



COLLEGE AND UNIVERSITY RESIDENCE HALL DESIGN GUIDELINES

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INTRODUCTION

These College & University Residence Hall Design Guidelines are provided as a resource for staff at the various campuses of the State University of New York (SUNY) and design professionals engaged by SUNY or the Dormitory Authority of the State of New York (DASNY) for the repair and rehabilitation of existing college and university residence halls and the design of new college and university residence halls. These guidelines represent the collective experience of DASNY regarding the suitability and performance of the various materials and systems that may be considered for use in college and university residence halls.

The intent of these guidelines is to share DASNY's knowledge with our clients and the design professionals chosen to perform design services for SUNY residence hall projects, not to dictate material and system selection. The final decision on material and system selection for a specific residence hall project rests with the campus, and the final responsibility for selection of suitable materials and systems for a specific residence hall project rests with the design professional. Where applicable codes, rules, regulations or laws limit or otherwise impact material and system selections, this shall be so noted.

DASNY encourages SUNY campus staff and design professionals to provide feedback on these guidelines. These guidelines are intended to be a living document and shall be revised as issues with materials and systems emerge over time.



OCCUPIED AND HABITABLE AREAS - Public Areas

1. Entrance Doors

- a. Balanced doors or swinging doors with continuous hinges are recommended at main entrances.
- b. When aluminum main entrance doors are planned, medium or wide-stile door systems should be used, depending on the volume of traffic anticipated. Narrow stile aluminum door systems should be avoided.
- c. At a minimum, one pair of double doors, each leaf a minimum of thirty-six inches wide, is recommended at main entrances to facilitate student moving.
- d. Main entrance doors will typically be required to be accessible to disabled persons. Check with the campus for hardware preferences, such as automatic openers.
- e. Equipment Typically Provided at Main Entrances:
 - i. Card readers to control building access. Card access systems are recommended to prevent unauthorized access to the residence hall.
 - ii. Electric strikes controlled by card readers.
 - iii. Blue Light emergency phone device to call for help in an emergency.
 - iv. Fire alarm manual pull stations must be provided within 5 ft. of entrance (and all exterior) doors. (Code requirement.)

2. Vestibule

- a. Vestibules should be provided at entrance doors. (Code requirement for residence halls over three stories.) Vestibule doors should have sufficient clearance from one another to provide accessibility for the disabled.
- b. A walk-off mat or grate with a floor drain and sediment bucket is recommended in main entrance vestibules. Floor drains should be a deep seal trap type or have a trap primer to prevent drying out. Floor drain components should be salt resistant.
- c. Heat is recommended in vestibules.
 - i. Recommended heating equipment types are convectors, cabinet heaters and concealed fan coils.
 - ii. Piping should be run in such a way as to prevent freezing.
- d. Smoke detection must be provided within vestibules, as they are a component of the means of egress. If the vestibule is subject to freezing temperatures, heat detection may be substituted. (Governor's Task Force on Campus Fire Safety requirement.)

3. Main Lobby

- a. Recommended finishes in lobbies are as follows (the design consultant shall check code requirements for flamespread ratings):
 - i. Flooring: Floor finishes should be durable, slip-resistant, easily cleaned materials that can withstand water and salt tracked into the building by occupants and visitors. Recommended materials include stone tile, ceramic tile, paver tile, quarry tile, terrazzo, and rubber flooring.
 - ii. Walls: Wall construction and finishes should be of durable materials capable of resisting impact and gouging. Recommended materials include architectural concrete or brick masonry, glazed or painted concrete masonry units and heavy gauge metal stud systems with impact-resistant gypsum board materials. For gypsum board walls, recommended finishes include hard wainscot systems, heavy-duty wall coverings, graffiti resistant coatings, and semi-gloss or gloss paint systems.
 - iii. Ceilings: Recommended materials include commercial grade suspended acoustical ceiling systems, lay-in cementitious wood fiber acoustical panels, and painted gypsum board.
- b. The Resident Director's office should be located so that it is visible and/or easily accessible from the lobby. Check with the campus for preferences.
- c. A reception/security desk is often required at the main lobby adjacent the main entrance. Check with the campus for preferences.



OCCUPIED AND HABITABLE AREAS - Public Areas (Continued)

- d. Smoke detection must be provided within lobbies, as they are a component of the means of egress. Fire alarm system notification appliances (audio/visual alarms) should also be provided within lobbies. (Governor's Task Force on Campus Fire Safety requirement.)

4. Elevators

- a. Where elevators are required by code or requested by the campus, a minimum of two elevators should be provided. This allows for continued elevator service to students when an elevator must be taken out of service for maintenance or repair.
- b. When elevator service is provided in a residence hall, whether the elevator is required by code or not, upper floors of the building shall then be required to comply with accessibility requirements under the code.
- c. Consider locating elevators near stairs to encourage stair use. In addition to health benefits for occupants, this will minimize elevator energy use.
- d. Where elevators are provided, locate and size them to facilitate moving in and out of the residence hall by students.
- e. Smoke detection must be provided in all elevator lobbies. (Code requirement.)
- f. Elevator cab finishes should be of durable, vandal-resistant materials.
- g. Provide elevator sump pit drainage. Discharge from the sump pit shall be piped to indirect waste. Drainage pit should be sized accordingly.

5. Stairs and Ramps

- a. Flooring: Floor finishes should be durable, slip-resistant, easily cleaned materials. Recommended materials include linoleum, vinyl composition tile, rubber flooring and epoxy paint. Floor finishes may be omitted entirely if bare concrete or painted steel is acceptable to the campus.
- b. Walls: Wall construction and finishes should be of durable construction capable of resisting impact and gouging. Recommended materials include heavy gauge metal stud systems with impact resistant gypsum board or concrete masonry units, painted with semi-gloss or gloss paint systems.



- c. Stairs at grade levels will be subject to corrosion from water and salt tracked into the building by occupants and visitors, and should be constructed of easily maintained or replaced materials. Recommended stair components include rubber treads and painted steel components.
- d. Ramps are preferable to stairs for small changes in elevation.
- e. Railing systems at stairs and ramps will experience heavy use and should be constructed of heavy-duty materials and systems.
- f. Raised or sunken floor areas should be avoided as they make providing accessibility to the disabled more difficult.
- g. Provide emergency lighting. (Code requirement.)
- h. Vandal proof light fixtures are preferred by some campuses.
- i. 120-volt receptacles are typically provided at each stair landing for cleaning equipment.
- j. Fire alarm system notification appliances (audio/visual alarms) should be provided within stairs. Manual pull stations must be provided within 5 ft. of all stair doors. Smoke detection must be provided. (Governor's Task Force on Campus Fire Safety requirement.)

OCCUPIED AND HABITABLE AREAS - Public Areas (Continued)

6. Resident Director's Office

- a. Recommended finishes in the Resident Director's Office include all those appropriate for general office use.
- b. The Resident Director's Office should be located in close proximity to the main building entrance and entrance lobby.
- c. Electrical Devices Typically Provided:
 - i. Convenience Outlets
 - ii. Telephone Outlet
 - iii. Cable TV Outlet
 - iv. Data Outlet
 - v. Ceiling lights
 - vi. Wireless Technology: Consider provisions for wireless communication. Consult with the facility and service providers to determine requirements.
- d. Smoke detection must be provided in offices. (Code requirement.)

7. Lounges and Recreation Rooms

- a. Movable and folding partitions are recommended to provide flexibility and maximize use of lounge and recreation room spaces.
- b. If a shared building kitchen is provided, it should be located adjacent to a lounge or recreation room.
- c. Electrical Devices Typically Provided:
 - i. Convenience Outlets
 - ii. Ceiling Lights
 - iii. Telephone Outlets
 - iv. Cable TV Outlets
 - v. Power and Cable TV outlets for wall hung televisions.
 - vi. Data Outlets
 - vii. Wireless Technology: Consider provisions for wireless communication. Consult with the facility and service providers to determine requirements.
- d. Smoke detection must be provided within common use spaces such as lounges, recreation rooms, and study rooms. Fire alarm system notification appliances (typically only visual alarms unless audibility is an issue) must also be provided within these spaces. (Code requirement.)
- e. Secure storage should be provided adjacent lounges and recreation rooms for storage of recreation equipment. Check with campus for specific requirements.

8. Public Toilets

- a. Recommended finishes in public toilet rooms are as follows:
 - i. Flooring: Floor finishes should be durable, slip-resistant, easily cleaned materials that are resistant to water leakage. Recommended materials include ceramic, quarry and paver tile, with a minimum static coefficient of friction of 0.6 at level surfaces and 0.8 at sloped surfaces.
 - ii. Walls: Recommended materials include ceramic tile wainscot, glazed concrete masonry units, structural glazed facing tile and gypsum board painted with semi-gloss or gloss paint systems.
 - iii. Ceilings: Recommended materials include commercial grade suspended painted gypsum board systems or suspended acoustical ceiling systems.
- b. Public toilets should be located in proximity to the main building entrance and recreation/activity rooms.
- c. All public toilet facilities should be provided with exhaust ventilation. If direct make up air is not introduced into the space then door undercuts should be used to provide make up air to the room.
- d. Plumbing Fixtures:
 - i. Lavatory:
 1. The recommended material is vitreous china or integral bowls in solid plastic countertops.
 2. The recommended color is white.
 3. Oval is one of the most popular sizes and can be supplied by many manufacturers. Ensure that the drillings match the lavatory faucet.
 4. Selecting a lavatory bowl that is ADA compliant when set at the correct counter height offers the client an ADA compliant lavatory at no additional cost.
 5. It is recommended that a lavatory with a back-splash be selected where no countertops are provided.
 6. It is recommended that a shelf be provided over the lavatory where no countertops are provided.
 - ii. Lavatory Carrier:
 1. If wall hung lavatories are selected, floor mounted, concealed arm carriers bolted to the floor are recommended.
 2. Concealed arms should be steel, with fixture locking lugs, leveling screws and a means of attaching, positioning and securing the fixture to the carrier.

OCCUPIED AND HABITABLE AREAS - Public Areas (Continued)

- iii. Lavatory faucet and trim: Lavatory faucets are high use, high maintenance fixtures. The best quality is recommended.
 - 1. Lavatory faucets should be a solid, cast brass product.
 - 2. The faucet finish should be polished chrome.
 - 3. A single handle faucet is recommended. Single handle faucets, if selected properly, comply with the Americans with Disabilities Act (ADA) with no special handles required. One valve also reduces the amount of maintenance required.
 - 4. Ceramic cartridges for faucets are recommended.
 - 5. Grid strainers should be used unless a specific request is made for pop-up drains.
 - 6. Metering faucets are good water saving devices but they will require increased maintenance.
- iv. Water Closet
 - 1. Vitreous china is the recommended material of construction.
 - 2. The recommended color is white.
 - 3. A flush valve type water closet is recommended over tank type to reduce maintenance. Where appropriate, consider dual flush valves.
 - 4. Open front seats with stainless steel check hinges are recommended.
 - 5. Wall mounted, rear outlet water closets allow for cleaning under the bowl.
 - 6. Coordinate the diameter of the toilet tissue holder with the type of toilet tissue roll normally supplied by the campus.
- v. Water Closet Flush Valve: Along with the lavatory faucet, the water closet flush valve is a high use, high maintenance device. The best quality is recommended. In addition, ensure that there is adequate pressure to operate the flush valve. This can be a problem in high-rise buildings or in areas with average or low water pressure.
 - 1. Flush valves should be solid cast brass.
 - 2. Finish should be heavy chrome plating.
 - 3. Handles are recommended over pushbuttons. Electronic flush valves are also an option, however, these are not water saving devices, but are used to improve sanitation. The use of electronic flush should be reviewed with the campus.
 - 4. Handles should be ADA compliant. In accessible stalls, ensure that the handle is pointing in the proper direction for ADA compliance, towards the side of the water closet open to the stall. This is often missed in design and in the field.
- 5. Check with the campus to determine if parts are stocked for a particular flush valve model and manufacturer.
- 6. If considering electronic flush valves, make sure they are furnished with an override button. Also, battery operated units are simple to retrofit and allow flushing of the fixture even during loss of power.
- 7. If 120 volt electronic flush valves are provided, consider connecting the devices to standby power such that the devices will operate in the event of a power outage.
- vi. Floor drain:
 - 1. Floor drains are required in public toilet facilities. The floor drains serve two main functions: to handle the occasional overflow of a fixture and to facilitate floor washing. (Code requirement.)
 - 2. The floor should always be sloped toward the drain. If the floor is constructed with thin-set tile, then accommodations must be made to pitch the sub-floor toward the drain. Experience has shown that better results in attaining a positive pitch to the drain are achieved when the sub-floor is recessed and a mud-set tile system is used.
 - 3. Where waterproofing is required under the floor, it is recommended that the waterproofing be tied into the flashing collar of the floor drain.
 - 4. Floor drains with adjustable height strainer heads are recommended to compensate for potential variations in the finished floor.
 - 5. If it is anticipated that the trap may dry out, then a trap primer is recommended. Trap primers have minimum flow requirements and the device they are connected to must provide the minimum flow or the trap primer will not function.
- vii. Hose Bibbs: It should be verified with the campus whether hose bibbs are required in public toilets. If required, the hose bibbs should be the concealed type (or incorporated into a janitor's closet) with a brushed stainless steel finish.
- e. Fire alarm system notification appliances (typically only visual alarms unless audibility is an issue) must be provided within toilet rooms. Smoke detectors (or heat detectors if nuisance alarms from steam and/or condensation are likely) must also be provided. (Code requirement.)

OCCUPIED AND HABITABLE AREAS - Student Living Areas

9. Corridors

- a. Recommended finishes in corridors are as follows (the design consultant shall check code requirements for flamespread ratings):
 - i. Flooring: Floor finishes should be durable, slip-resistant, easily cleaned materials. Consideration should also be given to the selected flooring's sound absorbing characteristics. Recommended materials include linoleum, vinyl composition tile and rubber flooring. Carpeting has been used successfully, but requires more maintenance.
 - ii. Walls: Wall construction and finishes should be of durable construction capable of resisting impact and gouging. Recommended materials include heavy gauge metal stud systems (minimum thickness 22 gauge (.0283 inches, .72 mm) at maximum 16 inches on center, with double studs at door jambs) with impact resistant gypsum board or concrete masonry units, painted with semi-gloss or gloss paint systems. Hard wainscot systems, heavy-duty wall coverings and graffiti resistant coatings are recommended for areas that may be subject to impact or other types of abuse and vandalism.
 - iii. Ceilings: Recommended materials include commercial grade suspended acoustical ceiling systems, lay-in cementitious wood fiber acoustical panels, and painted gypsum board. The need for hold-down clips at specific locations and specific rooms should be evaluated where suspended acoustical systems are used. Access panels for maintenance of mechanical and electrical systems may be required where gypsum board or other hard ceiling types are used.
- b. Exit signs should be visible from all locations, including exit signs indicating exit directional change. Exit signs should not be located at ceilings with a ceiling height less than nine feet high as they are subject to vandalism. Where ceiling heights must be less than nine feet, wall mounted exit signs are recommended.
- c. Drinking Fountains:
 - i. Drinking fountains are required in all residence halls classified by the Building Code of New York State as R-2.
 - ii. Stainless steel (no. 4 brushed finish) is recommended for all surface finishes.
 - iii. If water coolers are provided, electric power is required in addition to water and waste piping.
 - iv. Placement of drinking fountains in an alcove is recommended.
 - v. Exact locations should be reviewed with campus staff.
- d. Mechanical Ventilation: Provide mechanical ventilation in accordance with the New York State Codes and good engineering practice.
- e. Heating/Cooling:
 - i. If a corridor has an exterior wall or roof exposed to the exterior, then heating should be considered in the corridor.
 - ii. If cooling is provided in the building, cooling for the corridor is optional.
 - iii. Heating and cooling units provided in the corridor should be of durable construction. Cover construction should be a minimum of 16-gauge sheet metal, with 14-gauge sheet metal preferred.
 - iv. Flush mounted or concealed mounted heating and cooling units should be considered to prevent damage from passing traffic.
- f. Electrical Devices Typically Provided:
 - i. 120 volt outlets located conveniently for cleaning equipment.
 - ii. Night lighting circuit: Provide control to meet campus requirements.
 - iii. Emergency lighting: (Code requirement.)
 - iv. LED exit lighting. (Code requirement.)
 - v. Vandal proof fixtures are preferred by some campuses.
- g. Smoke detection must be provided within corridors and hallways, as they are a component of the means of egress. (Governor's Task Force on Campus Fire Safety requirement.) Care should be taken in locating smoke detectors near bathrooms as nuisance alarms from steam and/or condensation are possible. Fire alarm system notification appliances (audio/visual alarms) must also be provided. (Code requirement.)
- h. Above-ceiling utilities and services: The space above corridor ceilings is commonly used to distribute utilities and services throughout the residence hall. If this approach is used, the design must provide adequate clearance above the finished ceiling to accommodate the required piping, conduit, ductwork and equipment. The most common problem seen is providing a very tight above-ceiling clearance that does not account for installation tolerances, insulation thickness on piping and ductwork, support structures, and future access for maintenance and/or upgrades.

OCCUPIED AND HABITABLE AREAS - Student Living Areas (Continued)

10. Student Living Rooms and Bedrooms

- a. Recommended finishes in student living rooms and bedrooms are as follows:
 - i. Flooring: Recommended materials include linoleum, vinyl composition tile and carpeting. Carpeting will require more maintenance.
 - ii. Walls: Wall construction should be durable. Recommended materials include painted gypsum board or concrete masonry units.
 - iii. Ceilings: Recommended materials include suspended painted gypsum board systems. Suspended acoustical ceiling systems (commercial grade) may be used, but these present a more institutional appearance and also provide potential space for hiding contraband materials. Consideration of suspended acoustical ceiling systems in student bedrooms should be reviewed with campus.
 - iv. Consideration should be given to providing systems for hanging items on walls of student living rooms and bedrooms. Check with campus for preferences.
- b. Minimum size for a single bedroom is 70 square feet under New York State Code, exclusive of built-in closets. Experience has shown that a minimum of 100 square feet is required to accommodate furniture typically provided by most SUNY campuses.
- c. Minimum size for a multiple bedroom is 50 square feet per person under New York State Code, exclusive of built-in closets. Experience has shown that a minimum of 180 square feet is required in double bedrooms to accommodate furniture typically provided by most SUNY campuses.
- d. Resident Advisor living and office space should be located so that the Resident Advisor may visually observe, from the corridor entrance to his or her unit/bedroom, other student units/bedrooms for which he/she is responsible.
- e. Mechanical Ventilation: In buildings that have air conditioning, it is recommended that mechanical ventilation be provided in addition to operable windows.
- f. Heating/Cooling: Significant consideration should be given to the heating system delivery unit. In heating only applications, fin tube radiation has served residence halls very well for many years. Many other systems are available for the application of heating and cooling in the room. When considering the type of delivery unit, the following issues should be taken into consideration:
 - i. Location of the delivery unit (under the window is recommended).
 - ii. Delivery unit service requirements
 1. Filters, belts, controls, drain pans, valves, balancing, etc.
 2. Accessibility for service.
 3. Physical access to controls and valves.
 4. Campus service staff access requirements to student rooms.
 - iii. Potential damage from occupants.
 - iv. Amount of floor “real estate” that the delivery unit consumes.
 - v. Type of controls available on the delivery unit and the campus requirements.
 - vi. Filter types.
 - vii. Location of windows.
 - viii. Removal of condensate is a concern when providing delivery units with cooling coils in the student rooms. Proper pitch and condensate removal is critical. Insulation of all cold surfaces is critical to reducing moisture. Failure to ensure proper pitch or improper insulation both have the potential to create a mold condition.
- g. Electrical Devices Typically Provided:
 - i. Lighting: Some campuses prefer overhead or wall mounted lighting and some prefer a switched outlet in lieu of fixed lighting.
 - ii. Convenience Outlets: Outlets located on walls such that no location on a wall is greater than six feet from an outlet - without crossing an opening.
 - iii. Arc Fault Circuit Interrupters: If an apartment is considered a dwelling unit as defined in the National Electrical Code, arc fault circuit interrupters are required for all bedroom electrical circuits by the NEC. (Code requirement.)
 - iv. Communications Equipment: Typically one box is provided per student, each with a telephone jack, data jack, and cable TV jack. The boxes are typically provided on opposite walls and located near the student’s desk. Typically a 4" box is provided with 3/4" conduit stubbed up above an accessible ceiling. Check with the campus for exact requirements.
 - v. Wireless Technology: Consider provisions for wireless communication. Consult with the facility and service providers to determine requirements.
- h. Smoke detection is required in bedrooms and living rooms, including suite or apartment common spaces. Smoke detection shall be system type devices connected

OCCUPIED AND HABITABLE AREAS - Student Living Areas (Continued)

to the building fire alarm system. Sounder base smoke detection is recommended. Single station smoke alarms are not acceptable. (Governor's Task Force on Campus Fire Safety requirement.) Care should be taken in locating smoke detectors near bathrooms as nuisance alarms from steam and/or condensation are possible. Fire alarm system notification appliances (typically only visual alarms unless audibility is an issue) should also be provided within living rooms, including suite or apartment common spaces. Visual alarms must also be provided within designated hearing impaired and handicapped accessible bedrooms. Capability shall be provided to support visual alarms in all dwelling units. (Code requirement.)

11. Toilet Rooms and Bathrooms

- a. Recommended finishes in student toilet rooms and bathrooms are as follows:
 - i. Flooring: Floor finishes should be durable, slip-resistant, easily cleaned materials that are resistant to water leakage. Recommended materials include ceramic tile, with waterproof sheet membrane underlayment at shower areas, pitched to floor drains, and a minimum static coefficient of friction of 0.6 at level surfaces and 0.8 at sloped surfaces. Sheet membrane underlayments are recommended over liquid-applied membrane underlayments as they are easier to flash into drain structures and provide a reliably consistent membrane thickness that is not dependent on installer skill.
 - ii. Walls: Recommended materials include glazed concrete masonry units, structural glazed facing tile and ceramic tile wainscot, with full height tile or solid surface material at shower areas.
 - iii. Ceilings: Recommended materials include suspended fiberglass reinforced plastic grid ceiling systems, with fiberglass faced gypsum board lay-in panels. Suspended painted gypsum board systems may be used successfully, but will require access panels. Check with the campus for preferences and other materials and systems that may have a record of successful performance at that campus.
- b. Community bathrooms should be designed to accommodate simultaneous use by more than one student and to provide privacy at individual fixtures.
- c. Mechanical Ventilation: All toilet facilities should be provided with exhaust ventilation. If direct make up air is not introduced into the space, then door undercuts should be used to provide make up air to the room.



Ceiling and wall registers should be aluminum construction in the shower area to reduce the potential for corrosion. High free area ratio registers are recommended. Consider multiple registers in shower areas to effectively capture escaping water vapor.

- d. Heating: Heating is only required if the space is on an outside wall or located just below the roof level. If heating is provided then care must be taken to locate heating delivery units away from water and water spray. Consider recessed or concealed units, constructed of materials that resist corrosion.
- e. Plumbing fixtures: See Public Toilets for floor drains, lavatories, water closets, and associated trim.
- f. Showers: Showers can be constructed in various different configurations with different materials of construction. Some of the most common types of shower construction are one-piece solid acrylic units, terrazzo bases with solid surface or tile walls, and all tile shower floor and walls. Check with the campus for preferences and review existing campus cleaning protocols that may impact shower material selection.
 - i. Solid acrylic tub/shower units should follow the guidelines listed below:
 1. Minimum of one-eighth inch vacuum formed solid acrylic sheet formed to multiple layers of fiberglass.
 2. A solid support base in the standing area. This will prevent flex failures and failures at the drain connection due to movement.
 3. One-piece shower units are large units and typically DO NOT fit through 36-inch doors. They should be used with care in renovation projects. On new construction projects they should arrive prior to walls and door frames being installed.

OCCUPIED AND HABITABLE AREAS - Student Living Areas (Continued)

4. The designer of record should review shower drains. Heavy commercial shower drains are not generally available in these types of shower units. This should be reviewed with the campus.
- ii. Terrazzo bases should have the following features:
 1. Constructed from 3,000 PSI concrete with marble chips, ground and polished. Note that there are limited color selections.
 2. The connection for the drain pipe should be cast into the shower base.
 3. Strainer should attach to the base.
 4. The base should have an integral tiling flange made from either galvanized or stainless material.
 5. These bases can be extremely heavy. A typical 36-inch square shower base can weigh approximately 250 pounds. These can be difficult to handle, especially in renovation projects.
 6. Terrazzo bases are available in custom sizes at a minimum cost if ordered in a reasonable quantity.
 7. Terrazzo bases must be sealed in the field prior to use. Resealing of the base every year will prolong the base life.
 8. Install terrazzo bases in mud-set or thin-set, as required by the manufacturer. Coordinate all slab recess requirements with the overall design and with existing conditions in rehabilitation projects.
- iii. Tile shower bases should have the following features:
 1. Tile should have with a minimum static coefficient of friction of 0.6 at level surfaces and 0.8 at sloped surfaces.
 2. Epoxy grout is recommended.
 3. Waterproofing membrane is required under the tile and mortar setting bed. Sheet membrane is recommended. The sheet membrane must continue up the wall for a minimum dimension of 12 inches.
 4. The shower drain body should have a clamping collar to secure the waterproofing membrane.
- iv. It is recommended that private dressing areas be provided at each shower in all shower rooms designed for use by more than one student at a time.
- g. Shower Mixing Valve: Like the lavatory faucet and water closet flush valve, the shower-mixing valve is a high use, high maintenance item. Shower mixing valves should be the manufacturer's best quality valve.
 - i. Mixing valves are required by Code to be a pressure balance type mixing valve, thermostatic or combination pressure balance/thermostatic type valves.
 - ii. Valves should be provided with integral screwdriver stop/checks.
 - iii. Valves can be provided with a high limit stop.
 - iv. The handle and escutcheon plate should be of substantial construction.
 - v. Valves should be field adjusted once installed.
- h. Shower Head: Consider using shower head shut off valves to provide water savings opportunities.
- i. Floor drain:
 - i. Floor drains are highly recommended in shower facilities. The floor drains in bathrooms serve three functions: 1) to handle the occasional overflow of a fixture; 2) to capture fugitive water from showers; and 3) to facilitate floor washing.
 - ii. If an accessible shower is provided in the shower room, a floor drain in front of the shower is essential.
 - iii. See floor drain requirements in section on Public Toilets.
- j. Electrical Outlets: Locate GFI receptacles adjacent to sinks, such that one outlet is adjacent to each sink. Coordinate with the architectural plans to insure that outlets are not installed in mirrors. Show the outlets on the architectural elevations.
- k. Lighting:
 - i. Provide ample lighting for shower stalls and mirrors.
 - ii. Automatic Lighting Control: Provide lighting control where required by the campus and/or the code.
- l. Fire alarm system notification appliances (typically only visual alarms unless audibility is an issue) must also be provided within all community bathrooms. Visual alarms must be provided in all bathrooms in designated hearing impaired and handicapped accessible



OCCUPIED AND HABITABLE AREAS - Student Living Areas (Continued)



apartments and suites. Smoke detectors (or heat detectors if nuisance alarms from steam and/or condensation are likely) must also be provided. (Code requirement.)

12. Study Lounges

- a. Recommended finishes at Study Lounges are identical to those recommended for Student Living Rooms and Bedrooms.
- b. Where a suite or apartment-type living arrangement is not provided, study lounges are recommended for each floor and wing of the residence hall.
- c. Electrical Devices Typically Provided:
 - i. Convenience Outlets
 - ii. Ceiling Lights
 - iii. Telephone Outlets
 - iv. Cable TV Outlets
 - v. Data Outlets
 - vi. Wireless Technology: Consider provisions for wireless communication. Consult with the facility and service providers to determine requirements.
- d. Smoke detection must be provided within common use spaces such as lounges, recreation rooms, and study rooms. Fire alarm system notification appliances (typically only visual alarms unless audibility is an issue) should also be provided within these spaces. (Code requirement.)

13. Resident Director's Apartment

- a. The Resident Director's Apartment should have its own separate entrance.
- b. Utilities for the Resident Director's Apartment should be separately metered and controlled from utilities in the remainder of the building to permit occupancy when the remainder of the building is unoccupied.
- c. Electrical Metering: The New York State Energy Code requires provision for electrical metering of dwelling units.
- d. Smoke detection is required within all rooms in the Resident Director apartment, including bedrooms and living rooms. Smoke detection shall be system type devices connected to the building fire alarm system. Sounder base smoke detection is recommended. Single station smoke alarms are not acceptable. Smoke detectors (or heat detectors if nuisance alarms are likely) must be provided in bathrooms. (Governor's Task Force on Campus Fire Safety requirement.) Fire alarm system notification appliances (typically only visual alarms unless audibility is an issue) should also be provided within living rooms. Visual alarms must also be provided within bedrooms and bathrooms if designated as hearing impaired and handicapped accessible. (Code requirement.)
- e. The location of the Resident Director's apartment should be discussed with the campus. Some campuses may prefer it be located near the building main entrance/lobby, while others may prefer a more remote location.
- f. Check with the campus for other specific requirements for the Resident Director's apartment. For example, it may be desirable for the Resident Director apartment to have its own washer and dryer.

SERVICE AND UTILITY AREAS

14. Vending Machine Room

- a. If vending machines contain condensate drains, a floor drain should be provided at a minimum. A concealed method of removing condensate is recommended.
- b. Heat build up from coolers (such as soda, juice and cold snack vending machines) should be addressed. Increased ventilation or air conditioning should be considered. Other heat rejection schemes can also suffice.
- c. Smoke detection should be provided within vending machine rooms. (Code requirement.)
- d. Signal wiring: Consideration should be given to providing data outlets for vending machines to permit the use of student swipe cards.
- e. Consider providing an energy management system for the refrigerated vending machines to conserve energy.

15. Storage Rooms

- a. Wall construction should be of durable construction capable of resisting impact and gouging. Recommended materials include heavy gauge metal stud systems with impact resistant gypsum board or concrete masonry units.
- b. Finishes: Finishes are optional in most storage rooms. Where finishes are provided, the selection should be based on the materials stored and campus preference.
 - i. Where large or bulky materials (such as furniture) are stored, durable finish materials resistant to impact should be provided.
 - ii. Where liquids are stored, finishes should be water-resistant.
- c. Heating: Storage rooms should have enough heating to prevent freezing of stored materials as well as any piping that passes through the room.
- d. Ventilation: Materials being stored in the storage spaces dictate ventilation requirements.
- e. Smoke detection should be provided within storage rooms. (Code requirement.)
- f. Space should be provided for storage of recyclables. Check with the campus for specific requirements and locations to coordinate with campus recycling protocols.

16. Laundry Room

- a. Floor finishes should be durable, slip-resistant, easily cleaned materials that are resistant to water leakage. Recommended materials include ceramic tile, quarry tile and seamless vinyl flooring, pitched to floor drains. Tile should have a minimum static coefficient of friction of 0.6 at level surfaces and 0.8 at sloped surfaces.
- b. Laundry rooms should be located so that they are visible from well-frequented areas of the building in order to provide personal security for students using the laundry room. Check with the campus for preferred laundry room locations and whether a centralized or decentralized approach is preferred.
- c. Washing machine hook ups: Provide washing machine hook ups for all washers. Ensure that each washing machine has a hot and cold shut off valve and waste piping at each machine. If the room is a finished space, consider enclosing piping in the wall construction and utilizing commercial washing machine valve boxes.
- d. Floor drain:
 - i. Floor drains are required in laundry facilities. (Code requirement.) The floor drains serve two functions: 1) to handle the occasional overflow of a fixture; and 2) to facilitate floor washing.
 - ii. See floor drain requirements in section on Public Toilets.
- e. Utility sinks: Laundry rooms should have a utility sink. Utility sinks should be located to avoid conflicts with access/exit paths and door swings for laundry equipment. Commercial grade faucets are recommended. Cast iron or stainless are preferred materials for utility sinks.
- f. Ventilation:
 - i. General ventilation:
 1. Laundry rooms should be provided with dedicated general ventilation, coordinated with the clothes dryer exhaust.
 - ii. Clothes dryer exhaust:
 1. Clothes dryer exhaust should be installed in accordance with the clothes dryer manufacturer's installation instructions as well as the Mechanical Code of New York State. The Mechanical Code has specific requirements for dryer exhaust, which include prohibiting sheet metal screws in the duct installation and requiring make up air to the space. For multiple dryer

SERVICE AND UTILITY AREAS (Continued)

installation ensure the manufacturer's requirements for make-up ventilation are reviewed to ensure proper operation of dryers when one or more dryers are in operation.

2. Ganging more than one dryer into an exhaust duct requires specific engineering to ensure that the lint particles are carried to the exterior of the building. It is recommended that exhaust for each dryer be run independently to the building exterior.
- g. Electrical Panel: Consider installing a panelboard in the laundry room to serve washers and dryers.
- h. Smoke detection (or heat detection if nuisance alarms are likely) must be provided within laundry rooms. Fire alarm system notification appliances must also be provided. (Code requirement.)
- i. Signal wiring: Consideration should be given to providing data outlets for washers and dryers to permit the use of student swipe cards.

17. Janitor's Closet

- a. Floor finishes should be durable, slip-resistant, easily cleaned materials that are resistant to water leakage. Recommended materials include ceramic tile, quarry tile and bare or epoxy coated concrete, pitched to floor drains. Tile should have a minimum static coefficient of friction of 0.6 at level surfaces and 0.8 at sloped surfaces.
- b. Utility sink: Janitor's closets should have a utility sink installed. The utility sink can be either a floor sink or a wall mounted sink, depending on campus requirements, but should be low to accommodate buckets. They should be of substantial construction, either terrazzo or cast iron. Provide commercial grade utility faucet. Faucet should have a bucket hook, hose threads and a vacuum breaker. If the faucet is wall mounted, substantial wall blocking is required for support of the faucet and the piping should be well braced to support a full bucket. Wall finishes adjacent the utility sink should be of durable, water-resistant materials, such as ceramic tile or solid plastic panels.
- c. Floor drain:
 - i. Floor drains are recommended in janitor's closets, depending on the size of the space. The floor drains serve two main functions: 1) to handle the occasional overflow of a fixture; and 2) to facilitate floor washing.
 - ii. The floor should always be sloped toward the drains.

- iii. For finished floors, waterproofing tied into the flashing collars of the floor drains is recommended.
- iv. Floor drains with adjustable height strainer heads are recommended to compensate for potential variations in the finished floor.
- v. If it is anticipated that that the trap may dry out, then a trap primer is recommended.

- d. Ventilation: Janitor's closets should be provided with dedicated mechanical ventilation.
- e. Smoke detection (or heat detection if nuisance alarms are likely) must be provided within janitor's closets. (Code requirement.)
- f. Janitor's closets should be located in close proximity to bath, toilet or shower rooms.

18. Elevator Machine Rooms

- a. Ventilation: Elevator machine rooms should be provided with natural or mechanical ventilation and possibly air conditioning. Ventilation shall comply with both ASME A17.1 and the elevator manufacturer's installation instructions for ambient temperature in the space.
- b. Smoke detection must be provided in elevator machine rooms. Heat detection to initiate operation of elevator power shut down must also be provided within sprinklered elevator machine rooms within 2 ft. of each sprinkler. (Code requirement.)
- c. Elevator machine rooms shall be enclosed by the same level of fire rated construction as required for the elevator shaft(s). (Code requirement.) This code requirement is often missed.
- d. No piping, conduit or equipment serving systems that are unrelated to the elevator(s) may be contained in or pass through the elevator machine room. (Code requirement.) This code requirement is often missed.



SERVICE AND UTILITY AREAS (Continued)

19. Mechanical Equipment Room

- a. Wall construction and finishes should be of durable construction capable of resisting impact and gouging. Recommended materials include heavy gauge metal stud systems with impact resistant gypsum board or concrete masonry units, painted with semi-gloss or gloss paint systems.
- b. Soundproof construction or other soundproofing methods are recommended for mechanical equipment rooms that are adjacent, above or below student living spaces. Consideration should be given to providing thermal insulation at mechanical equipment rooms containing heat generating equipment that are adjacent, above or below student living spaces.
- c. Ventilation: Mechanical equipment rooms should have ventilation provided in accordance with the Mechanical Code, Fuel Gas Code if there are gas combustion appliances, equipment manufacturer's installation requirements, and good engineering practice.
- d. Floor drains:
 - i. Mechanical equipment rooms should have floor drains. Floor drains are required in boiler rooms. (Code requirement.) Floor drains serve two functions: 1) to handle the occasional overflow; and 2) to accommodate equipment water discharge, whether it is planned or unplanned.
 - ii. Floor drains should be located near equipment that will discharge water to the space. Floor drains must have adequate capacity for peak demand of equipment discharge.
 - iii. If a reduced pressure zone (RPZ) backflow prevention device is present, size the drain for catastrophic failure of the RPZ.
 - iv. The floor should pitch toward the floor drain.
 - v. See floor drain requirements in section on Public Toilets.
- e. Equipment access:
 - i. Design drawings should show all equipment coil and filter pull areas. Adequate access needs to be provided for equipment service.
 - ii. Replacement equipment will have to be brought into the space at some point in the life of the building. Suitable access for this equipment should be considered.
 - iii. If equipment is being placed in an attic area, then the designer should review the headroom and actual access that will be available for equipment service.



Drawing sections through equipment installed in attics should be provided in the contract documents to ensure adequate space.

- f. Smoke detection (or heat detection if nuisance alarms are likely) must be provided within mechanical equipment rooms. Fire alarm system notification appliances should also be provided. (Code requirement.)

20. Transformer or Electric Service Room

- a. Ventilation: Ventilation to transformer and electrical service rooms is required.
- b. Transformer Location: Some facilities prefer indoor transformers over outdoor transformers. Check with the facility to determine the preferred transformer location.
- c. Equipment:
 - i. Most facilities prefer dry type transformers.
 - ii. Primary Switching: If primary switching is located indoors, use UL Listed Metal Enclosed Switchgear.
- d. Smoke detection must be provided within all electric rooms. Fire alarm system notification appliances should also be provided. (Code requirement.)

21. Communications Service and Equipment Room

- a. Terminate services for Telephone, Data, and Cable TV services in a dedicated room.
- b. Coordinate with the facility and service providers to determine space requirements.
- c. Design the space(s) in accordance with EIA/TIA 569A.
- d. Smoke detection must be provided in all communications rooms. (Code requirement.)

GENERAL REMARKS ON PLANNING, DESIGN, AND EQUIPMENT

22. *General Requirements for Accessibility*

- a. General comments: The sections below provide an outline of major requirements for accessibility contained in the Building Code of New York State (BCNYS) and Existing Building Code of New York State (EBCNYS) for residence halls. These sections are not all-inclusive and do not list all detailed requirements that may apply to a specific project. It should also be noted that the code contains many exemptions to specific requirements, and these must be evaluated on a project-specific basis.
- b. Construction of New Residence Halls: Per the BCNYS, all dwelling units (apartments) and sleeping units (suites and individual bedrooms) on levels served by an elevator or an accessible building entrance are required to be Type B units, as defined by the code and ICC/ANSI A117.1–03. There are a limited number of exceptions to this requirement for sites with steep slopes. Additionally, a certain number of the units are required by the code to be fully accessible.
- c. Rehabilitation of Existing Residence Halls: When existing residence halls are rehabilitated, the level of rehabilitation defined by the EBCNYS will determine the level of accessibility required.
 - i. Repair (defined as the patching or restoration of materials, elements, equipment and/or fixtures): When rehabilitation is classified as a repair, the only requirement is that the work shall not make the building less accessible than it was before the repair work.
 - ii. Alteration-Level 1 (defined as the removal, replacement, or covering of materials, elements, equipment and/or fixtures): When rehabilitation is classified as an Alteration-Level 1, the building, element, or component altered shall be required to meet accessibility requirements in Chapter 5 of the EBCNYS and Chapter 11 of the BCNYS, unless technically infeasible. Where compliance is technically infeasible, the alteration shall provide accessibility to the maximum extent feasible. There are a limited number of exceptions to this requirement, and exceptions to accessibility requirements found in Chapter 11 of the BCNYS would also apply. If an area containing a primary function is altered, an accessible route shall be provided, and toilet rooms and drinking fountains serving that area shall be made accessible, up to twenty percent of the cost of alterations.
 - iii. Alteration-Level 2 (defined as the reconfiguration of space, addition or elimination of doors and/or win-

- dows, reconfiguration or extension of a system, or the installation of additional equipment): When rehabilitation is classified as an Alteration-Level 2, requirements for accessibility are essentially the same as for work classified as Alteration-Level 1.
- iv. Alteration-Level 3 (defined where the work area exceeds 50% of the aggregate area of the building): When rehabilitation is classified as an Alteration-Level 3, requirements for accessibility are essentially the same as for work classified as Alteration-Level 1.
- v. Change of Occupancy: When a building or portion thereof undergoes a change in occupancy, the following features of the building must be made accessible: at least one entrance, at least one route to primary function areas, signage, parking, and toilet rooms serving primary function areas. There are some exceptions for technical infeasibility.
- vi. Additions: Where an addition is constructed to an existing building, the addition shall comply with accessibility requirements as if a new building. Also, the addition shall not make the existing building less accessible than it was before the addition was constructed. Other related work in the existing building shall meet the requirements for repair or alteration work, as noted above, and the requirements for primary function areas found under the Alteration-Level 1 category shall apply to the existing building.

23. *General Requirements for Sustainable Design*

- a. General comments: The Dormitory Authority is committed to being a leader in promoting sustainable design in the projects it designs, constructs and manages for its clients and to achieving the goal of LEED Silver certification for all of its projects. Many of the Dormitory Authority's clients are mandated by law or



GENERAL REMARKS ON PLANNING, DESIGN, AND EQUIPMENT (Continued)

Executive Order to provide elements of sustainable design in their projects. Contrary to popular belief, sustainable design features do not always increase the project first cost and, when they do, provide other benefits after construction such as decreased energy consumption, decreased maintenance and operating costs, and increased health of occupants.

- b. Life Cycle Analysis: When developing the sustainable design approach for any individual project, it is recommended that life cycle costs and impacts be considered in final decisions regarding material and system selection. Durable, long-lasting, and non-toxic materials and systems may have a higher first cost, but generally cost less over the life of the building and also require less frequent replacement, cause less air quality issues, minimize construction waste and consume fewer natural resources for new materials and systems. The life cycle analysis should include the cost, health, and environmental impact of routine maintenance, as well as the final disposition of products at the end of their useful lifespan.
- c. Executive Order 111: The State University of New York is mandated by Executive Order 111 to provide specific levels of sustainable design features in its projects, as follows:
 - i. Construction of New Residence Halls: Residence halls of 20,000 gross square feet or larger must 1) achieve at least a twenty percent improvement in energy efficiency performance over that required by the New York State Energy Conservation and Construction Code (NYSECCC), 2) meet the criteria for a U.S. Green Building Council Leadership in Energy and Environmental Design (USGBC LEED®) rating at a minimum certified level, and 3) comply with the New York State Green Building Tax Credit in regards to indoor air quality testing, indoor air quality management plan during construction, operations and maintenance management plan, and commissioning. For new residence halls of less than 20,000 square feet, significant attributes of green design must be incorporated.
 - ii. Reconstruction of Existing Residence Halls: A reconstruction project is defined as a building area undergoing a renovation where four or more primary building systems are undergoing at least a fifty percent replacement within a twelve month period, and the building area is unoccupied for thirty days or more. Projects over 20,000 square feet that meet these criteria must 1) achieve at least a ten percent improvement in energy efficiency performance over that required by the NYSECCC, 2) use best efforts to insure that the project incorporates the criteria for a USGBC LEED® Existing Building (EB) rating or LEED® New Construction (NC) rating, and 3) comply, where practical, with the New York State Green Building Tax Credit in regards to indoor air quality testing, indoor air quality management plan during construction, operations and maintenance management plan, and commissioning. For reconstruction projects of less than 20,000 square feet, significant attributes of green design shall be incorporated.
 - iii. Substantial Renovation and Alteration of Existing Residence Halls: A substantial renovation or alteration is defined as the replacement of more than fifty percent of any building subsystem within any consecutive twelve-month period. Substantial renovations and alterations must 1) achieve at least a ten percent improvement in energy efficiency performance over that required by the NYSECCC for subsystems undergoing the substantial renovation or alteration, and 2) comply with all applicable requirements for new construction. For substantial renovation and alteration projects of less than 20,000 square feet, significant attributes of green design concepts shall be incorporated as appropriate.
- d. Sustainable Design Principles: There are many ways to incorporate sustainable (or “green”) design features into residence hall projects. General strategies include utilizing environmentally responsible site development, minimizing water use, minimizing energy consumption (specifically fossil fuel and electrical power consumption), utilizing recycled, recyclable and environmentally sustainable materials, reusing existing materials and/or buildings, and providing improved air quality and comfort for building occupants. The Dormitory Authority encourages its clients and design consultants to explore all options to ensure the best outcome for each project and supports innovative design solutions. Specific strategies that have been successfully used on previous residence hall construction include:
 - i. Highly energy-efficient heating and cooling systems.
 - ii. Building management systems to provide increased controllability of building systems.
 - iii. High performance glazing systems that minimize heat gain/loss.

GENERAL REMARKS ON PLANNING, DESIGN, AND EQUIPMENT (Continued)

- iv. Daylighting principles to maximize light for occupants while minimizing energy consumption for artificial lighting.
 - v. Energy-efficient fixtures, devices, appliances, and equipment.
 - vi. Light-colored roofing systems to minimize heat gain during the cooling season.
 - vii. Indigenous vegetation to minimize water use and provide building shading during the cooling season.
 - viii. Locally produced materials.
 - ix. Recycled materials.
 - x. Locating residence halls on bus routes to minimize parking and vehicle use by students.
 - xi. Use of non-toxic materials.
- e. UB High Performance Guidelines: The State University of New York University at Buffalo, the Dormitory Authority, the State University Construction Fund (SUCF), and the New York State Energy Research and Development Authority (NYSERDA) participated in the development of a comprehensive set of guidelines for compliance with Executive Order 111 and producing the next generation of high performance buildings. These guidelines can be viewed at <http://wings.buffalo.edu/ubgreen/guidelines.html>.
- f. Energystar™ Appliances: Energystar™ appliances are required by Executive Order 111 for New York State universities and colleges, however, it is recommended that Energystar™ appliances be provided wherever possible and available to maximize energy savings and minimize energy costs.
- 24. General Requirements for Quality, Quality Control and Quality Assurance**
- a. General comments:
- i. Quality is the meeting of the stated need. In the case of a residence hall project, or any construction project, that would mean meeting the owner's requirements as defined by the drawings and specifications. Quality Control is the system which ensures that products or services are designed and produced to meet or exceed customer requirements and expectations. Quality Assurance is the planned activities necessary to provide a high degree of confidence in the quality of a product or service. Quality Assurance provides quality assessment of the quality control program. Some of the quality tools available to owners and designers are contracts, campus standards, design guidelines or requirements, and metrics. Metrics should be identified prior to project commencement and should be specific and measurable.
 - ii. The selection of the most appropriate materials and systems to meet program requirements is an important cornerstone for achieving a quality project. Equally important in achieving a quality project, however, is ensuring that those materials and systems are properly installed. Two key tools for ensuring proper installation are mock-ups and testing. Required/recommended mock-up and testing requirements for residence hall projects are outlined below.
- b. Recommended Mock-ups:
- i. A full, typical student bedroom, including all interior finishes, trim, furnishings, windows, doors, heating delivery units, and other equipment found in the room. Heating delivery units and other equipment need not be fully functional, but should include all parts that will be physically located in the finished bedroom. The color scheme should be an actual color scheme to be used in the finished project. It is recommended that the mock-up bedroom be an actual bedroom to be constructed or rehabilitated. Once approved, the mock-up bedroom should be maintained for use in confirming the acceptability of the remainder of the bedrooms in the project.
 - ii. A full, typical student bathroom, including all interior finishes, trim, accessories, fixtures, windows, and doors found in the room. Fixtures need not be functional, but should include all parts that will be physically located in the finished bathroom. The color scheme should be an actual color scheme to be used in the finished project. It is recommended that the mock-up bathroom be an actual bathroom to be constructed or rehabilitated. Once approved, the mock-up bathroom should be maintained for use in confirming the acceptability of the remainder of the bathrooms in the project.
 - iii. Where apartments are to be constructed, a full, typical student kitchen, including all interior finishes, trim, accessories, fixtures, appliances, cabinets, countertops, windows, and doors found in the room. Fixtures and appliances need not be functional, but should include all parts that will be physically located in the finished kitchen. The color scheme should be an actual color scheme to be used in the finished project. It is recommended that the mock-up kitchen be an actual kitchen to be constructed or rehabilitated. Once approved, the mock-up kitchen should be maintained for use in confirming the acceptability of the remainder of the kitchens in the project.

GENERAL REMARKS ON PLANNING, DESIGN, AND EQUIPMENT (Continued)

- iv. A complete installation for one of each type of fire, smoke, or fire/smoke damper to be used in the project. The mock-up(s) shall include all associated support, framing, trim, joint fillers, and sealants required. It is recommended that the mock-up(s) be an actual damper(s) required in the project. Once approved, the mock-up(s) should be maintained for use in confirming the acceptability of the remainder of the dampers in the project.
 - v. A typical window of each type to be used in the project. The mock-up(s) shall include all associated lintels, sills, mullions, support, framing, trim, joint fillers, sealants, and glazing required. It is recommended that the mock-up(s) be an actual window(s) required in the project. Once approved, the mock-up(s) should be maintained for use in confirming the acceptability of the remainder of the windows in the project.
 - vi. A typical portion of exterior masonry wall. The mock-up shall include all masonry types required, in the actual color scheme to be used for the finished project, as well as associated lintels, sills, supports, joint fillers, sealants, and flashing required. It is recommended that the mock-up be an actual section of wall required in the project. Once approved, the mock-up should be maintained for use in confirming the acceptability of the remainder of the exterior masonry wall in the project.
 - vii. Firestopping: Complete mock-up installations for each type of firestop system required for the project to verify selections made and to establish the standard of quality and performance by which the firestopping work will be judged. Obtain acceptance of mock-up installations before the start of firestopping installation.
- c. Required/Recommended Testing:
- i. The Building Code of New York State requires significant testing of many materials and systems commonly used in building projects. The design consultant must evaluate testing requirements found in the code against the project scope, provide a listing of code-required testing, and incorporate the same into the design documents for each residence



- ii. Additional typical testing required/recommended for residence hall projects includes testing of windows, waterproofing, fire alarm systems, sprinkler systems, mechanical systems, plumbing systems, and generators. The design consultant must evaluate the materials and systems included in the project scope to determine if additional materials or systems require testing. See Table B below and the sections that follow covering specific systems for further requirements regarding individual systems.
- iii. Commissioning: Specific building systems are required to be commissioned under Executive Order 111, however, it should be noted that any building system can be commissioned. The design consultant should evaluate additional systems other than those identified in conjunction with Executive Order 111 that could benefit from being commissioned and advise the campus and the Dormitory Authority of their findings.
- iv. See Tables A and B below for detailed listings of testing requirements typical for projects managed and constructed by the Dormitory Authority. See the Building Code of New York State for the definitions of all acronyms and abbreviations.

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TABLE A INSPECTION AND TESTING Continuous and Periodic is as Defined by the BCNYS	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE
<i>A. Steel Construction</i>				
1. Material verification of high-strength bolts, nuts, and washers.		X	Applicable ASTM material specifications. AISC ASD, Section A3.4; AISC LRFD, Section A3.3	1704.3
2. Inspection of high-strength bolting.	X	X	AISC LRFD, Section M2.5	1704.3, 1704.3.3
3. Material verification of structural steel.			ASTM A 6 or A 568	1704.3, 1708.4
4. Material verification of weld filler materials.			AISC, ASD, Section A3.6; AISC LRFD, Section A3.5	1704.3
5. Inspection of welding:			AWS D1.1, D1.3, D1.4; ACI 318: 3.5.2	1704.3, 1704.3.1 1903.5.2
a. Structural steel	X	X		
b. Reinforcing steel	X	X		
6. Inspection of steel frame joint details.		X		1704.3, 1704.3.2

TABLE A (CONTINUED) INSPECTION AND TESTING Continuous and Periodic is as Defined by the BCNYS	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE
<i>B. Concrete Construction</i>				
1. Inspection of reinforcing steel, including prestressing tendons, and placement.		X	ACI 318: 3.5, 7.1-7.7	1704.4, 1903.5, 1907.1, 7 1914.4
2. Inspection of reinforcing steel welding.			AWS D1.4; ACI 318: 3.5.2	1704.4, 1903.5.2
3. Inspection of bolts to be installed in concrete prior to and during placement.	X			1704.4, 1912.5
4. Verify use of required design mix.		X	ACI 318: Ch. 4, 5.2-5.4	1704.4, 1904, 1905.2-4 1914.2, 3
5. Sampling fresh concrete: slump, air content, temperature, and strength test specimens.	X		ASTM C 172, C 31; ACI 318: 5.6, 5.8	1704.4, 1905.6, 1914.10
6. Inspection of placement for proper application techniques.	X		ACI, 318: 5.9, 5.10	1704.4, 1905.9, 10 1914.6-8
7. Inspection for maintenance of specified curing temperature and techniques.		X	ACI, 318: 5.11, 5.13	1704.4, 1905.11, 13 1914.9
8. Inspection of prestressed concrete.	X		ACI 318: 18.18, 18.16.4	1704.4
9. Erection of precast concrete members.		X	ACI 318: Ch. 16	1704.4
10. Verification of in-situ concrete strength prior to stressing of tendons and prior to removal of shores and forms from beams and slabs.		X	ACI 318: 6.2	1704.4, 1906.2

TABLE A (CONTINUED) INSPECTION AND TESTING Continuous and Periodic is as Defined by the BCNYS	CONTINUOUS	PERIODIC	REFERENCE STANDARD		BCNYS REFERENCE																																		
<i>C. Masonry Construction</i>					L1 = Level 1 Inspection required for nonessential facilities. L2 = Level 2 Inspection required for essential facilities See 1704.5 for clarification			ACI 530 ASCE 5 TMS 402, Ch. 35	ACI 530.1 ASCE 6 TMS 602, Ch. 35	1. Verify to ensure compliance:																													
a. Proportions of site prepared mortar and grout		X L1, L2		2.6A	b. Placement of masonry units and construction of mortar joints.		X L1 L2		3.3B	c. Location and placement of reinforcement, connectors, tendons, anchorages.		X L1 L2		3.4, 3.6A	d. Prestressing technique and installation.		X L1 L2		3.6A 3.6B	e. Grade and size of tendons and anchorages.		X L1		2.4B 2.4H	f. Grout specs prior to grouting.	X L2			3.2D	g. Placement of grout.	X L2			3.5	h. Grouting of tendons.	X L2			3.6C
2. Inspection shall verify:					a. Size and location of structural elements.		X L1, L2		3.3G	b. Type, size, and location of anchors.	X L2	X L1	1.2.2(e) 2.1.4, 3.1.6	1704.5																									

TABLE A (CONTINUED) INSPECTION AND TESTING Continuous and Periodic is as Defined by the BCNYS	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE
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L1 = Level 1 Inspection required for nonessential facilities. L2 = Level 2 Inspection required for essential facilities See 1704.5 for clarification			ACI 530 ASCE 5 TMS 402, Ch. 35	ACI 530.1 ASCE 6 TMS 602, Ch. 35	
c. Specified size, grade, and type of reinforcement.		X L1 L2	1.12	2.4, 3.4	1704.5
d. Welding of reinforcing bars.	X L1 L2		2.1.10.6.2 3.2.3.4 (b)		1704.5 2108.9.2.11
e. Cold/hot weather protection of masonry construction.		X L1 L2		1.8 C, D	1704.5 2104.3, 4
f. Prestressing force measurement and application.	X L2	X L1		3.6B	1704.5
3. Inspection prior to grouting		X L1	1.12	3.2D, 3.4, 2.6B, 3.3B	1704.5
4. Grout placement.	X L1			3.5, 3.6C	1704.5
5. Preparation of grout specimens, mortar specimens, and/or prisms.	X L1 L2			1.4	1704.5 2105.22 2105.3
6. Compliance with documents and submittals.		X L1 L2		1.5	1704.5

TABLE A (CONTINUED) INSPECTION AND TESTING Continuous and Periodic is as Defined by the BCNYS	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE
D. Wood Construction: <i>Fabrication of wood structural elements and assemblies.</i>				1704.6, 1704.2
E. Soils				
1. Site preparation.				1704.7.1
2. During fill placement.				1704.7.2
3. Evaluation of in-place density.				1704.7.3
F. Pile Foundations: <i>Installation and load tests.</i>				1704.8
G. Pier Foundations: <i>Seismic Design Category C, D, E, F.</i>				1704.9, 1616.3
H. Wall Panels and Veneers: <i>Seismic Design Category E, F.</i>				1704.10, 1616.3, 1704.5
I. Sprayed Fire-Resistant Materials				
1. Structural member surface conditions.				1704.11.1
2. Application.				1704.11.2
3. Thickness.			ASTM E 605	1704.11.3
4. Density.			ASTM E 605	1704.11.4
5. Bond strength.			ASTM E 736	1704.11.5
J. Exterior Insulation and Finish Systems (EIFS)				1704.12
K. Special Cases				1704.13
L. Smoke Control				1704.14

TABLE A (CONTINUED) INSPECTION AND TESTING Continuous and Periodic is as Defined by the BCNYS	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE
<i>M. Special Inspections for Seismic Resistance:</i> Applicable to specific structures, systems, and components.				
1. Structural steel.	X		AISC 341	1707.2
2. Structural wood.	X			1707.3
3. Cold-formed steel framing.		X		1707.4
4. Storage racks and access floors.		X		1707.5
5. Architectural components.		X		1707.6
6. Mechanical and electrical components.		X		1707.7
7. Seismic isolation system.		X		1707.8
<i>N. Structural Testing for Seismic Resistance:</i> Applicable to specific structures, systems and components.				
1. Testing and verification of masonry materials and assemblies.				1708.1
2. Testing for seismic resistance.				1708.2
3. Reinforcing and prestressing steel.				1708.3
4. Structural steel.			ACI 318	1708.4
5. Mechanical and electrical equipment.			AISC	1708.5
6. Seismically isolated structures.				1708.6

TABLE A (CONTINUED) INSPECTION AND TESTING Continuous and Periodic is as Defined by the BCNYS	CONTINUOUS	PERIODIC	REFERENCE STANDARD	BCNYS REFERENCE
<i>O. Structural Observations: Applicable to specific structures.</i>				1709.1
<i>P. Test Safe Load</i>				1712.1
<i>Q. In-Situ Load Tests</i>				1713.1
<i>R. Preconstruction Load Tests</i>				1714.1
<i>S. Foundation and Soil Investigations</i>				1802.1
1. Questionable soil.				1802.2.1
2. Expansive soils.				1802.2.2
3. Groundwater table.				1802.2.3
4. Pile and pier foundations.				1802.2.4
5. Rock strata.				1802.2.5
6. Seismic Design Category C.				1802.2.6
7. Seismic Design Category D, E, F				1802.2.7
<i>T. Soil Classification</i>				1802.3

TABLE B INSPECTION AND TESTING	REFERENCE STANDARD	CLARIFYING NOTES
<i>Windows</i>		
1. Field Test.	AAMA 502, Test Method B with ASTM E1105 Procedure A	
<i>Storefront & Curtainwall</i>		
1 Field Test.	AAMA 503	
<i>Waterproofing</i>		
1. Flood Testing of Horizontal Surfaces	ASTM D5957	
<i>Sealants</i>		
1. Adhesion Field Test	ASTM C1193	
<i>Brick Veneer</i>		
1. Water Penetration	ASTM E514	
<i>Roof/Deck Drains</i>		
1. Flow Test		Existing drains to remain shall be flow tested prior to the start of work. After work is completed, drains shall be retested to assure proper drainage and flow.

GENERAL REMARKS ON PLANNING, DESIGN, AND EQUIPMENT (Continued)

25. Site Work

- a. Walks, Driveways and Parking Areas:
 - i. Show walks, driveways, parking areas and utilities on the site plans even if they are not in the contract.
 - ii. Recommended materials for curbs at parking areas include granite and pre-cast concrete.
 - iii. Consider pervious paving at sidewalks, driveways, and parking areas to minimize stormwater runoff.
 - iv. Provide site lighting for walks, driveways, parking areas, and roadways.
 - v. Provide perimeter building lighting for security purposes.
 - vi. Exterior lighting should be designed to balance security and safety needs with respect for the night sky.
- b. Utilities:
 - i. Ductile iron pipe under building slabs should be a heavy-duty type.
 - ii. Water Shutoff: If underground water shutoffs are provided, valve boxes and valve wrenches must be provided. Valve closing direction should be reviewed with the campus. Underground valves can close with either a right hand or left hand turn. Valves selected should be reviewed with the campus for consistency with their existing valves.
 - iii. Fire service shutoff should be a post indicator valve provided with a tamper switch.
 - iv. Gas Meter/Shutoff: Gas shutoff must be accessible. Check with local utilities for any specific requirements. Regulators should be located away from windows as they have pressure relief valves and can vent gas. This will minimize nuisance reports of gas leaks by building occupants.

26. Building Envelope

- a. Materials located near grade should be durable and vandal resistant. Recommended materials include concrete, masonry and stone.
- b. Less durable materials such as vinyl siding and exterior insulation finish systems (EIFS) should be limited to upper story and low traffic locations.
- c. Where EIFS is used, only those systems with an internal drainage/weep system and secondary weather barrier should be used.

- d. Where masonry cavity wall construction is used, flashings should project a minimum of one-half inch from the face of the masonry.
- e. Where clay masonry is used as the exterior finish, the masonry should rest on a shelf or support angle a minimum of six inches above grade.

27. Windows

- a. Recommended window types include double hung, single hung, casement, projected or fixed windows. Sliding windows are not recommended, as they have not performed in a satisfactory manner in SUNY residence halls.
- b. Recommended window materials include thermally broken aluminum, steel, and aluminum or vinyl clad solid wood.
- c. Recommended minimum window grade for student use areas is heavy commercial, minimum HC-40.
- d. Recommended exterior window finishes include anodizing, factory applied paint systems (such as “Kynar”), and aluminum or vinyl cladding.
- e. Limit stops are recommended to restrict window openings to a maximum of eight inches. Limit stops should be installed with vandal-resistant screws. On double hung windows, limit stops should be provided on the lower sash only. Limit stops should not be removed from existing windows without consulting the manufacturer, as the limit stop may be part of the operating mechanism of the window and its removal may cause a potential hazard to students when the window is open. Limit stops shall not reduce the amount of openable area required by code.
- f. At operable windows on upper stories, in-swinging or tilt-sash types are recommended to facilitate window washing.
- g. Recommended materials for exterior window sills include pre-cast concrete, stone and aluminum. Brick sills are not recommended as they are prone to leakage and difficult to maintain.
- h. It is recommended that windows be set back from the exterior face of the exterior wall a minimum of a few inches. This setback provides protection from weathering and prolongs sealant life at the window perimeter.

GENERAL REMARKS ON PLANNING, DESIGN, AND EQUIPMENT (Continued)

- i. The selection of glazing should consider orientation. Multiple glazing types may be required for the different orientations of a building to optimize window system performance.

28. Roofing

- a. Recommended flat roof system types include multi-ply modified bitumen and built-up roofing systems. These systems have proven durable and are relatively easy for campus maintenance staff to maintain and repair.
- b. Single-ply membranes have been used on SUNY residence halls with success, although the life span of single-ply membranes tends to be less than the multi-ply systems listed above and campus maintenance staff does not always have the knowledge or skills necessary to maintain and repair them. Where hazards from falling objects or corrosive building exhaust exist, single-ply membranes are not recommended.
- c. Systems employing ballasted and inverted roof membrane assemblies (IRMA) are not recommended as it is difficult to find the location of leaks in these systems and they are more difficult to repair in general.
- d. Roof membrane edges should terminate under metal flashings, such as cap flashings, copings and gravel-stops. Termination bars are not recommended unless no other method is feasible.
- e. Light-colored roofing membranes should be considered to reduce heat build-up and summer air conditioning load.
- f. Green roof systems should be considered to reduce stormwater runoff. If green roofs are contemplated, coordination with the building structural system and quality control during installation are critical. The campus should also be consulted regarding routine required maintenance, of both the roofing system and the roof vegetation.

29. Interior Construction and Finishes

- a. Flooring
 - i. Flooring that may become wet, such as at building entrances, public toilet rooms and student bathrooms, should have a minimum static coefficient of friction of 0.6 at level surfaces and 0.8 at stairs and ramps.
 - ii. Where carpeting is used, carpet tiles should be considered as they are easier to repair and maintain in the event of damage or severe soiling and pro-

duce less waste than sheet goods. It should be noted, however, that carpet tiles may not be appropriate for areas subject to vandalism. Recycled carpeting, carpeting that is recyclable, and low VOC carpeting is recommended.

- iii. Where precast concrete plank floor construction is used, a topping slab is recommended to level the floor prior to the installation of floor finishes. Experience has shown that an acceptable level floor cannot be achieved with thin floor finish systems due to typical plank cambering.

b. Wall Construction

- i. Wall construction between units (apartments, suites or individual student bedrooms) is required by code to be fire rated and shall extend from the floor to the underside of the structure above.
- ii. Wall construction between apartments is required by code to have a minimum sound transmission class (STC) rating of 50. An STC rating of 50 is also recommended between suites and individual bedrooms, although not required by code.
- iii. Consideration should be given to extending the walls between bedrooms within apartments or suites to the underside of construction above for acoustical and security reasons.

c. Wall Finishes

- i. Graffiti resistant coatings are recommended for areas that may be subject to vandalism.
- ii. The selection of interior wall finishes should be made with sustainability and environmental indoor air quality in mind. Low VOC paints and coatings are recommended.

d. Ceiling Systems

- i. Recommended ceiling systems include commercial grade suspended acoustical ceiling systems, suspended gypsum board ceiling systems and acoustical finishes applied to the underside of floor or roof construction above. The choice of system is dependent on several factors, including acoustic requirements for the space, required access to mechanical and electrical components above the ceiling and the desired appearance. Per code, an STC rating of 50 is required for floor construction separating apartments from each other and from public areas of the building.
- ii. Suspended ceiling systems provide space for concealed piping and ductwork serving spaces in the building. Where ceiling finishes are applied directly to the underside of the structure above,

GENERAL REMARKS ON PLANNING, DESIGN, AND EQUIPMENT (Continued)

provisions must be made for concealing these items, such as the construction of soffits and chases.

- iii. Direct applied ceiling systems will permit sound to travel more readily between floors. When using these systems, the space acoustics must be studied and consideration must be given to providing other types of sound absorbing finishes.
 - iv. Consideration should be given to providing “hard” ceilings such as gypsum board at student living areas for security reasons. Acoustical tile systems with removable tiles provide a place for concealment of contraband materials.
- e. Toilet Room and Bathroom Accessories
- i. Recommended toilet partition systems include systems with solid plastic panels, doors and pilasters. Systems with pilasters anchored at the floor and the ceiling will provide the greatest stability and durability.
 - ii. Solid plastic countertops with drop in china lavatories or integral bowls are recommended. These countertops are easy to clean and maintain, and provide a pleasing appearance as well. Plastic laminate countertops are prone to delamination and are not recommended for student toilets, bathrooms or kitchens.
 - iii. Coordinate the diameter of the toilet tissue holder with the type of toilet tissue roll normally supplied by the campus.

30. Doors and Door Hardware

- a. Recommended exterior door types include thermally broken aluminum and insulated steel.
- b. Recommended interior door types include minimum 20-gauge steel and solid core wood.
- c. Recommended interior door frame types include minimum 18-gauge fully welded steel. Knock-down door frames are not recommended. Double studs are recommended at either side of the door frame opening in metal stud wall construction.
- d. It is recommended that door closers be through-bolted to doors.
- e. Care must be taken to coordinate the location of internal blocking in solid core wood doors with the location of surface applied door closers. This is especially critical with fire rated wood doors that have mineral cores. If not coordinated, the closer through-bolts may crush the mineral core of the door and cause premature door and closer failure.

- f. In door applications using lever type hardware, the door locking mechanism can easily be defeated through the use of simple tools slipped through the door undercut. A security type threshold should be used with lever hardware to prevent unauthorized opening of the door from the outside.
- g. Continuous hinges are recommended for high-traffic doors such as main entrance doors and doors to internal stairs.
- h. Card Access Controlled Doors: Electric strikes are preferred over magnetic locks for controlling doors that are controlled by a card access system. Combined with panic hardware, the doors with electric strikes can be opened mechanically in the direction of egress without interrupting the power to the door strike. This allows the doors to be opened independently of the card access system in the event the card access system fails. If magnetic locks are utilized, a door release switch must be installed adjacent to the door to unlock the door independently of the card access system. The locks must be connected to the fire alarm system to release on alarm activation. The locks must also fail open upon a loss of power. Check with the facility for preferences.

31. Heating

- a. General:
 - i. The primary conditioning of the residence hall spaces during student occupancy in New York State is heating. The heating system should be given prime consideration, as this can generate the most complaints due to discomfort. Student room delivery unit sizing, noise, and sense of control should all be of prime consideration to the designer. If a two pipe, dual use system (heating and chilled water) is being considered, extra attention needs to be given to the sizing of the delivery units. Typically the cooling load will drive the coil size. Significant oversizing of the heating coil can occur when sizing the coil for the cooling load. The designer must take steps to mitigate the heating coil oversizing or equipment cycling and complaint levels will increase.
 - ii. Redundancy in heating plant equipment should be discussed with the campus. Typically some percentage of redundancy of heating equipment is recommended.
 - iii. Standby Power: If the building is provided with an emergency generator, then the campus personnel need to provide guidance as to whether or not the heating

GENERAL REMARKS ON PLANNING, DESIGN, AND EQUIPMENT (Continued)

- system (and all its components: boilers, pumps, controls, etc.) are to be supplied by the emergency generator. If standby loads are connected to the emergency generator, a separate transfer switch is required to separate standby loads from emergency loads.
- iv. NYS DEC Air Permitting: If boilers are being installed in a project, it is the designer's responsibility to ensure that air permitting requirements are followed. The designer may or may not be required to file the permit application on behalf of the owner, but the design professional should inquire as to the permitting status.
- b. Equipment:
- i. Boilers: There are many types of boilers available in today's market. The designer should prepare the building load calculations and then discuss with the campus the options for boiler types and redundancy schemes. Heating boilers are subject to inspection in accordance with New York State Department of Labor, Code Rules 4 and 41.
 - ii. Combustion air: One of the most common boiler errors observed in the design documents and in the field is the failure to properly size the combustion air opening. Combustion air openings are to be provided in accordance with the Mechanical Code of New York State. If natural ventilation through louvers and ducts is supplied to the space, then the designer must size the opening based on the free area of the louver. Typically this is only 40% to 50% of the rough opening. Depending on the design, two louvers may be required by Code. If combustion air units are provided, supplemental heat will most likely be needed for the space. Sealed combustion boilers may eliminate the need for exterior louvers and supplemental heat.
 - iii. Gas train: If the campus does not have a standard, an IRI gas train is recommended. Most gas trains have vents, which must be routed to the building exterior. IRI gas trains typically will have four vents. Manufacturers will have varying guidance on the sizing and actual number of pipes required to go to the exterior of the building. Most manufacturers require that the normally open vent valves be run separately to the exterior of the building. They may not be combined with other piping, including the normally open vent valves from other boilers. The vent piping, sizing and routing must be shown on the drawings.
 - iv. Heat Exchangers: Various types of heat exchangers are available to the design professional, depending on the heating medium.
 1. Shell and Tube (generally used for steam to water applications): Provide coil pull space.
 2. Plate and Frame (generally used for water to water applications): Provide gasketed plate and frame type that can be disassembled and cleaned. Brazed plate type heat exchangers should only be used when it is acknowledged that opening and cleaning of the heating exchanger would not be cost effective.
 - v. Pumps: Campuses may have pump standards, so pump requirements should be reviewed with the campus. If no standards are recommended by the campus, in-line pumps are recommended. Lower floor space requirements and minimum or no alignment issues make these pumps a good lower maintenance choice. Mounting location is important. Mounting the pump too high in the space makes repairs difficult. If large in-line pumps are used, a lifting pad overhead to lift heavy motors is required. When specifying pumps, select pump seals with a maximum upper temperature limit of 250 degrees F.
 - vi. Delivery Units:
 1. Fin Tube Radiation: By far, the most common heating only delivery unit is fin tube radiation. Fin tube is simple, noiseless, requires low to no maintenance, and can fit most room configurations. If fin tube radiation is the basis for design the following are recommended:
 - i. Minimum cover thickness: 16 gauge, 14-gauge is recommended.
 - ii. Provide balancing valves for each circuit.
 - iii. Provide access doors for valves.
 - iv. If control valves are provided and intended to fit behind the fin tube cover, verify that the valve will physically fit. Typically they will not. A mock up should be provided.
 - v. Sloping top covers prevent items from being placed on top.
 - vi. Operable dampers are not often used by the students and become maintenance issues as the covers age.
 - vii. If the rooms are small, furniture placement should be reviewed. If it is anticipated that a bed will be pushed up against the entire length of the fin tube radiation (and potentially covered by bedding), then other systems should be considered.

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2. Fan Coil Units: Fan coils are a popular solution because fan coils can deliver heating and cooling to a space. Recent history has proven fan coils to be very problematic. The following are some of the more common problems with heating/cooling fan coil units:
 - i. Single coil units have heating coils between two and six times too large.
 - ii. Control valves installed backwards at factory.
 - iii. Manufacturer supplied control valves do not fit in cabinet.
 - iv. Incorrect digital control microprocessor cards installed.
 - v. Factory installed balancing valves that are inaccessible.
 - vi. Piping configuration provided in a different configuration than indicated on the approved shop drawings.
 - vii. Digital controls do not shut off fan when fan coil thermostat is satisfied (draft complaints).
 - viii. Outside air dampers are fixed (mold growth during warm summer months).Some of these problems are not evident or discovered until the fan coil units are installed and the building is occupied. If fan coils are to be specified, the design professional is cautioned as to the above problems. Extreme attention is to be paid to shop drawings. Mock-ups are recommended for each type and piping configuration and it will be the design professional's responsibility to ensure that the issues noted above do not occur.
3. Valance Units: Valance type delivery units provide heating and cooling with no moving parts. Controls are simple, typically on/off valves – modulating valves are not recommended. If valance units are to be used, the design professional should ensure adequate headspace is available at the outside wall. If the valance units are to be installed below the window heads, the visual impact should be considered. Mock-ups are recommended. Condensate removal is a prime consideration. Proper pitch on the condensate pan is essential. A thorough inspection of ALL units is required to ensure pans are pitched properly. Condensate drain pans should be constructed from a single piece of sheet metal to reduce the potential for leaks.

4. All air delivery systems: If all air delivery systems are being installed, air registers should be located low and on the outside wall of the room. Under the window is ideal. Installing air registers high and on the inside wall is not acceptable for heating delivery, but would be acceptable for delivery of cooling only.
5. Since all air delivery systems are inherently “dirtier” than hot water delivery systems, good system design of air filtration is essential. Higher MERV filtration ratings are recommended. In addition, all air systems do have increased maintenance with respect to filters. To keep these systems running clean and efficient, a filter management program is recommended.

32. Ventilation

- a. In buildings with conditioned spaces, fresh make up air should be provided. Unless the building is an all air delivery system, a separate make up air system should be provided, delivering outside air to the student rooms. If an all air system is being utilized, make up air should be incorporated into the air system.
- b. Toilet rooms and shower rooms should have exhaust ventilation. Consideration should be given to increased ventilation rates in toilet and shower rooms due to high demand periods.
- c. Ductwork: Exhaust ductwork from toilet rooms should be resistant to corrosion. Aluminum ductwork is recommended.
- d. Registers: Shower room registers and other registers exposed to high humidity levels should be aluminum construction. Opposed blade dampers are recommended for balancing purposes.
- e. Fans: If possible, locate fans on accessible roofs. If there is a pitched roof, locate fans in an accessible attic or other accessible space.
- f. Heat recovery: Consider using heat recovery any time conditioned air is being rejected to the exterior. There are several kinds of heat recovery units available, including heat wheels, heat pipes, cross flow and run around coils. These technologies can reduce the size of HVAC systems and reduce the operating costs associated with operating those systems.

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33. Air Conditioning

- a. Chillers: Chiller strategies should be discussed with the campus. If there is chilled water available, it may be possible to access the campus chilled water system. If not a chiller must be provided. Typically air cooled chillers are provided for residence halls. Water-cooled chillers with their associated cooling towers are a significant increase in maintenance to the campus staff. Cooling towers should only be utilized with express permission of the campus. The proximity of a chiller to a residence hall is of potential concern due to noise issues. When locating a chiller or cooling tower at grade, a noise study should be performed to determine the impact of noise on the building residents.
- b. Pumps: See recommendations and discussion under heating system.

34. Motor Voltage for Three Phase Motors

- a. Specify 200 volt motors for 208 volt systems and 460 volt motors for 480 volt systems. Avoid 230/460 dual voltage motors on 208 volt systems.
- b. When selecting motors always consider premium efficiency motors. Also for varying loads consider utilizing variable frequency drives for equipment such as pumps, fans and air handlers.

35. Plumbing

- a. Piping:
 - i. Water piping should be a minimum of type L copper. If the budget will allow, provide Type K copper for longevity.
 - ii. Waste, drain and vent piping should be cast iron in larger sizes and type K copper in the smaller sizes with drainage patterns. DWV copper is typically not recommended due to its thinner wall. Experience has shown that DWV copper does not stand up to rodding over the years. Thicker wall piping will give the residence hall piping increased longevity.
- b. Valves:
 - i. Typically, ball valves are supplied. For most campuses, this is the valve of choice. This should be confirmed with campus personnel. Full port ball valves should be used in domestic water systems and are required by code in some instances.
 - ii. Isolation valves should be used to segregate bathrooms, janitor's closets, etc. from distribution piping and to isolate floors from risers. Both hot and cold

piping should have isolation valves. Valves should be easily accessible to building maintenance staff.

- c. Natural Gas Powered Generators: Include a schematic diagram of the gas train on the design and contract drawings demonstrating compliance with NFPA 37 and NFPA 110.

36. Building Management Systems

- a. Control of HVAC and lighting, as well as security and life safety, are typically a component of all new and major rehabilitation projects. Integrated building management systems (BMS), using direct digital controls (DDC) that encompass all building functions should be considered on all new construction and major rehabilitation projects. Totally integrated DDC systems that capture lighting control, comfort control (temperature, humidity, etc.), life safety, security, elevators, scheduled operations, sequence of operations, alarms, reporting, etc. should be strongly considered.
- b. Utilizing a BMS will allow campuses to monitor building loads and provide improved control over energy consumption. A BMS can implement load-shedding strategies during peak demand periods.
- c. Integrations into campus energy or building management systems should be reviewed with the campuses. Compliance with green building strategies will be greatly enhanced by using building management systems.

37. Commissioning

- a. Building commissioning is a process for achieving, verifying and documenting that the performance of a building meets the design intent. The use of building commissioning is to ensure that the building systems meet expectations defined in the contract documents. The commissioning activity takes all system components and ties them together to ensure they work as an integrated system. Commissioning is not a standard service provided by a typical contract with a design professional and a contractor, but must be specifically called out in the contract documents.
- b. Commissioning requires the involvement of a commissioning authority, an independent third party, hired by the owner, to develop and oversee the commissioning process for the owner. The commissioning process requires the owner, design professional and the contractor(s) to work together in the commissioning effort to

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deliver a building that functions as a system and meets the intent of the contract documents.

- c. Compliance with most green building strategies today requires some level of commissioning of the project. Commissioning has many levels of effort. The most basic level of commissioning would be to commission the building's energy systems. But commissioning could extend to the entire spectrum of building systems including such systems as building envelope, plumbing systems, sprinklers, and elevators to mention a few.
- d. Commissioning of the building systems will give the building operations and maintenance staff a verifiable starting point for building system quality and operations to refer back to as the building ages. It will also ensure better documentation is delivered to the building operators at the end of a project.

38. *Lighting and Lighting Control*

- a. Acceptable light levels for specific areas shall be in accordance with the ANSI/IESNA Lighting Handbook.
- b. Lighting control shall be provided in accordance with the NYS Energy Code and as required by the client.

39. *Electrical Service Design*

- a. Capacity: Verify that the existing campus system has capacity and space to serve the building. Advise utility of anticipated increases in load.
- b. Campus Short Circuit & Coordination Study: Perform a short circuit and coordination study to determine the available short circuit current at the building and to determine that the building over current protective devices are coordinated with upstream campus over current devices.
- c. Building Short Circuit & Coordination Study: Perform a short circuit and coordination study to determine equipment short circuit ratings and to provide for a properly coordinated electrical system design.
- d. Voltage & Campus Configuration: Verify the campus primary system voltage and primary feeder configuration and show on the drawings.
- e. Main Transformer: Most campuses prefer dry type transformers. Check with the campus to determine the preferred transformer type and location. Many times the existence of a fire pump influences the location of

the transformer. Review NFPA 20 regarding fire pump feeders prior to locating the transformer.

- f. Primary Switching: If primary switching is located indoors, use metal enclosed switchgear. Other non-listed equipment may be used if the equipment is located in a transformer type vault or is located outdoors.
- g. Caution is advised when utilizing non-listed equipment. Make sure non-listed equipment such as "vault/subsurface" switches and "puffer switches" are separated from other electrical equipment and accessible only to "qualified personnel" as defined in the manufacturer's literature and the NEC.
- h. Electrical metering is typically provided.
- i. Single Line Diagram: Include a single line diagram on the contract drawings. Show all protective device ratings and settings. Show all major equipment and connections. Show existing site utility system to the extent that all devices affected by the project are included on the diagram.
- j. Grounding Details: Include grounding details to show grounding of electrical services and generators. Apply four pole transfer switches for generator systems when required to avoid multiple system grounds.

40. *Electrical Considerations*

- a. Underground primary and secondary service feeders are typically concrete encased PVC or concrete encased rigid steel conduit.
- b. Conduits under buildings and in slabs should be rigid steel to reduce the effects of electromagnetic fields inside the buildings.
- c. Site Lighting Conduits: PVC conduits are typically used for site lighting circuits.
- d. Light Pole Bases: Tapered pole bases tend to resist tilting better than cylindrical shaped bases.
- e. Attic Junction Boxes: Coordinate with the Architect and make sure any junction boxes installed in an attic will be accessible.

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- f. Lightning Protection:
 - i. Review NFPA 780 and NFPA 780 Annexes. Perform a risk assessment in accordance with Annex L and consult with the client to determine if a lightning protection system should be installed.
 - ii. If lightning protection is included in the project call for a UL Master Label System.
 - iii. If lightning protection is included in the project, the drawings must show the design. Show and detail roof penetrations.
- g. Motor Voltage for Three Phase Motors: Coordinate with the architect, the mechanical engineer, and plumbing engineers to ensure 200 volt motors for 208 volt systems, and 460 volt motors for 480 volt systems. Avoid 230/460 dual voltage motors on 208 volt systems.
- h. Lighting Fixtures: Consider energy saving fixtures and lamps, such as compact fluorescents and LEDs, where appropriate.

41. **Emergency and Standby Power Systems**

- a. Emergency generators are typically provided to serve code required emergency loads. NEC 700 requires a separate transfer switch for emergency loads. Non-emergency loads may be served by the emergency generator if a separate transfer switch is provided.
- b. Standby power is sometimes required for elevators and fire pumps. Refer to the respective Building Code to determine when elevators and fire pumps require standby power.
- c. Optional Standby Power: Check with the client to determine their standby power needs. Items such as the heating system, security system and sump pumps are frequently connected to the standby power system. If electronic flush valves are provided, connect the devices to standby power such that the devices will operate in the event of a power outage.
- d. The fuel source for the generator should be diesel fuel or natural gas. Check with the campus for preferences.
- e. Natural Gas Powered Generators: Verify that the gas train of the specified generator complies with NFPA 37 and NFPA 110. Include a schematic diagram of the gas train on the plumbing drawings demonstrating compliance. Verify that the gas utility service to the campus is classified as non-interruptible.

- f. Call for generators to be UL 2200 Listed if Listed generators are available in the size and type utilized.
- g. Call for the emergency systems to be tested in strict accordance with NFPA 110 Acceptance Testing requirements. The Dormitory Authority typically witnesses the test.
- h. Grounding Details: Include grounding details to show grounding of generators. Apply four pole transfer switches for generator systems when required to avoid multiple system grounds.

42. **Communication Systems**

- a. Telephone, Data, and Cable TV Systems are typically provided.
- b. Consult and coordinate with the facility and service providers to determine service requirements.
- c. Typically service conduits are required for the service cables provided by a service provider. Check with the facility for preferences.
- d. Provide a main communications service room for termination of system services.
- e. Provide communications system closets strategically located throughout the building. EIA/TIA 569A includes guidance for locations and sizes of closets.
- f. Provide riser raceways and cables. Sometimes cables are provided by the facility.
- g. Design a pathway for cabling from the communications system devices to the service room. Communications cabling is sometimes provided by the facility.
- h. Determine cable preferences from the facility. Facility preferences for cable type vary.
- i. Design systems in accordance with EIA/TIA 569A.
- j. Communication System Riser Diagrams: Include riser diagrams on the contract documents for communications and security systems.

GENERAL REMARKS ON PLANNING, DESIGN, AND EQUIPMENT (Continued)

43. Security Systems

- a. Card Access Systems: Card access systems are typically provided to control access to the building. Card readers are typically installed at main entrances. Check with the facility for preferences.
- b. Blue Light Systems: Blue light systems are typically provided to allow a person to call for help in an emergency. Check with the facility for preferences.
- c. Mass notification systems are becoming an integral part of both emergency and non-emergency communications for many colleges. There are many mass notification options and services on the market today. Check with the facility for preferences and standards.

44. Fire Alarm

- a. Scope:
 - i. All residence halls shall be equipped with fully addressable fire alarm systems that comply with NFPA 72 (National Fire Alarm Code).
 - ii. The fire alarm system design should conform to the requirements of the Governor's Task Force on Campus Fire Safety for an Integrated Fire/Smoke Detection and Alarm System, defined as follows:

Integrated Fire/Smoke Detection and Alarm System: A complete fire and smoke detection and alarm system that is fully addressable¹ with addressable devices². It shall include a manual fire alarm system in public spaces and automatic fire/smoke detection installed in all areas of the building, including but not limited to dwelling units, sleeping units, recreation rooms, lounges, dining rooms, laundry rooms, mechanical equipment rooms, storage rooms, corridors, and exits. In addition, the equipment will automatically actuate audible and visual alarms

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- 1 Fully Addressable: All fire alarm initiating and control devices shall be individually identifiable as to actual location and status (examples of status include but are not limited to device alarm and supervision; communication; detector sensitivity; alarm threshold).
 - 2 Addressable Device: A fire alarm component with discrete identification that can have its status individually identified or that is used to individually control other functions (NFPA 72 National Fire Alarm Code, 2002 Edition, Section 3.3.3).
 - 3 A supervising station recognized by NFPA 72 National Fire Alarm Code could include a constantly attended University Police communication center, commercial fire alarm central station (i.e. Wells Fargo, ADT), or fire department communication center (i.e. 911).

throughout the building when an automatic initiating device is alarmed or when the system is manually activated. Fire alarm systems shall be monitored at a supervising station³ for retransmission of alarms to the fire department.

- iii. The Design Professional shall consult with the campus to determine if a campus fire alarm standard exists. Where there are discrepancies between campus standards and the Governor's Task Force on Campus Fire Safety requirements, the Design Professional shall advise the campus and the Dormitory Authority and seek direction.
 - iv. The Design Professional shall determine whether a sole source fire alarm system manufacturer is required.
 - v. The Design Professional should consult with the campus to determine what doors should be provided with hold-open devices (student room doors, stair doors, cross corridor doors, etc.)
 - vi. All high rise residence facilities having floors used for occupancy located more than 75 ft. above the lowest level of fire department vehicle access shall be provided with one and two-way emergency voice communication systems and a Fire Command Center.
- b. Reporting/Annunciation:
 - i. The fire alarm system shall be monitored by an approved supervising station.
 - ii. The fire alarm system shall report to the central campus monitoring system if one exists. The Design Professional shall determine if common building alarm, trouble, and supervisory annunciation or point specific annunciation is required.
 - iii. The Design Professional shall determine if the municipality requires a direct interconnection with the fire alarm system.
 - iv. Provide a remote annunciator or the fire alarm control panel (FACP) at the entrance normally used by responding emergency personnel. This may be located in a building vestibule and/or lobby.
 - c. Initiating Devices:
 - i. Smoke detection shall be provided in all spaces throughout the building except toilet rooms, bathrooms, and locations where nuisance alarms may occur. See below for locations where heat detectors may be substituted for smoke detectors.
 - ii. Smoke detection within sleeping rooms and dwelling units should be sounder base system smoke detectors.

GENERAL REMARKS ON PLANNING, DESIGN, AND EQUIPMENT (Continued)

- iii. All smoke detectors should be capable of alarm verification.
 - iv. Means shall be provided to initiate operation of required smoke dampers. Means shall include full smoke detection coverage of the areas served by the HVAC systems or duct detectors at each smoke damper. Both duct detectors and area smoke detection present operational problems at locations such as bathrooms and kitchens due to nuisance alarm possibilities. Area heat detection or sprinklers may possibly be substituted at these locations.
 - v. Manual pull stations shall be provided at all exits, exterior doors, and open stairs that can be used as a means of escape.
 - vi. Heat detectors should only be used in lieu of smoke detectors in areas where nuisance alarms are likely, i.e. kitchens, steam rooms, bathrooms, shower rooms, and boiler rooms.
 - vii. Fixed temperature heat detectors (not rate-of-rise detectors) should be provided in all kitchens and kitchenettes.
 - viii. Duct detectors must generally be provided in return air systems with a capacity greater than 2,000 CFM and at return air risers on each story at systems having a capacity greater than 15,000 CFM.
- d. Notification Appliances:
- i. Audible notification appliances shall use the three-pulse temporal fire alarm evacuation signal.
 - ii. Audible alarm appliances shall be provided to ensure that a sound level of at least 15 dBA above the average ambient sound level or a sound level of at least 70dBA, whichever is greater, when measured at pillow height.
 - iii. Visual alarms (strobes) shall be provided as required by applicable codes and ADA requirements. Strobes shall be provided in all common use areas and spaces.
 - iv. In dwelling units (apartments) required to be provided with visual alarms, strobes shall be provided in designated bedrooms, each bathroom, and in the common areas.
 - v. Visual alarms located in sleeping rooms or dwelling units for the hearing impaired must be arranged so that the device activates in “first alarm condition.” Strobes must be mounted within 80 in. and 96 in. AFF. 177 candela devices must be provided if the strobe is less than 24” from the ceiling.
 - vi. Sequence of operation for sounder base smoke detectors:
 - 1. Upon alarm activation of a sounder base smoke detector, all sounder base devices within the sleeping/dwelling unit shall sound and all strobes within the sleeping/dwelling unit shall flash. The activation shall be reported to the building FACP and supervising station.
 - 2. Upon alarm activation of a subsequent initiation device anywhere in the building, a general alarm shall be activated throughout the building.
 - 3. A general building alarm shall include the activation of all sounder base smoke detector integral alarms and strobes within the sleeping/dwelling units.
- e. Installation:
- i. Signaling line, initiating, and notification circuits should not exceed 75% of the manufacturer’s identified capacity.
 - ii. Raceways in finished areas shall be concealed where possible. Where it is not possible to conceal raceways, the Design Professional shall consult with the campus as to the type and location of the exposed raceway.
- f. Specifications:
- i. The Design Professional shall provide a complete fire alarm specification that minimally includes the following sections: Scope/Summary of Work, Quality Assurance, Code References, Submittals, System Description, Sequence of Operation, Acceptable Manufacturers, Products, Equipment Installation, Wiring Methods and Materials, Field Quality Control, Testing, and Training.
 - ii. The following fire alarm system programming requirements should be included in the specifications:
 - 1. Add requirement that FACP messages must be approved by the engineer and that custom messages be provided as directed.
 - 2. Add requirement that FACP descriptors utilize room/space designations and numbers to be used by the facility after occupancy and that descriptors be approved by the engineer.
 - 3. Add requirement that the Contractor shall allow for three fire alarm system reprogrammings as directed by the Owner.
 - iii. A testing/acceptance section should be added to the specification that will minimally include the following:
 - 1. Prior to the acceptance testing the contractor shall complete and submit the “Record of Completion” form as identified in NFPA 72 figure 4.5.2.1.

GENERAL REMARKS ON PLANNING, DESIGN, AND EQUIPMENT (Continued)

2. Add the following, “An acceptance test of the fire alarm system shall be conducted by the Contractor and the fire alarm equipment vendor as directed by the Owner after the fire alarm equipment vendor has performed a 100% test of the system.”

45. Fire Protection

- a. Scope:
 - i. All new and substantially renovated residence facilities shall be fully sprinklered throughout with a system that complies in all respects to NFPA 13 (Installation of Sprinkler Systems), 13R (Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height), or 13D (Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes) as applicable to the specific occupancy classification and project specific construction requirements. An NFPA 13 system allows the greatest flexibility when meeting code requirements.
 - ii. Standpipe shall be provided as required by the applicable building code.
 - iii. Applicable seismic requirements must be fully detailed on the design drawings.
- b. Design:
 - i. The Design Professional is required to hydraulically design the sprinkler system as part of the design process. Hydraulic calculations should be provided for review if requested.
 - ii. The Design Professional must determine if the existing water supply is adequate for the fire protection system.
 - iii. The drawings shall indicate all piping and pipe sizes. A pipe schedule system is not permitted.
 - iv. Elevator machine rooms shall be sprinklered.
 - v. Elevator hoistways shall be sprinklered as required by code.
 - vi. Fire pumps:
 1. Emergency power shall be provided for all electric fire pumps.
 2. Diesel fire pumps shall only be provided upon concurrence of the campus.
 3. The fire pump test header shall be located at the building exterior and shall be readily accessible to testing personnel.
 4. The building fire alarm system shall monitor the fire pump for Pump Running, Phase Reversal, Loss of Phase, and Alternate Power Source Transfer.
- c. Installation:
 - i. A sprinkler floor control valve assembly (control valve with tamper switch, water flow switch, combination inspector’s test connection/drain) shall be provided on each floor. The floor control valve assembly shall be readily accessible for maintenance and test personnel.
 - ii. A post indicating valve (PIV) should be provided outside the building in the fire service connection to the municipal or site water supply.
 - iii. Concealed type sprinklers should be used in all areas accessed by residents.
 - iv. Residential type sprinklers shall be used in all sleeping and dwelling spaces.
 - v. An exterior sprinkler alarm bell shall be provided.
 - vi. The Design Professional shall coordinate the interconnection of all fire protection devices such as water flow switches, tamper switches, low air switches, and fire pumps with the building fire alarm system.
 - vii. The location of the fire department connection(s) shall be coordinated with the local fire department.
 - viii. Ensure that drain piping discharges to a suitable receptor, i.e. mop sink, or to the exterior. Drain piping should not discharge to a floor drain.
 - ix. Fire protection piping in finished areas shall be concealed where possible. Where it is not possible to conceal piping, the Design Professional shall consult with the campus as to the location of the exposed piping. Special attention should be given to support of exposed piping.
 - x. Standpipe hose connections within stairs shall be located at intermediate landings as required by NFPA 14.

STATE LAWS PERTAINING TO RESIDENCE HALL CONSTRUCTION

46. Outline of Applicable New York Laws

- a. New York State Uniform Fire Prevention and Building Code, including:
 - i. Building Code of New York State
 - ii. Fire Code of New York State
 - iii. Plumbing Code of New York State
 - iv. Mechanical Code of New York State
 - v. Fuel Gas Code of New York State
 - vi. Property Maintenance Code of New York State
 - vii. Residential Code of New York State
 - viii. Existing Building Code of New York State
- b. Energy Conservation Construction Code of New York State
- c. Executive Order 111
- d. New York State Department of Environmental Conservation, including:
 - i. Air Emissions
 - ii. Flood Plain
 - iii. Stormwater
- e. New York State Department of Labor
 - i. Industrial Code Rule 4: Construction, Installation, Inspections and Maintenance of Low Pressure Boilers; Construction of Unfired Pressure Vessels
 - ii. Industrial Code Rule 36: Places of Public Assembly
 - iii. Industrial Code Rule 56: Asbestos

47. Accessibility for Persons with Disabilities

- a. Americans with Disabilities Act
- b. Americans with Disabilities Act Accessibility Guidelines
- c. ICC/ANSI A117.1-2003, as referenced by the New York State Uniform Fire Prevention and Building Code

48. Automatic External Defibrillators

- a. Pursuant to Chapter 510 of the Laws of 2004 and Part 303 of Title 9 of the NYCRR, the State of New York requires all public institutions and buildings of the state, including leased facilities, to be equipped with automatic external defibrillators (AEDs) by March 31, 2010.
- b. Office of General Services (OGS) promulgated AED Program Regulations calling for the phased-in installation of public access defibrillation by 2010. Agencies will need to comply with all of the associated AED regulations and submit specified reports and documentation to OGS.

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