratory personnel to conduct their work. A secondary objective is to allow for the maximum flexibility for safe research use. Undergraduate teaching

laboratories require other specific design considerations. Therefore, all health and safety hazards must be anticipated and carefully evaluated so that protective measures can be incorporated into the design. No matter how well designed a laboratory is, improper usage of its facilities will always defeat the engineered safety features. Proper education of the facility users is essential.

2. In general, it is desired to control the occupancy classifications of all areas at UNM to the lowest and least restrictive class applicable, considering the work to be conducted in the area. Therefore, all designs should include the assumptions made regarding the anticipated occupancy classification, the data upon which this classification is based (for instance, the proposed hazardous materials list), and any features of the design that may act to control the occupancy to the design standard (e.g., the design capacity of any planned hazardous material storage areas.)

The General Requirements listed in this section illustrate some of the basic health and safety elements to include in all new and remodeled laboratories at UNM. Variations from these guidelines require approval from UNM Safety and Risk Services. The subsections of Section 1.0 provide specific guidance on additional critical features of a general laboratory (e.g., fume hoods, hazardous materials storage, and compressed gases.) NFPA 45 will be used to determine fire safety, separation and egress requirements as well as flammable liquids use and storage requirements.

B. General Requirements - CSI Divs. 1, 2, 7, 11 or 23

1. Because the handling and storage of hazardous materials inherently carries a higher risk of exposure and injury, it is important to segregate laboratory and non-laboratory activities. In an academic setting, the potential for students to need access to laboratory personnel, such as instructors and assistants, is great. A greater degree of safety will result when non-laboratory work and interaction is conducted in a space separated from the laboratory.
2. Special consideration should be given to the choice of fireproof construction for the buildings.
3. Provide separate office spaces for laboratory employees. Under UNM policy and OSHA regulation, it is prohibited to eat, drink, apply makeup or chew gum in areas where hazardous materials are used or stored. Office spaces for laboratory employees should have separate corridor access where at all possible. A reasonably accessible break room where food may be stored and prepared is highly desirable.
4. Laboratory spaces shall be designed for easy and safe egress. A minimum of two ways out of any laboratory space, with rapid access to a safety corridor, shall be required in any Class A or B lab over 500 sq. ft. High hazard operations shall be placed away from the door so that in the event of an emergency, safe egress is not impeded.
5. The laboratory shall be completely separated from outside areas. Provisions for access control shall be considered early in the planning stages.
6. Secured hazardous materials storage areas shall be provided, with particular attention to this element for laboratories that will utilize specifically regulated materials such as DEA (Drug Enforcement Administration) controlled substances, radioactive materials, select agents as defined by the Center for Disease Control (CDC), and Department of Homeland Security (DHS) Controlled substances.
7. If the laboratory has operable windows, they must be fitted with insect screens.
8. The floor must be impervious, preferable one piece, and with covings to the wall. Openings through which spills could penetrate under the cabinets or into the wall cavity should be sealed. The preferred method is through the coving of sheet flooring, but alternate methods for control may be approved upon review.
9. Floors in storage areas for corrosive or flammable liquids shall be of liquid tight construction. Dedicated hazardous material storage rooms must provide for secondary or tertiary containment through installation of berms or other equivalent methods.
10. Each laboratory must contain a sink for hand washing and plumbed eyewash; those laboratories in which injurious corrosive materials may be used in such a manner that body contact to such materials may occur must also have a plumbed deluge shower. A handheld drench hose rather than the deluge shower may be used to supplement the plumbed eyewash in areas in which exposure to chemicals that are not injurious corrosive materials may occur.
11. Laboratory sinks shall have lips that protect the sink drain from chemical spills on the adjacent bench top. Each lip or berm should be at least ¼ inch and designed to separate the lab bench or fume hood work area from the sink drain. A removable plug shall be provided for each laboratory sink.
12. Unless a process requirement is demonstrated, the installation of cup sinks inside fume hood work areas is strongly discouraged.
13. Chemical storage shelves shall have a lip or guard provided to prevent bottles from falling. Storage shelves shall not be placed above laboratory sinks or above areas where access is difficult (for instance, over bulky equipment) or requires ladder access. Planned use of a 12” step stool is acceptable.
14. Sufficient storage space or facilities shall be provided such that incompatible chemicals may be physically separated for storage.
15. The area underneath a laboratory fume hood may be used for general chemical storage or corrosive chemical cabinets. Use of this area for flammable storage is strongly discouraged.

16. The area underneath hand washing sinks may not be used for hazardous chemical storage, except for common household strength cleaning materials.
17. The laboratory workbench should incorporate a lip to prevent small chemical spills from running off onto the floor. The materials of construction shall be resistant to all classes of chemical hazard which are to be used in the laboratory, or that may reasonably be anticipated to be used in the laboratory.
18. The minimum aisle clearance shall be 36 inches. Main aisles used for emergency egress must have a clear width of at least 44 inches if the occupant load of the room is 50 or more.
19. Good practice indicates that designated storage space should be provided for laboratory carts. Lab carts may be required for transporting hazardous materials within the lab or into the lab, and when stored the location must not reduce the width of the corridor or aisles to less than the code-required width.
20. Laboratory doors shall be automatically self-closing. Doors in H-occupancy laboratories or other labs with occupant loads of 50 or more shall have doors which swing in the direction of egress.

C. <u>Laboratory Ventilation</u> - CSI Divs. 7, 11 or 23

1. General Ventilation
    a. General laboratories shall have a minimum of 6 air changes per hour (ACH).
    b. The designer should be careful to consider the air removed by laboratory hoods and other local exhaust ventilation systems (LEVs) when evaluating the ACH. Generally, laboratory areas should be maintained at a slight negative pressure relative to the adjacent corridors. However, excessive negative pressure can degrade the performance of the LEVs. Therefore, the HVAC system design must be tightly integrated with the LEV design, with appropriate control systems provided.
    c. Fixed laboratory equipment which may be a point source of hazardous or odorous air contaminants shall be provided with local exhaust ventilation.
    d. Laboratories that handle highly toxic materials may have special ventilation requirements; the designer should ensure that an appropriately-trained engineer participates on the design team.
2. Local Exhaust Ventilation Systems (LEVs)
    a. Laboratory fume hoods and other LEVs are essential to safe handling of hazardous materials. The details of the designs of these systems are far beyond the scope of this standard, but the following considerations are basic.
        i. Tempered makeup air shall be provided. The location of supply registers shall be such that the room air distribution minimizes turbulence in front of any laboratory hoods.
        ii. Recirculating hoods are prohibited for hazardous materials use.
        iii. The materials of construction for ventilated ductwork shall be compatible with the materials to be used and the temperature of the exhausted areas.
        iv. Ductwork systems for ventilating hazardous materials shall be under negative pressure within the building envelope.
        v. Ductwork systems for particulates shall be designed to maintain sufficient transport velocity throughout the system to prevent deposition of particulates within the duct.
        vi. LEVs for reactive hazards such as perchloric acid require special design provisions.
    b. The design average face velocity of laboratory fume hoods shall be 100- 125 fpm with the sash at operating height, unless a design exception is made for special situations. SRS approval for exceptions must be made in writing.
    c. The ACGIH manual, *Industrial Ventilation,* any recent edition, may be consulted for further design guidance.

VI. SRS Contacts

The following list is provided for your information should you need assistance:

SRS Division	Contact	Phone #	Cell #	E-mail
Fire Safety	Vincent J. Leonard	277-4076	321-8021	vleonard@unm.edu
Safety (OSHA)	Bob Dunnington	277-9511	238-5746	rdunning@unm.edu
Radiation Safety	Jim DeZetter	277-0315	951-0310	jimdz@unm.edu
Environmental Health/	Vern Hershberger	277-9756	269-8343	hershber@unm.edu
Industrial Hygiene	Julia Sager	277-9418	951-0296	jsager@unm.edu
Asbestos/Lead	Travis Miller	277-6597	934-7698	travmill@unm.edu
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