# Division 13 Special Construction

## 13 05 00 Common Work Results for Special Construction

### *13 05 10 General Requirements for Special Construction*

1. Project Specifications for Audio-Visual Systems shall use as their basis *Section 27 40 00 Audio-Visual Systems* of the latest edition of the DFD Master Specifications when applicable. Consult with the UW Project Manager as to applicability.

2. Deviations from DFD's Minimum Design Guidelines or the DFD Master Specification sections shall be made only upon approval from the UW-Madison Project Manager.

3. The Guidelines for Planning and Design of UW-Madison Facilities shall take precedence over DFD Guidelines, but the A/E shall discuss all conflicts within the guidelines and specifications with the UW-Madison Project Manager.

4. The goals and guiding principles of the UW-Madison Campus Master Plan (latest edition) shall be considered and referenced as part of the planning, design, detailing, and material section for every project.

### *13 05 30 Architectural Mock Up*

1. Unless there are extenuating circumstances, agreed upon during the design phase by all parties, including the UW-Madison University Architect, an architectural mock up is required to be constructed for each project to confirm major building material selections including all masonry, metal panel, sealants and mortars, vision and spandrel glass, metal copings, sills, headers, and trim, among others. The mock up not only ensures that the materials work well with each other, but confirm they will work well in their larger context as applied to the new building. In addition, the mock up provides an excellent opportunity for testing how materials come together via design details, and constructability overall.

2. Architectural mock ups shall be prioritized to be constructed soon after the site is cleared for construction. There must be ample time allocated such that any delays in obtaining materials or any rejected materials will be able to be reordered and applied to the mock up for additional review and approval **prior** to there being any construction schedule impacts.

3. The architectural mockup must be reviewed and approved by the design team, including the UW-Madison University Architect, **prior** to the order of any large quantities of materials for the new building.

## 13 20 00 Special Purpose Rooms

### *13 22 00 Academic Spaces*

#### 13 22 20 Laboratories

1. A/E Design Teams shall utilize the services of qualified laboratory planners for the design of all new laboratory buildings.

2. Consultants shall be current with NIH (National Institutes of Health) guidelines for laboratory design.

3. Laboratory doors shall be self-closing and lockable and have access control.

4. Surface mounted sliding doors should not be used in a laboratory. Pocket doors, bifold doors, and accordion doors are not permitted in a laboratory.

5. Laboratory windows that open to the exterior are not recommended. If the laboratory has windows that open to the exterior, windows shall be fitted with fly screens.

6. Open ceilings are not recommended in a laboratory.

7. Acoustical tile ceilings shall be hydrophobic, smooth surfaced, and able to be cleaned.

8. Carpets and rugs are not permitted in a laboratory. Carpeting is not recommended in office and administrative spaces that can only be accessed by passing through laboratory areas.

9. Laboratory floor finishes shall be non-absorbent and allow for decontamination with liquid disinfectants.

10. Laboratory finishes shall be non-porous and resistant to degradation from disinfectants commonly used in the laboratory.

11. Laboratory wall finishes shall be smooth and able to be easily cleaned and decontaminated. Laboratory finish requirements are recommended for office and administrative spaces that can only be accessed by passing through laboratory areas.

12. Laboratory shall have a sink for handwashing. The sink should be located near the exit door.

13. An eyewash station shall be readily available in the laboratory.

14. An autoclave on each floor where research with biological materials is performed is recommended.

15. In general, floor drains are not permitted in the laboratory. Environment, Health & Safety must be consulted regarding floor drains or floor sinks in the laboratory.

16. Benchtops must be smooth, impervious to water and resistant to heat, organic solvents, acids, alkalis, and other chemicals.

17. Laboratory furniture shall be sturdy and able to support anticipated loads and uses.

18. The laboratory shall be designed so that it can be easily cleaned. Spaces between benches, cabinets, and equipment shall be accessible for cleaning.

19. Chairs used in laboratory work shall be covered with a non-porous material that can be easily cleaned and decontaminated.

20. All surfaces and furniture shall be non-porous for effective disinfection. The use of wood and wood veneer for cabinetry or shelving should be avoided.

21. The Office of Biological Safety must be consulted regarding requirements or recommendations for laboratory facilities (e.g., research laboratory, teaching laboratory, animal facility, greenhouse) in which activities with biological materials will be performed. Requirements and recommendations for laboratories are based on the biological materials handled and the procedures performed in the facility.

22. The Office of Biological Safety must be consulted regarding BSL3 or ABSL3 laboratory facilities as these facilities will have additional requirements.

23. Biosafety in Microbiological and Biomedical Laboratories (BMBL), NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules, and NIH Guidelines Design Requirements Manual are used by the Office of Biological Safety when determining requirements or recommendations for laboratory facilities.

24. Ventilation systems shall provide an inward flow of air without recirculation to spaces outside of the laboratory.

## 13 22 40 Auditoriums and Lecture Halls

1. Design Criteria:

1.1. In new construction, auditoriums and lecture halls shall contain fixed continuous tables and moveable ergonomic chairs (on casters appropriate for the flooring). The appropriate number of accessible seating with companion seats shall be provided. Wheelchair spaces and designated aisle seats shall be dispersed to provide a choice of admission prices (if applicable) and lines of sight comparable to that provided to other spectators.

1.2. In new construction and to the extent possible in renovation projects, each seat should be wired for power with one duplex outlet serving two seats. Data outlets are not needed as wireless shall be used.

1.3. The floor shall be tiered or sloped to allow for best sight lines. Transitions between ramped aisles and stepped rows shall be beveled, well designed, and coordinated for safety.

1.4. Aisles shall be ramped (not stepped) to meet ADA requirements.

2. Audio/Visual Requirements:

2.1. Rear screen projection is only permitted on a specific case need. The A/E shall consult with the UW-Madison Project Manager if a specific need is required.

2.2. The A/V design shall be discussed early in Programming to determine equipment needs. Some system inputs may include:

2.2.1. Blu Ray player accommodating DVD/laser discs - unlocked
2.2.2. CD, MP3 or equivalent Audio
2.2.3. Document Cameras (multiple in large lecture halls)
2.2.4. Video camera for the recording of lectures
2.2.5. Laptop input HDMI
2.2.6. Code compliant Assistive Listening Devices

2.3. Some system outputs may include:

2.3.1. Video projectors (multiple)
2.3.2. Recording devices
2.3.3. Overflow classroom
2.3.4. Distance learning technology
2.3.5. Video windows in touch control screen and video based interactive educational smart boards

3. A/V Podium Control System shall include:

3.1. The A/V control system shall use a touch color screen with video window for monitoring document camera, videos, cameras, window shades, and lighting scenes.

3.2. The A/V Control System shall use an easy to understand icon based graphical user interface (GUI).

3.3. The A/V Control System shall contain automation software to trigger by user actions, system events, or timed events.

3.4. A/V Control Systems and podiums shall be made accessible.

3.5. A well-labeled telephone shall be provided for technical assistance when needed.

4. Integration of the Control System:

4.1. Video system and equipment control
4.2. Window shades control
4.3. Lighting system control
4.4. Sound system and equipment control
4.5. The sound system shall include a podium as well as UHF wireless microphones and a high quality multi-speaker system.

## *13 24 00 Special Activity Rooms*

### 13 24 10 Single Occupancy Toilet Rooms

1. A minimum of one (1) single occupancy toilet room shall be included within each new or significantly renovated building and more than one if programmatically desired.

2. The most publicly located single occupancy toilet room shall contain a floor-mounted urinal in addition to standard lavatory and toilet. It should also include a menstrual product dispenser.

3. The room shall be ADA accessible and unisex in nature and shall be located on the floor and/or near spaces designed for general public use and gathering. At the discretion of the building occupants, it may also be fitted with an infant changing table to enable the room to serve as a family restroom.

4. The single occupancy toilet room shall be signed “Restroom” to be consistent with other room signs within the same facility. The term “Unisex” shall not be used. The pictogram associated with the sign, shall indicate that it is accessible and whether or not it includes an infant changing table.

**13 24 20 Commuter Showers/Changing Rooms**

1. As biking is an important mode of transportation on our campus, it is desirable to include shower/changing facilities within each new or significantly renovated building. The quantity of showers shall be determined by the occupants of the building.

2. The rooms shall be located near a building point of entry and near bicycle parking.

3. The rooms shall be ADA accessible and unisex in nature. The shower shall incorporate a trench drain across the entrance to the shower to capture as much water as possible. It shall also include a toilet and sink with appropriate accessories including mirror, robe hooks, etc.

4. The room shall be accessed by card reader and also have a deadbolt for privacy as part of the hardware group.

**13 24 40 Wellness Rooms**

1. A minimum of one (1) room designated for lactation and/or personal health treatments shall be included within each new or significantly renovated building and more than one if programmatically desired. These spaces shall be located in staff rich zones, such as on floors occupied primarily by offices and workstations to encourage their use, yet removed from the direct public domain for privacy and quiet.

2. The room shall be accessible with a minimum of 50 ASF and include a built-in counter at table height along one wall – minimum 48 inches long – with knee space and a single base cabinet for storage. Power shall be provided above the counter for easy access.

3. A task chair with arms and casters shall be provided at the counter.

4. A small wall mounted sink with gooseneck faucet and mirror shall be included.

5. The room shall be accessed by card reader and also have a deadbolt for privacy as part of the hardware group.

6. Refrigeration will not be provided inside the room for security and access reason, but should be made available nearby.

7. Confirm Wellness Room requirements with UW Project Manager prior to design.

**13 24 60 Animal Containment Rooms**

1. Consultants should be current with regulatory guidelines (USDA, The Guide for the Care and Use of Animals) for animal housing.

2. Doors should be large enough (approximately 42 × 84 in.) to allow the easy passage of racks and equipment and they should fit tightly in their frames. Both doors and frames should be appropriately sealed to prevent vermin entry or harborage. Doors should be constructed of and, where appropriate, coated with materials that resist corrosion. Self-closing doors equipped with recessed or shielded handles, sweeps, and kickplates and other protective hardware are usually preferable. Hospital or terminated stops are useful to aid in cleaning. For safety, doors should open into animal rooms; if it is necessary that they open toward a corridor, there should be a recessed vestibule.

a. Where room-level security is necessary or it is desirable to limit access (as with the use of hazardous agents), room doors should be equipped with locks or electronic security devices. For personnel safety, doors should be designed to open from the inside without a key.

b. Doors with viewing windows may be needed for safety and other rea- sons, but the ability to cover these windows may be considered if exposure to light or hallway activities would be undesirable (e.g., to avoid disturbing the animals' circadian rhythm). Red-tinted windows, which do not transmit specific wavelengths of visible light between corridors and animal rooms, have proved useful for mouse and rat holding rooms as both species have a limited ability to detect light in the red portions of the spectrum.

3. Floors should be moisture resistant, nonabsorbent, impact resistant, and relatively smooth, although textured surfaces may be required in some high-moisture areas and for some species (e.g., farm animals). Floors should be easy to repair and resistant to both the action of urine and other biologic materials and the adverse effects of hot water and cleaning agents. They should be capable of supporting racks, equipment, and stored items without becoming gouged, cracked, or pitted. Depending on their use, floors should be monolithic or have a minimal number of joints. Some materials that have proved satisfactory are epoxy resins, hard-surface sealed concrete, methyl methacrylate, polyurethane, and special hardened rubber-base aggregates. The latter are useful in areas where noise reduction is important. Correct installation is essential to ensure the long-term stability of the surface. If sills are installed at the entrance to a room, they should be designed to allow for convenient passage of equipment.

4. Where floor drains are used, the floors should be sloped and drain traps kept filled with liquid. To minimize prolonged increases in humidity, drainage should allow rapid removal of water and drying of surfaces. Drainpipes should be at least 4 in. (10.2 cm) in diameter, although in some areas, such as dog kennels and agricultural animal facilities, larger drainpipes (≥6 in.) are recommended. A rim- and/or trap-flushing drain or an in-line comminutor may be useful for the disposal of solid waste. When drains are not in use for long periods, they should be capped and sealed to prevent backflow of sewer gases, vermin, and other contaminants; lockable drain covers may be advisable for this purpose in some circumstances.

   a. Floor drains are not essential in all animal rooms, particularly those housing rodents. Floors in such rooms can be sanitized satisfactorily by wet vacuuming or mopping with appropriate cleaning compounds or disinfectants. But the installation of floor drains that are capped when not in use may provide flexibility for future housing of nonrodent species.

5. Walls and ceilings should be smooth, moisture resistant, nonabsorbent, and resistant to damage from impact. They should be free of cracks, unsealed utility penetrations, and imperfect junctions with doors, ceilings, floors, walls, and corners. Surface materials should be capable of with- standing cleaning with detergents and disinfectants and the impact of water under high pressure. The use of curbs, guardrails or bumpers, and corner guards should be considered to protect walls and corners from damage, and such items should be solid or sealed to prevent access and harborage of vermin.

6. Ceilings formed by the concrete slab above are satisfactory if they are smooth and sealed or painted. Suspended ceilings are generally undesirable in animal holding rooms unless they are sealed from the space above with gaskets and clips. When used, they should be fabricated of impervious materials, have a washable surface, and be free of imperfect junctions. Exposed plumbing, ductwork, and light fixtures are undesirable unless the surfaces can be readily cleaned.

7. A properly designed and functioning HVAC system is essential to provide environmental and space pressurization control. Areas for quarantine, housing and use of animals exposed to hazardous materials, and housing of nonhuman primates should be kept under relative negative pressure, whereas areas for surgery or clean equipment storage should be kept under relative positive pressure with clean air.

    a. HVAC systems should be designed for reliability (including redundancy where applicable), ease of maintenance, and energy conservation; able to meet requirements for animals per regulatory guidelines

    b. They should be capable of adjustments in and ideally maintain dry-bulb temperatures of ±1°C (±2°F). Relative humidity should generally be maintained within a range of 30-70% throughout the year. Ideally relative humidity should be maintained within ±10% of set point; however, this may not be achievable under some circumstances.

    c. Constant-volume systems have been most commonly used in animal facilities, but variable-volume (VAV) systems may offer design and operational advantages, such as allowing ventilation rates to be set in accordance with heat load and other variables.

    d. Temperature is best regulated by having thermostatic control for each holding space. Use of zonal control for multiple spaces can result in temperature variations between spaces in the zone because of differences in animal densities and heat gain or loss in ventilation ducts and other surfaces within the zone. Individual space control is generally accomplished by providing each space with a dedicated reheat coil. Valves controlling reheat coils should fail in the closed position; steam coils should be avoided or equipped with a high-temperature cut-off system to prevent space overheating and animal loss with valve failure.

    e. Humidification is typically controlled and supplemented on a system or zone basis. Control of humidification in individual holding spaces may be desirable for selected species with reduced tolerance for low relative (e.g., nonhuman primates) or high humidity (e.g., rabbits).

    f. Consideration should be given to measures that minimize fluctuations in temperature and relative humidity outside the recommended ranges due to extremes in the external ambient environment. Such measures can include partial redundancy, partial air recirculation, altered ventilation rates, or the use of auxiliary equipment. In the event of an HVAC system or component failure, systems should at the minimum supply facility needs at a reduced level, address the adverse effects of loss of temperature control, and, where necessary, maintain critical pressurization gradients. It is essential that life- threatening heat accumulation or loss be prevented during mechanical failure. Temporary needs for ventilation of sheltered or outdoor facilities can usually be met with auxiliary equipment.

    g. Air handling system intake locations should avoid entrainment of fumes from vehicles, equipment, and system exhaust. While 100% outside air is typically provided, when recirculated air is used its quality and quantity should be in accord with recommendations in Chapter 3 of The Guide. The type and efficiency of supply and exhaust air treatment should be matched to the quantity and types of contaminants and to the risks they pose. Supply air is usually filtered with 85–95% dust spot efficient filters. In certain instances, higher efficiency filters (e.g., HEPA) may be beneficial for recirculated supply air and air supplied to or exhausted from specialized areas such as surgical and containment facilities.

8. The electrical system should be safe and provide appropriate lighting, a sufficient number of power outlets, and suitable amperage for specialized equipment. In the event of power failure, an alternative or emergency power supply should be available to maintain critical services (e.g., the HVAC system, ventilated caging systems [Huerkamp et al. 2003], or life support systems for aquatic species) or support functions (e.g., freezers and isolators) in animal rooms, operating suites, and other essential areas.

9. Light fixtures, timers, switches, and outlets should be properly sealed to prevent vermin access. Recessed energy-efficient fluorescent lights are commonly used in animal facilities. Spectral quality of lights may be important for some species when maintained in the laboratory; in these cases full spectrum lamps may be appropriate.

    a. A time-controlled lighting system should be used to ensure a uniform diurnal lighting cycle. Override systems should be equipped with an automatic timeout or a warning light to indicate the system is in override mode, and system performance and override functions should be regularly evaluated to ensure proper cycling. Dual-level lighting may be considered when housing species that are sensitive to high light intensity, such as albino rodents; low-intensity lighting is provided during the light phase of the diurnal cycle, and higher-intensity lighting is provided as needed (e.g., when personnel require enhanced visibility).

    b. Light bulbs or fixtures should be equipped with protective covers to ensure the safety of the animals and personnel. Moisture-resistant switches and outlets and ground-fault interrupters should be used in areas with high water use, such as cage-washing areas and aquarium-maintenance areas.

10. Noise control is an important consideration in an animal facility and should be addressed during the planning stages of new facility design or renovation. Masonry walls, due to their density, generally have excellent sound-attenuating properties, but similar sound attenuation can be achieved using many different materials and partition designs.

    a. Experience has shown that well-constructed corridor doors, sound-attenuating doors, or double-door entry vestibules can help to control the transmission of sound along corridors. An excellent resource on partition design for sound control is available in *Noise Control in buildings: A Practical Guide for Architects and Engineers* (Warnock and Quirt 1994). Attention should be paid to attenuating noise generated by equipment.

    b. Fire and environmental-monitoring alarm systems and public address systems should be selected and positioned to minimize potential animal disturbance. The location of equipment capable of generating sound at ultrasonic frequencies is important as some species can hear such high frequencies. Selecting equipment for rodent facilities that does not generate noise in the ultrasonic range should be considered.

11. Vibration may arise from mechanical equipment, electrical switches, and other building components, or from remote sources (via ground borne transmission). Regarding the latter, special consideration should be given to the building structure type especially if the animal facility will be located over, under, or adjacent to subways, trains, or automobile and truck traffic. Like noise, different species can detect and be affected by vibrations of different frequencies and wavelengths, so attempts should be made to identify all vibration sources and isolate or dampen them with vibration suppression systems.

12. Monitoring of environmental conditions in animal holding spaces and other environmentally sensitive areas in the facility should be considered. Automated monitoring systems, which notify personnel of excursions in environmental conditions, including temperature and photoperiod, are advisable to prevent animal loss or physiologic changes as a result of system malfunction. The function and accuracy of such systems should be regularly verified.

### 13 24 80 Custodial Equipment Storage Rooms

1. All new buildings on campus shall provide convenient, code compliant storage space for larger equipment such as snow blowing equipment, leaf blowers, and mowers, accessible from the exterior of the building. The storage rooms must store at least 4 gallons of gas and two 20 pound LP tanks, approximately 50 square feet of space and a floor drain. An early review of the building-specific requirements is suggested during Programming. LP shall be stored outside the building.

2. All new buildings on campus shall provide a code compliant room to allow for charging and storing of large pieces of battery powered custodial equipment. Size depends on building configuration and floor materials to be cleaned. There shall be at least 150 square feet with proper ventilation for three 36 V and three 24 V machines, 18 inch deep shelf at 54 inch above floor to put chargers on, and outlets 12 inches above shelves (average hall machine 52 inches high, 38 inches wide, and 60 inches long). For a detailed plan, please contact the UW-Madison FP&M Project Manager. Provide an ANSI Z358.1 code compliant eyewash in the room.

3. Rooms shall be located close to loading docks or building entries, where equipment is most frequently needed.

4. Custodial closets must include:

   4.1. 42 inch doors on 180 degree hinge opening out

   4.2. There shall be one outlet on each wall with no more than 8 feet between the outlets

   4.3. Outlets shall be mounted 24 inches above the floor to handle two 12 amp chargers

   4.4. Shelves shall be provided for custodial cleaning supplies. An early review of the building-specific requirements is suggested during Programming.

   4.5. Sufficiently sized space for ladder storage and at least one custodial cart (50 inches long, 22 inches wide, and 39 inches high) shall be provided.

   4.6. Mop sink shall be provided with no higher than 6 inch sides for ease in emptying buckets and equipment. A hose bib with flex connection is required. The wall area behind the sink area shall be covered with a water resistant material such as ceramic tile, FRP panel, or similar.

# 13 40 00 Integrated Construction

## *13 41 00 Built-In Waste and Recycling Units*

1. Freestanding waste and recycling containers shall be coordinated with FF&E per Division 12. It may also be desired to include built in waste and recycling units for this purpose in highly visible public spaces. The following guidelines shall apply to these:

1.1. Materials for the enclosure units shall be coordinated by the design team as appropriate to the space in which they occur. The units may be fully recessed or semi-recessed, built into alcoves.

1.2. Separated units shall be included to manage the streams which UW-Madison Waste and Recycling collect: Waste, comingled recycling of glass, plastic & aluminum, and mixed paper. Additionally, office paper is collected, but collection points for this stream are not typically located in public areas, rather they are located in copy and work areas where this type of waste paper is generated.

1.3. The enclosure units shall include an opening in the top or on the front for each stream large enough to enable items to be tossed in without congestion. There shall be no flipper doors over the opening. These tend to break and are difficult to keep clean.

1.4. Labels shall be associated with each compartment and can be created using an applied plaque or the words can be engraved directly into the surface near the openings. The proper language per UW-Madison Waste and Recycling is as follows:

1.4.1. Trash

1.4.2. Mixed Paper

1.4.3. Glass, Plastic, & Aluminum (ampersand and commas are optional, text can be on 3 lines)

1.5. The enclosure units shall be designed with front doors that open to remove the liner so less lifting is required. The inside of the units sized to fit a large, standard size Rubbermaid container, whose model number shall be called out in the details. The Rubbermaid containers can be purchased either by the contractor or via FF&E.