

PART II
GENERAL BUILDING REQUIREMENTS

II. BUILDING REQUIREMENTS:

- A. GENERAL: The guidelines within this Section are meant to apply to all new construction (including entire new buildings as well as remodels or additions to existing buildings) on the UCSC Campus. *Alterations to all facilities shall incorporate existing materials, detailing, colors, finishes and textures. Where the project program limits the ability to incorporate such existing conditions or to follow any of the guidelines listed below, request for clarification shall be directed to the Project Manager.* See Housing Guidelines Supplement for additional housing construction guidelines.
- B. DISABLED ACCESS: Provide for disabled access to all buildings per the requirements of CCR Title 24 and the ADA Accessibility Guidelines, using the more stringent where the two conflict. See Part I. C, Administrative Requirements, for additional information. *University Projects are reviewed for access compliance by the Division of the State Architect.*
- C. MOISTURE CONTROL: Due to the rainfall levels in Santa Cruz, the proximity to the ocean, adjacent damp forest conditions, etc., buildings on the UCSC Campus have experienced a number of dryrot, mildew, rust and moisture problems. Most of the following concerns involve wood frame construction.

PROVIDE:

1. Air gaps, galvanized washers, or other means of separation between wood or metal in direct contact with other wood or concrete in exterior locations, (typically at wood siding, wood trim / concrete, metal railing / concrete, wood posts / concrete, etc.). Allow for a minimum 1/4" gap for air to circulate.
2. Maximum eave, foundation, and attic ventilation, exceeding minimum UBC standards when possible.
3. Ledgers at all deck, trellis, and similar locations. Avoid beams, joists, or any other structural elements continuously projecting or cantilevering from wall planes.
4. Careful flashing at all windows, building corners, skylights, parapet walls, exterior guardrail walls, thresholds, etc. Integral flashing or cap flashing (metal or wood with galvanized sheet metal flashing underneath) is important for all exterior guardrails or parapet walls.
5. Caulking at all appropriate locations where openings in walls, trim junctions, siding / trim junctions, or any miscellaneous gaps at exterior walls occur. Set all thresholds in a continuous bed of sealant.
6. Mechanically fastened joints, whenever possible, are highly preferable to caulked joints; openings that rely on caulk alone to protect against moisture must be constantly maintained, and are less resistant to moisture penetration during joint expansion and contraction.
7. Drip edges at all horizontal edges of trim, fascia against walls, window sills, window and door head trim, roof shingles at rake and eave conditions, etc. where water can drip off edges without bleeding back into soffits, siding openings, fascias, etc.. Drip edges can be galvanized sheet metal flashing, saw kerfs, 1/2" min. overhangs, or other similar devices.
8. Roof overhangs (when possible or appropriate).

9. Wood decks, when applicable to program requirements, on columns or piers. Avoid decks that serve as roofs over living space below.
10. Oversize gutters and downspouts to accommodate accumulations of forest debris (typically redwood duff, tree leaves, etc.) *Provide stainless steel gutter screens.*
11. *Positively drain landscape and pavement areas away from buildings.*
12. *Provide subdrainage at all retaining walls.*

D. ROOF WATER DRAINAGE:

1. Roof leaders shall be piped away from building as not to cause erosion. Incorporate Best Management Practices when applicable. Splash blocks will not be allowed. (See specific project soil investigation to determine constraints on daylighting such storm water.)
2. Prevent concentrated roof storm water from flowing across pedestrian paths or walkways.
3. Provide grates or screens over underground system, and open clean-out areas at downspout/underground system junction.
4. Design of roof drains shall include consideration for large amounts of redwood duff and tree litter which accumulate in storms.

E. ACOUSTIC PRIVACY

1. Refer to "Housing Guidelines" *in the Appendices* for specific bedroom, lounge, corridor, etc., acoustic requirements for residential areas. Note that common office and classroom walls, and bathroom / office or bathroom / classroom wall junctions (stairwell and other noise-generating areas similar), must also observe acoustic privacy guidelines similar to those specified for bedroom areas. Verify all requirements with the Project Manager.
2. The following table specifies wall and floor constructions between functions requiring acoustic isolation. Note that these requirements do not apply to sound recording rooms, control booths, etc., where more stringent or specialized requirements might apply. Alternatives to these requirements shall be submitted to the Project Manager for review. Constructions 1A - 4B can be found in Part VI of these Standards.

<u>Neighboring functions</u>	<u>Construction at rooms requiring acoustic protection</u>
<i>Classroom, conference rooms, faculty offices, and other rooms requiring acoustic protection</i>	1A, 1B, 1C
Student lounges and baths	1A, 1B, 1C
Storage, quiet mechanical, walls containing doors (e.g. corridors)	2
<i>Noisy mechanical rooms, public bathrooms, laundry rooms, public stairwells</i>	3

Floor/ceilings of mechanical rooms, *faculty offices*,
kitchens, lounges, corridors, bathrooms 4A

3. General design constraints that apply to all rooms requiring acoustic protection are as follows:
 - a. All plumbing penetrations (bathroom, hydronic, etc.) in walls must be caulked airtight using specified acoustical caulk.
 - b. Where recessed fixtures of any type are installed (e.g., medicine cabinets, fire extinguishers, electric distribution panels, recessed water fountains, recessed bookcases), ensure that required acoustic wall construction extends behind these recessed elements.
 - c. Installation of noise-making equipment (e.g., telephones, water fountains) is not allowed on walls of rooms requiring acoustic protection.
 - d. Maximize separation of operable windows so that sound transfer from adjoining rooms through window is minimized.
 - e. Use surface mounted rather than recessed lighting fixtures and fans, etc. at ceilings of rooms requiring acoustical protection in order to minimize sound transfer.
 - f. Space doors to rooms requiring acoustical protection so that neighboring rooms do not have directly adjoining doors, and so that doors on opposite sides of corridors do not directly face each other. (Stagger all doors.) Do not place any doors to rooms requiring acoustical protection opposite stairwell or bathroom doors. *Provide acoustical gasketing all around where appropriate.*
 - g. Provide a maximum gap of 1/2" at all door bottoms (less when possible).
 - h. Do not place bathrooms (public or private) or student lounges over rooms requiring acoustical protection.
 - i. Mechanical equipment in spaces above or below rooms requiring acoustic isolation shall have vibration isolation, including piping and conduits, from walls, floors, and ceilings.
 - j. The Campus has experienced problems of insufficient sound absorption in conference and meeting areas.

F. ENERGY EFFICIENCY:

1. General:
 - a. The purpose of the following guidelines is to reduce the cost of energy over the lifetime of a building.
 - b. The energy standards as required by CCR Title 24 set the minimum energy efficiency design criteria for all campus construction. Where Title 24 allows for optional compliance with more stringent standards, the more stringent standards shall be used. Title 24 compliance calculations shall be submitted for approval as per Part I of this Handbook. Further, the 1988 Long Range Development Plan and its EIR require the following:

1. Where the Campus can establish financial feasibility and secure funding, new buildings will be designed to exceed the requirements of Title 24.
 2. Where cost effective, solar energy features shall be utilized for all new campus buildings.
 - c. The University is interested in pursuing cost effective energy conservation measures over and above the requirements of Title 24; the Executive Architect is encouraged to suggest alternative designs to reduce both energy use and demand. Alternative design suggestions could include, but are not limited to:
 1. Revised building orientation,
 2. Revised construction materials,
 3. Increased insulation,
 4. Use of variable air volume (VAV) HVAC systems vs. constant volume systems,
 5. More effective use of outdoor air in HVAC systems,
 6. Strategies to reduce lab hood exhaust,
 7. Revised piping configurations to reduce pumping costs,
 8. More efficient building and heat recovery equipment selections,
 9. More sophisticated equipment control strategies,
 10. High efficiency motors in long run time applications,
 11. More efficient lighting systems.
 12. *Variable volume pumping systems*
 - d. Alternatives involving increased construction costs shall be economically evaluated to determine payback period. In determining the payback period, data concerning energy costs and energy cost escalation rates will be furnished by the University. Data furnished by the University and all assumptions used in the evaluation shall be clearly stated.
2. Siting:
 - a. Buildings of appropriate size shall be located, oriented and designed to receive the benefits of passive solar gain when feasible.
 3. Building Configuration:
 - a. Minimize the ratio of surface area of walls and roof to gross building area in order to reduce surface heat loss within reasonable design/aesthetic constraints.
 4. Glazing:
 - a. Consider double-glazing all windows and skylights.
 - b. *Use architectural devices (e.g. projections, roof overhangs, horizontal shutters and awnings) to provide protection from excessive heat gain, especially at south and west orientations. Shading calculations shall emphasize summer and fall. This provision is particularly important due to LRDP Mitigation Measure prohibiting air conditioning for human comfort.*
 - c. *The Campus has had problems in the past with the sole use of reflective coatings for control of solar heat gain, both from construction and manufacturing defects and from insufficient control of heat gain.*

- d. *Windows shall be equipped with close fitting shades or blinds.* When floor registers/diffusers are provided, they shall be located on the room side of the drapes or shades.
 - e. Operable windows for all areas on exterior walls are required for natural ventilation. Cross-ventilation of all building areas is highly desirable.
5. Infiltration:
- a. All exterior doors and operable windows shall be weatherstripped.
 - b. Door thresholds shall incorporate a weatherstrip seal.
6. Mechanical
- a. The UCSC LRDP prohibits air-conditioning for human comfort. Verify all requirements with the Project Manager.
 - b. Start/stop control of all HVAC equipment in new construction shall be by the campus Energy Management System (EMS). Equipment may be electrically interlocked for start/stop control in functional groups by a single control point.
7. Lighting:
- a. Fluorescent fixtures equipped with energy saving lamps and ballast shall be standard. Use of incandescent fixtures must be approved by Project Manager.
 - b. Zone lighting or task lighting shall be utilized whenever energy efficiency can be improved by these measures.
 - c. All exterior building lighting shall be by high pressure sodium or fluorescent fixtures and shall be controlled by the Energy Management System (EMS).
 - d. *Indirect lighting is strongly discouraged due to maintenance and performance problems.*
- G. MAINTENANCE:
- 1. Provide soil entrapment/prevention systems at building entries, including recessed walk-off mats.
 - 2. Locate and specify windows, when possible, to enable convenient window cleaning by occupants and maintenance personnel. Pivoting windows or windows easily accessible for cleaning are desirable.
 - 3. Custodial Closets:
 - a. Provide one custodial closet per floor, minimum. Provide additional closets on large floors if any custodian must walk more than 150 ft. to get to a closet. Verify all requirements of custodial closets, including at remodels and additions, with the Project Manager.

- b. Locate custodial closets near elevators, or close to bathrooms, and/or central to the areas to be serviced. Do not locate custodial closets on stair landings and avoid entrances to custodial closets through restrooms, mechanical rooms, or similar intermediate spaces.
 - c. Provide closet area sufficient for the number of personnel using it, and for an approximate two-week supply of cleaning supplies. In general, this would mean an area of 60 sq. ft. minimum (70 sq. ft. to 80 sq. ft. preferred). Do not locate equipment such as electrical panels, telephone boards, elevator controls, or mechanical equipment within the custodial closet.
 - d. A long, narrow shape to the custodial closet is more efficient than a square shape, and it discourages subsequent appropriation of the closets for office space. The sink, when provided, is best located near the door.
 - e. Provide doors that open out of the closet, and provide double doors, vs. a single door, when the closet is of considerable width and relatively shallow depth. Single doors shall be 36" wide.
 - f. Equipment (minimum):
Utility sink: metal or cast iron with stainless steel lip on curb floor sink. Do not provide wall sinks.
Faucet over sink: provide hot and cold water, bibb-type with hose threading, and project approximately 6 " from the wall. Provide siphon-breaker at faucet.
Shelving: provide 15 lineal. ft. of shelving, 14" between shelves vertically. Stainless steel shelves are preferred, but painted wood is adequate.
Mop hangers: provide mop hangers over the sink.
 - g. Wall Finishes: provide ceramic tile or other approved impervious material at all wall areas above the sink to 48" from the floor. Semi-gloss or gloss enamel paint (epoxy preferred) is the minimum finish required, although ceramic tile to 48" from floor is desirable.
 - h. Floor Finishes: provide ceramic tile, sealed concrete, or sheet vinyl with a 6" integral cove (or other materials as approved by the Project Manager).
 - i. Ventilation should be adequate to allow for damp conditions; provide door louvers or door gaps when feasible (note restrictions at one-hour corridors), or provide a minimum of 15 air changes per hour.
 - j. Lighting should be between 50 - 75 fc level. Provide one electrical outlet minimum per custodial closet.
4. Storage Rooms:
 - a. When called for in project programs, provide storage rooms over 200 sq.ft. with adequate electrical outlets, heating, hose bibb, and floor drain for possible future use as a maintenance room.
 5. Laundry Rooms: (see Housing Guidelines, Appendices)
 6. Buildings and Grounds Storage:

- a. Provide an area within the building or directly outside the building, with direct access to the exterior, for the storage of equipment for the campus Buildings and Grounds Dept.* (This equipment includes such items as lawnmowers, tools, landscaping equipment, etc.) This requirement shall be considered on a project by project basis; *suggested minimum size is 60 ASF*. Verify with Project Manager.
 - b. Outdoor materials storage areas shall be designed to prevent storm water contamination from loose, particulate or dissolved materials. Design features may include covering or enclosing storage areas and preventing run-on and run-off through the use of berms or grading design.
7. Floor Coverings: UCSC's experience with carpet is that, compared to resilient flooring:
- a. it has a higher installed cost.
 - b. it has approximately half the useful life.
 - c. it costs approximately twice as much to maintain.

For these reasons, carpet should be avoided except in situations where it is clearly necessitated by programmatic concerns. Verify guidelines with Project Manager.

8. Restrooms :
- a. Floor drains shall be provided.
 - b. Provide water impervious wall surfaces behind and adjacent to all plumbing fixtures to a height of 4 feet.

H. MECHANICAL:

1. Mechanical Requirements: Heat Control Ventilation (HCV) for offices and classrooms should be given careful consideration for providing for human comfort levels. The following design criteria for HCV apply:
 - a. General: The ventilation system shall provide a sufficient volume of outdoor air to maintain the occupant level of the room within 15 degrees F of outside air temperature under design cooling conditions. Unoccupied high bay areas may be at warmer temperatures.
 - b. Lecture Halls: The HCV system for large lecture halls, classrooms without windows, and large office spaces without windows, shall be equipped with both supply (make up air) and exhaust fans. The supply system shall distribute air throughout the room at velocities that will provide a cooling effect to all occupants. The supply system should provide air near the occupant level to avoid short cycling into the exhaust. The exhaust system should draw air from a location near the highest point in the room. When the same supply fan system is used for both heating and heat control ventilation, variable air volume controls shall be used to avoid the use of excessive air volumes while in the heating mode.
 - c. Classrooms and Offices with operable windows: The HCV system for rooms where occupants will be located within 20 feet of operable windows may be powered exhaust without a supply system. Sufficient operable window area must be provided to allow the required outside air volume to pass through the windows at velocities of 100 feet per minute or less. The windows should be at the same height level as the occupants to avoid short cycling into the exhaust.

- d. Small Offices with operable windows: Small Offices designed with opening windows, small internal cooling loads, and occupants located within 10 feet of the windows do not require a powered HCV system.
 - e. Controls for HCV Systems: The control system should operate the HCV system automatically based on room temperature. The control system shall be properly interlocked with the heating system, to lockout operation of the HCV system when in the heating mode. Outdoor air ventilation shall automatically be reduced to minimum when in the heating mode. The control system should prevent operation of the HCV system during unoccupied periods.
 - f. Each zone shall be capable of balance within itself. The air supplies and returns for each zone shall be served by the same air handler.
2. Mechanical System Noise
- a. Design Classrooms, Libraries, Study Halls, and general Office spaces within NC 30 Standards. For large Lecture Halls, Auditoriums, Concert Halls, Recording Studios etc., (where more stringent controls are desirable), consult with the Project Manager to set standards suitable for the intended uses. Design all other areas within the NC standards recommended in the most recent ASHRAE handbooks. Inform the Project Manager during the Design Development stage if necessary sound control measures will be adding a high cost value to the project.
 - b. *Mechanical equipment noise and vibration shall be aggressively controlled.*
3. Access to Mechanical Systems
- a. Mechanical equipment requiring heavy materials and tools for service shall allow hand truck (or larger as required) access from service vehicle parking areas by way of ramps or elevator. Regardless of method used, the building design shall incorporate a safe and practical path of travel for access of materials and personnel to equipment spaces. Included equipment would be *large air compressors, vacuum pumps, and air handlers*, all wet side mechanical equipment such as chillers, boilers, cooling towers, evaporative condensers, heat exchangers, refrigeration service valves for systems 10 tons and greater, medium to large pumps, water softening equipment, and water treatment points.
 - b. For mechanical equipment not requiring heavy materials and tools for service, minimum access shall be a ships ladder. Equipment in this category includes small to medium air handlers requiring only filter & lubrication service, packaged air conditioners and condensing units sized smaller than 10 tons, gas fired furnaces and make-up air units, and pumps weighing less than 75 pounds.
 - c. A variance from the requirement of 3.b above may be granted by the Project Manager in consultation with UCSC Physical Plant for extremely small mechanical equipment. The Executive Architect shall put forward this request for variance during the Design Development phase with a description of the equipment, the service requirements, and the design provisions for providing service access. Equipment in this category includes small fan coils, small circulation pumps, small control valves, air reliefs, etc.

- d. Manufacturers' recommendations for minimum clearances shall be followed and shall be indicated on the drawings. Include all equipment access door swings, coil and tube pulls, fan shaft pulls, etc.
 - e. Mechanical systems areas shall be finished such that cleanliness is facilitated (e.g., raised housekeeping pads, sealed concrete floors with floor drains, enamel paint at walls, etc.)
 - f. All roof mounted mechanical equipment shall be placed in accessible, walkable areas of the roof. Installations on sloped roofs shall be with the Project Manager's approval (in consultation with UCSC Physical Plant) and shall be leveled with a roof curb. Request for sloped roof installations shall be made during Design Development with a description of the equipment, the service requirements, and the provisions for service access.
 - g. *Boilers and heating water equipment:*
 - 1. *All boilers, including hot water heaters, pumps, hot water storage tanks, water treatment and water softeners, shall be installed inside fully enclosed mechanical rooms, preferably at ground level. The mechanical room shall incorporate provisions for removal of the boiler in one piece without partial building demolition (i.e., removable combustion air louvers or adequately sized doors).*
 - 2. *The boiler must be readily accessible to mechanics for water treatment and easy monitoring. Hand truck access to mechanical rooms should be provided via ramp or elevator from the service vehicle parking areas.*
4. Location, protection, and replaceability of mechanical equipment
- a. All pumps, boilers, chillers (except for air cooled chillers), furnaces, make-up air units, compressors, vacuums, water softeners, etc. shall be placed under cover, well protected from the elements, preferably inside the building., since exposure to the moist climate and debris from redwood trees has caused rapid deterioration of this type of equipment.
 - b. Air handlers, fans, air cooled chillers, condensing units and cooling towers may be designed for and placed in outdoor locations as required. Provide TEFC motors. All ground mounted equipment shall have provisions to prevent public access. Radiated equipment noise and visual impacts shall be addressed. Access from service vehicle parking areas shall be provided as covered in 3a, above.
 - c. Since nearly all mechanical equipment will be replaced several times over the life of each building, the building shall be designed so that all powered mechanical equipment can be replaced without building demolition or the use of a helicopter. Provisions shall include: oversized doorways, removable louvers, oversized areaways, etc., as required for equipment removal without unusual disassembly. Roof mounted equipment shall be placed so that it can be rigged into place by a ground level crane or via access through the building elevator.
 - d. Air intakes for HVAC equipment shall be positioned well away (50 feet or more) from all sources of air contaminants, e.g., loading docks, roads, exhaust fans, vacuum exhaust and plumbing vents. *Where site permits, locate air intakes low on the North*

side of building, to introduce the coolest outside air possible. Conflicts shall be resolved in consultation with the Project Manager.

- e. Mechanical elements generating contaminated air (e.g., discharge from fume exhaust systems, lab vacuum exhaust, plumbing vents for lab waste systems) shall be placed well away from all building air intakes serving occupied spaces and from operable windows. Provide a minimum separation of 50 foot horizontal and 30 foot vertical. Conflicts shall be resolved in consultation with the Project Manager.

5. *Mechanical Equipment Rooms*

- a. *Mechanical equipment rooms shall be provided with direct grade level exterior access. Provide 36" wide single door or, if larger openings are required, provide double doors.*

I. PLUMBING:

1. Water and Gas Meters:

- a. Provide each new building, or portions of new buildings, with separate meters for water and gas, *as well as a water meter for each point of connection for irrigation systems.* Portions of existing buildings, and large additions or remodels of existing buildings may also require separate meters. (refer to Sections 02665, 02685 and 15400 in Part V of this Handbook). Verify all requirements with the Project Manager.
- b. *Provide RPPBD backflor prevention on all iirrigation systems. Verify requirements for backflow prevention on domestic water systems with the Project Manager. See section VI for installation detail.*

2. Hose bibbs:

- a. Provide each new building with a hose bibb at 100 ft. o.c. maximum along exterior walls.
- b. *Provide siphon breaker on hose bibbs.*

3. Plumbing Fixtures

- a. Provide low-flow shower heads, low-flush toilets, etc. per LRDP EIR and Part V, Division 15400.

J. FIRE PROTECTION:

1. All buildings are to be provided with automatic fire sprinklers conforming to NFPA and CCR standards. (NFPA 13 d standards are *generally* not allowable for *campus* residential construction.)
2. The Designated Campus Fire Marshal is to approve all fire protection systems in new buildings. (See Part I, Administrative Requirements).

K. ELECTRICAL:

1. Electrical Meter Requirements

- a. Provide each new building, or portion thereof (see Part V, Section 16430), with a separate electrical meter. Large additions to or remodels of existing buildings may also require separate meters. Verify all requirements with the Project Manager.
2. Utility Service to Buildings:
 - a. All buildings are to be connected to existing utilities on campus. These utilities include, for new building projects: (2) 12 KV electrical feeders, fiber optic data cables, twisted pair telephone and miscellaneous system cables, coaxial cable TV. Verify all points of connection with the Project Manager.
 - b. All utility service, including electric, telephone, fiber optic data, cable TV, fire alarm, etc. is to be underground. (Refer to Part V of this Handbook, Divisions 2, 15, and 16 in particular).
 - c. All buildings are to be pre-wired for telephone, data, cable television, EMS, and fire alarm.
 - d. All communications closets shall be sized per EIA standards.
 3. Lighting Levels

Lighting levels shall conform to Title 24 and IES standards. Refer also to the Classroom Standards. The following table shall be used for preliminary values:

<u>Area</u>	<u>Approx. Maintained Footcandle Level</u>
Storage	20
Corridors, Entries, Lobby	15 - 20
Toilet Rooms	15
Offices, Computer Rooms	50
Classrooms, Laboratories	50
Classroom notetaking during video presentation	7

Low brightness lenses shall be utilized for offices, classrooms, laboratories. Parabolic louvers are recommended for areas with high concentrations of CRTs.

4. Emergency Power

A natural gas-fired emergency generator shall be provided to supply emergency power to egress lights, fire alarm system, and selected receptacles.

5. Fire Alarm System

All buildings shall be provided with a fire alarm system that communicates with the existing Pyrotronics CXL System in the Dispatch Center. Minimum requirements are:

- a. Smoke detectors in corridors and enclosed stairwells.
- b. Monitoring of fire sprinkler flow and tamper switches.
- c. Manual stations at corridor exit doors.
- d. Smoke detectors in student bedrooms.
- e. ADA/CAC Title 24 compliance.
- f. Fire Marshal Approval.

6. *Electrical/Communications Rooms*

- a. *Separate main electrical and communications rooms shall be provided with direct grade level exterior access. Provide a 36" door or provide double doors if a larger opening is required.*
- b. *Provide powered exhaust ventilation for all electrical/communication rooms.*
- c. *Communications closet sizes listed in this section assume that the rooms are dedicated. If space is shared with compatible facilities such as low voltage electrical panels or energy management cabinets, room sizes should be increased to account for space excluded to communications equipment.*
- d. *Closet provisions*
 - 1. *Minimum of two walls covered with rigidly mounted fire-rated 3/4 inch A-C plywood*
 - 2. *Lighting, minimum 50 ft candles*
 - 3. *No suspended or false ceiling; space shall be clear to structure above. No heat generating equipment, such as building transformers. No sinks, mop sinks.*
 - 4. *Door minimum 36 inches wide, without door sill, hinged to open outward or slide side-to-side.*
 - 5. *Minimum of two dedicated 15 A 120 V duplex outlets on separate circuits. If E-power or yellow power is available it shall be in addition to normal power outlets.*
- e. *Continuous air ventilation sufficient to limit temperature rise to 10 F for a 1 KW load from communications equipment.*
- f. *Very small buildings (less than 2000 sq ft) may be served by a single small closet or large lockable cabinet.*
- g. *Moderately small buildings (less than 5000 sq ft) may be served by a shallow closet minimum 24 inches deep and 8 ft wide with double doors opening outward to expose the entire back inside wall.*
- h. *BDF (Building Distribution Frame) Entrance Facilities: In buildings less than 100,000 sq ft, wall mounted termination is suitable. The table below assumes wall space clear from the floor to 8 ft. Larger buildings usually require frame mounted terminations. The following recommendations are from EIA/TIA-589*

Gross floor sq ft	Linear wall board space (inches)	Terminal & equipment room space (ft x ft)
5,000	39	10 x 4
10,000	39	10 x 4
20,000	42	12 x 4
40,000	68	12 x 4
60,000	96	12 x 4

80,000	120	12 x 4
100,000	144	12 x 6.3
200,000		12 x 9
300,000		12 x 13

- i. *If any station cables terminate at the BDF, it becomes a combined BDF/IDF and the larger space requirements listed in the next section govern.*
- j. *Intermediate Distribution frame (IDF) Facilities: Data communications standards require that the length of station cables from the serving equipment in the IDF to the station face plate be less than 90 meters (295 ft). The area served by a single closet must fall within the 90 meter rule, including the cable needed to change elevation.*

- 1. *The following closet size guidelines assume a workstation density of one per 100 sq ft:*

Area sq ft	Closet size ft x ft
10,000	10 x 11
8,000	10 x 9
5,000	10 x 7

- 2. *No closet shall be smaller than 10 x 7 unless it is a "pass-thru" closet for both data and voice.*
- 3. *Where the 90 meter rule will not be violated, it is permissible to run the station cables to an adjacent floor for termination. The intermediate closet is a "pass-thru" because unspliced and unterminated station cables see it only as a very large access point for pulling more cables.*
- 4. *Designers of small remodels should endeavor to use an existing IDF if their project is within its 90 meter cable distance zone. Building remodeling projects shall utilize existing IDFs rather than create new, auxiliary IDFs.*
- 5. *IDFs are connected to their serving BDFs by riser cables for voice (multipair copper) and data (multimode fiber). Typically, one binder group (25 pairs) in the riser cables are dedicated for non-telco low voltage power limited applications. Examples of these applications include freezer alarms, security alarms, elevator phones and "blue light" phones.*

7. Security System

- a. *Security systems are not considered utility systems and consequently are not included in the cost of State Funded Buildings. Building projects should provide concealed conduit for installation of security system after building completion by the department in areas identified in the program as needing a security system.*
- b. *See Campus Security Alarm Policy:
<http://www.ucsc.edu/ucsc/ppmanual/abstract/sps0003.htm>*

L. ELEVATORS

1. Elevator sumps shall include a *gravity drain* . *Where conditions do not allow, a sump pump shall be specified in lieu of a gravity drain.*
2. Hydraulic elevators shall have self-lowering capability during power failure.

M. NONSTRUCTURAL BUILDING ELEMENTS:

Nonstructural building elements shall be anchored according to the Uniform Building Code, as modified by applicable California State Codes.

N. FACULTY OFFICES

1. Allow 18" (including door frames) behind doors into faculty offices to allow for placement of bookshelves and filing cabinets.
2. *Provide double coat hook at inside face of door to corridor.*
3. *Provide floor type door stop.*
4. *Allow a space 12 feet wide by 6 feet tall for the placement of standard bookshelves (either movable metal furniture or wall standards with wood shelves)*
5. *Refer to Standard Details 10.1 and 13.7 in Part VI of this publication.*

O. BUILDING DIRECTORIES

1. *Campus Standards for Building Directories are not in place at the time of this printing. Verify status with Project Manager.*

P. TRAILER STANDARDS

1. *All trailers shall be designed and manufactured per requirements of California Code of Regulations, Title 25 (CCR Title 25), as well as all applicable requirements for Commercial Coaches. All trailers shall also comply with UBS, UPC, UMC, NEC, NFPA, and ADA codes.*
2. *All trailers shall be designed and installed with the following additional requirements:*
 - a. *Live load on all floors 60 pounds per square foot live load. Partition load of 20 pounds per square foot additional dead load.*
 - b. *Wind and earthquake loadings as specified in CCR Title 25 and the UBC.*
 - c. *All suspended ceiling elements, including light fixtures, heating supply and return ducts shall be tied and braced for gravity loads and earthquake loads to the most stringent standard of all applicable codes including, but not limited to, CCR Title 25, UBC, NEC, and UMC.*
 - d. *The trailer exterior shall provide full weather protection and moisture protection and shall not leak or allow moisture intrusion.*
 - e. *Flashing shall be provided over all exterior openings. All flashing shall be placed under exterior siding and vapor barrier and be installed in a manner to guide water out and away from trailer skin.*

- f. *All exterior siding shall be continuous, 5/8" minimum thick plywood siding, full sheet panels from the bottom of the floor joists to the bottom of the roof sheathing without joints, eliminating the need for z-stripping or trim boards to cover the splice.*
- g. *All exterior trim shall be of a weather resistant solid wood.*
- h. *All exterior nailing shall be with hot-dip galvanized nails.*
- i. *All wood sheathing materials shall have exterior glue. All interior floor sheathing and exterior sheathing and siding shall be with full sheet panels rated for exterior application. All flooring and roofing sheathing shall be structural plywood or oriented strand board.*
- j. *All windows shall be designed to be placed under exterior sheathing and shall be installed under exterior sheathing.*
- k. *All electrical wiring shall comply with the NEC and all campus codes and standards.*
 - (1) *In rooms with water (sinks, showers, and/or toilets) all outlets shall be GFI protected. All exterior outlets shall be GFI protected.*
- l. *Trailers shall be installed to resist current applicable Uniform Building Code Wind and Earthquake loadings, and shall be provided with vertical, horizontal, and uplift resisting systems including tie-downs. The installation plans shall be designed for the specific trailer and signed by an engineer licensed in the State of California.*
- m. *Minimum size of wall framing members shall be 2 x 4 studs. Sizing shall be based on engineering requirements, with a 2 x 4 minimum. Provide structural, seismic, and energy calculations for each trailer.*
- n. *Current foundation system type consists of steel piers with pressure treated wood pads. The pressure treated wood must be rated for buried ground contact. The steel pier tops must be positively connected to the trailer chassis by screws or clamps. The steel pier bottoms must be positively connected to the wood pads by nailing or screws. The tie down system must provide resistance to the UBC specified loadings (wind and earthquake). The system must be tested at the trailer location to assure that it will provide the required resistance. Auger style anchors, including helix and double helix anchors, are unacceptable.*
- o. *All foundation systems in a marine environment, including (but not limited to) all located at Long Marine Lab, Ano Nuevo Reserve, S.C. Marina, shall be designed with consideration for the marine environment, including hot dip galvanized metal parts after fabrication on all steel foundation system components.*
- p. *Trailer clearance from earth shall be per all applicable sections of Uniform Building Code and CCR, Title 25. If skirting is installed, access and ventilation shall be provided per all applicable sections of Uniform Building Code and CCR, Title 25.*
- q. *Trailers shall be ADA accessible per current State of California and federal accessibility standards. This will apply to interior and exterior accessibility of all newly purchased trailers.*

- (1) *For interiors this includes, but is not limited to: door latches and handles, door size, and location, interior access, light switches, fire alarm pull station, thermostat height, countertop, toilet, sink and/or shower access, (Note: toilets, sinks and/or showers require special approval).*
 - (2) *For exteriors this includes, but is not limited to: doors, ramps, rails, stairs, and pathways.*
- r. *The utility connections to the trailer shall be flexible at the point of connection, allowing for flexibility and trailer releveled, without having to disconnect and reconnect. All domestic water supply piping shall be copper and secured per requirements of plumbing code.*
- s. *Plumbing to trailers for toilets, sinks and showers is not standard for trailers. This will be allowed by special circumstance only, must be justified by the function of the unit in the trailer and is subject to approval by the Campus Architect. toilet room accessories shall be per campus standard. toilets shall be low flush, shower heads and faucets shall be low flow.*
- t. *Baseboard resistance heating systems are not allowed. HVAC systems shall have fully ducted supply and return, with acoustical treatment to minimize noise transfer.*
- u. *Trailers shall be furnished with fire alarm, heat detectors and manual stations as required by the Designated Campus Fire Marshal. Trailers shall also be furnished with fire extinguishers as required by the Designated Campus Fire Marshal.*
- v. *All data and communications wiring shall comply with CATS and campus standards and requirements. ENT conduit for telephone/data cables shall be concealed in the walls from telephone data outlets mounted 36" above finish floor to below the trailer floor. Telephone/Data wiring shall be neatly routed exposed beneath the trailer to an exterior mounted termination cabinet.*
- w. *All shelving shall be provided with floor mounted shelving units, braced for earthquake.*
- x. *Provide solid core doors in frames designed for these doors. Door gaskets shall be made of neoprene or silicone; vinyl gaskets are unacceptable.*
3. *All trailers shall be installed with distance separations from other trailers and buildings as required by the Designated Campus Fire Marshal.*
4. *All trailer locations are subject to campus Design Advisory Board review of siting and design.*
 - (1) *All trailers shall be painted a neutral color which blends into surrounding area. Neutral color to be determined by campus paint shop, unless color is specified by campus design review board.*
5. *Due to maintenance concerns, installation of used trailers is subject to special approval by the Director of Physical Plant.*

Q. *Hazardous Building Materials*

1. *Some buildings have existing Asbestos Containing Materials (ACM) in place, e.g., gypsum board and taping compound, floor tiles, roofing, pipe insulation, ceiling spray and tiles, boiler refractories.*
2. *Some buildings have paint containing lead.*
3. *Verify the presence or absence of hazardous building materials with UCSC Environmental Health and Safety through the Project Manager.*

R. Food Facilities

1. Food facilities designed with the following:
 - a. Oil and grease interceptor design approved by jurisdiction overseeing sanitary waste water discharge.
 - b. Wash area for cleaning of equipment and accessories. Wash area connected to the oil and grease interceptor and the sanitary sewer.
 - c. If the wash area is outdoors, it must be covered and designed to prevent storm water run-on and run-off.

S. Loading Docks

1. Design loading docks to minimize storm water run-on and run-off through the use of grading design and berms or their equivalent.
2. Oil/water/sediment catch basins at loading docks and all parking lots not equipped with a pre-engineered oil/water/sediment separator.
3. Runoff from roads and parking lots; operation centers and municipal yards; vehicle fueling and maintenance facilities and food facility loading docks that include at least 5000sf of new or replacement impervious surfaces will be subject to treatment. Appropriate treatment could consist of discharge to a permeable area, as long as subject to appropriate sizing criteria and treatment design. Volume based treatment will be calculated using either the 85th percentile, 24-hour storm event or 80 percent of the annual runoff volume. Flow based treatment will be calculated using either the 85th percentile hourly rainfall intensity, multiplied by a factor of two or 10 percent of the 50 year peak flow.