## DESIGN

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Exterior Spaces

Introduction

Exterior spaces provide places for interaction, play, group activities, etc. They can become integral parts of the building's overall design and provide a needed break from the density and severity of many urban surroundings. However, spaces on the exterior of a building, especially spaces along a public street or alley, are often subject to intense use and even abuse. When choosing exterior materials, durability and ease of maintenance should be the guiding principles.
Entries and Streetscapes

Entryways and streetscapes in urban neighborhoods are subject to a tremendous amount of use, and occasionally, abuse. Vandalism, graffiti, theft of plantings and fixtures, loitering and "camping out" in entryways are common problems that many owners of urban buildings confront on a regular basis. Although well designed affordable housing often improves the neighborhood within which it is sited, affordable housing is not immune to these larger social problems. Thus, choosing façade finishes which are durable, easy to clean and economical to repair, is very important for areas along public streets. For example, maintenance staff may need the capability to wash down recessed vestibules (such as doorways) if they are used as a bathroom, bedroom or as a place to use drugs. Limiting recessed areas along the street edge, providing a secure hose bib for cleaning, and choosing easily cleanable materials can simplify maintenance and avoid the cost of repeatedly replacing finishes and hardware. In addition, windows that look out onto the public way (and in some cases, exterior security cameras) can also discourage illegal and destructive activities by providing "eyes on the street."

A major challenge is how to address the need for durability and ease of maintenance while recognizing the role that streetscapes play in contributing to vital, lively, and attractive urban environments. Most people experience buildings at the street level and are most aware of buildings' entries and façades. One of the more successful strategies for combating NIMBYism (opposition to affordable housing based on the position that "It may be a good idea, but 'Not In My Back Yard!'") is to design attractive buildings that complement the design of neighboring buildings. Since neighborhood perception is important, the façade should be designed so as to extend local patterns and should employ surface materials, plantings and window openings which contribute to an attractive and active street environment. The best designs allow people inside the building to feel connected to the larger neighborhood without sacrificing privacy and security.
Key Concepts

Durability and Ease of Maintenance: Perhaps no place is the quote from property management staff, "make it bomb-proof or easily replaceable," more applicable than when selecting street-level finish materials. Designers and developers must anticipate heavy use and abuse, and choose materials accordingly.

- Ceramic tile, stone wainscoting or even split face block along the base of the street level façade can be an attractive choice that provides a tough, durable surface. However, such materials can be difficult to rid of graffiti, which can be a significant problem on the façade of a building. Some sponsors elect to use a "sacrificial" graffiti coating that comes off when cleaned, allowing the graffiti to be removed at the same time. This approach works best if maintenance is prepared to reapply the sacrificial coating after graffiti removal. Otherwise, it is a "one-shot" fix. As an alternative, painted surfaces provide for a relatively "quick and easy" repair. When a building gets "tagged" with graffiti, most building managers believe the graffiti should be removed, or painted over, as soon as possible to discourage similar acts in the future.

- "Industrial" strength hardware should be used for principal entry doors (including electronic door locks/releases and power actuated doors). If hardware fails, management will be forced to decide whether to leave the entry either permanently closed or permanently open (neither being a popular option) while the hardware is repaired or replaced. The expense of repair and replacement is exacerbated by the inconvenience to tenants and compromised security.

Energy Efficiency: Exterior lights should be wired to "photo-cells" that automatically turn exterior fixtures off during day-light hours.

Indoor Air Quality: Floor mats ("walk off mats"), preferably on both sides of the main entry door, reduce cleaning requirements and can minimize the incidence of "slip and fall" accidents during wet weather. Perhaps most importantly, floor mats can substantially reduce the amount of dust and other pollutants that are tracked into the building from the outside which otherwise would degrade the quality of the indoor air.
Other Design Considerations

Safety: Large expanses of windowless, blank walls at the street level can create an unsupervised environment that fosters anti-social and potentially destructive behavior. In contrast, ground floor commercial space or lobbies with windows at street level can help create a more active street front that encourages “eyes on the street” security. In addition, where ground floor residences are placed along the street, elevating them from the street level will help to provide privacy.5

Accessibility: In general, sponsors should not assume that they will be allowed to modify the slope of the sidewalk in order to provide required accessibility to exterior doors. Rather, measures that promote accessibility, such as ramps in lieu of steps, should be located within the footprint of the building. Work on the sidewalk typically must be limited to improving sidewalk accessibility. Existing sidewalk slopes must be measured precisely and calculated carefully in order to design an accessible entry access.6

Landscaping: Landscaping can provide natural shading and “soften” the edge of a building. In addition it can increase privacy by limiting the public’s ability to get close to low lying windows and doors. Hardy, native plants that thrive under local climate conditions with little additional irrigation are best for “durability” and “ease of maintenance.” Some sponsors have selected plants with thorns when there was a concern about the planting area being used as a place to sit, sleep, or to “stash” contraband.

Lighting: Highlighting architectural elements, such as cornice or trim details, with exterior lights can produce a dramatic and pleasing effect as well as contribute to a well-lighted and safer street at night. However, window openings to individual units should be shielded from exterior lights in order to avoid unintentionally lighting the unit interiors.

Entrances: The use of additional volumes, voids, canopies, threshold detailing, paving, etc. can give prominence to the entry. Art work or unique finishes at the entry can personalize the building and give users a sense of pride.


3 When selecting colors for the façade, it may be useful to consider that people frequently lean against the front of buildings, with one foot braced against the building. For buildings with light colored paint at low elevations of the façade, the resulting footprints can be unsightly and present an ongoing cleaning problem for maintenance.

4 Energy efficiency on a city-wide level can be promoted by providing secure bicycle parking. This will encourage bike use by residents and visitors alike, thereby reducing urban vehicular traffic (and fossil fuel consumption) and cutting down on associated noise and air pollution.

5 However, if the units are "stepped up" from the street, it may be difficult to ensure that these units are accessible for people with mobility impairments who use wheel chairs.

6 In San Francisco work impacting the sidewalk may need several permits and approval of three different public authorities: the Department of Building Inspection ("DBI"), the Department of Public Works - Bureau of Street Use and Mapping ("DPW-BSM"), and the Mayor's Office on Disability ("MOD").

7 As mentioned above, be aware that creating "nooks and crannies" may invite loitering by people not affiliated with the building.
Courtyards

Even though courtyards can be difficult to include in urban settings, a certain amount of common outdoor space is important (and often required). Design elements can encourage use of the courtyard, and by extension, provide areas for residents to interact. Since courtyards are shared spaces, provision of durable ground cover, paving material, site furnishings, and plantings should be a guiding principle.

Whether or not tenants will take advantage of a courtyard largely depends on its design. Most successful outdoor common areas are oriented to receive ample sunlight and located close to other common spaces such as laundry facilities, community dining areas, lobbies, etc. Organizing adjacent units so that they look out onto shared areas will encourage the use of courtyards as play areas because parents may feel more secure letting their younger children play in the yards if they can be easily monitored from inside the unit.

Key Concepts

Durability and Ease of Maintenance: Courtyards must be designed to withstand heavy use (as is the case with all common areas) and also continuous exposure to the elements. Therefore, all design elements (paths, furniture, plantings) should be extremely durable. In addition, exterior courtyards must be designed with an eye toward ease of maintenance. Sufficient, secure storage must be available in close proximity to the courtyard for cleaning and gardening supplies. Hose bibs should be regularly spaced to minimize the length of hose needed to water plants and clean walkways.

Energy Efficiency: Exterior lights should be wired to photocells if they are designed to remain "on" throughout the night. Alternatively, they can be controlled by a timer, or a combination of a timer and motion sensor. Regardless of the method used, it is critical that exterior lights be turned off during daylight hours.

Recycling: Trash receptacles should be provided in conjunction with adjacent recycling containers. In addition, areas with plantings need adequate storage for compost containers so that green (compost) waste is diverted from landfills. Finally, a variety of extremely durable site furnishing products (such as chairs, benches and tables) made from recycled materials are now available for common, exterior areas.
Other Design Considerations

**Water Conservation:** Exterior plants chosen for drought tolerance help to insure that the courtyard remains verdant even during periodic droughts. Properly designed and maintained irrigation systems can provide optimal levels of water for plant growth, while minimizing staff time necessary for maintaining plants.

**Climate:** Shading patterns and local climate information are important for determining the amount of sunlight that will enter the courtyard and the direction of prevailing breezes. Roof spaces used for exterior common areas frequently need to include "wind breaks" so that prevailing winds do not render the space uncomfortable.

**Safety:** Exterior common areas need to restrict access by members of the public in order for them to be secure and to be used by tenants. Adequate lighting is important to insure resident safety during the evening. In addition, toxic plants should be avoided in family housing, or in any housing that includes exterior play areas.

**Accessibility:** Raised planters protect plants from trampling and can make gardening accessible for people with a variety of abilities. In addition, surfaces used for pathways and patios ("hardscape") must be accessible to people with disabilities. Commonly identified "architectural barriers" that impede access for people with disabilities who use wheelchairs include cross slopes that exceed 2%, soft pathway materials that cause wheels to "dig in", and surfaces that are "bumpy" that cause pain for people with back problems who use wheelchairs.

**Tenant Participation:** When tenants feel a sense of "ownership" over common outdoor areas it can encourage use of the spaces and discourage negligent or destructive behavior. Creating opportunities for tenant participation in community projects (such as adding tiles to benches or creating a community garden) can foster a sense of ownership among residents.

**Landscape:** A combination of hardscape (pavers, concrete walkways, etc.) and softscape (grass and plantings) provides visual interest and can accommodate a variety of activities. Absent a dedicated "programmatic" need, avoid large expanses of paved/hardscaped areas as these may be difficult to use and will contribute to storm water run-off. Instead, break up large areas into smaller spaces for sitting or recreation.
1 Composting yard waste may act as a catalyst to generate tenant interest in additional recycling and compost efforts.

2 A good source of information on site furnishings made from recycled materials is the Recycled Content Product Database, sponsored by the California Integrated Waste Management Board at www.ciwmb.ca.gov/rcp

3 The Pacific Energy Center offers classes and has a “tool lending library” that can be used to determine the amount of sun that a site will receive during different times of the year. See, www.pge.com/003_save_energy/003c_edu_train/pec/003c1_pac_energy.shtml
Playgrounds

Many of the general issues that apply to courtyards and common outdoor areas are equally important for playgrounds. However, design and construction of playgrounds and playground equipment is an increasingly specialized field. For example, playground equipment must meet specific safety requirements. In addition, playgrounds need to be accessible to people with wide ranging abilities.

Key Concepts

**Durability and Ease of Maintenance:** Most modern play structures designed for common area use are quite durable. However, equipment designed for residential "back yard" use is not designed to withstand the level of use encountered in multifamily facilities.

The major maintenance concerns for play equipment are cleaning and safety. Maintenance staff needs adequate supplies to keep the play area clean, including a hose bib and possibly a floor drain. The flooring of the play surface needs to have sufficient slope to drain away water, yet be flat enough for accessibility. Finally, maintenance staff need proper tools and training to make simple adjustments and repairs to keep the play structure maintained in a safe, accessible and operational condition.

**Recycling:** Rubber play surfaces made from recycled tires are safe and accessible and are available in a variety of colors in either a "tile" or "pour and trowel" form.

Other Design Considerations

**Toxics:** Many older play structures were built using pressure treated lumber containing arsenic and other toxic materials. In general, it is a good idea to replace these older structures with modern, safe, accessible play structures.

**Safety**

- Posted rules and safety guidelines are recommended, and often required.
- A protective barrier, such as a fence, is very important to keep children from wandering into unsafe areas.
- Play areas need lots of clear space and are typically required to have a 6’ “use zone” of unobstructed space around each play structure, and 9’ between structures with a height above 30”.

Recycled rubber surface with a strong pattern provides a safe play surface for the kids at Minna Russ Apartments.
Sand boxes in an urban environment can become litter boxes or even worse, places where people might hide needles or other contraband. While sand provides an important tactile experience for infants and toddlers, it must be kept clean. Finally, sand does not typically provide an accessible path of travel because it is too soft to traverse in a regular wheelchair.

**Accessibility**

- An accessible path of travel should be provided to all play areas and within each play area. Flat surfaces should have no more than 2% slope.

- At least 50% of the "play stations" should be accessible to people with mobility impairments who use wheelchairs.3

- "Wood chips" or "tan bark" has often been used in the "use zone" around play equipment. However, these materials frequently present accessibility problems for people with mobility impairments who use wheelchairs. Rubber play surfaces provide safety in "use zones," without the accessibility problems created by wood chips or bark.4

**General Design Issues**

- Play areas that appeal to children of differing ages and abilities encourage interaction and allow families to play together. However, infants and toddlers typically need a separate, secure area so that they are not inadvertently injured by older children.

- Location, orientation and color of play equipment can be very important. For example, dark or reflective equipment (such as a slide) placed in direct sunlight can get very hot. However, as with all outdoor spaces, locating play areas so that they receive adequate sunlight (especially in a climate such as San Francisco’s) will encourage their use.

- Provide a water source (drinking fountain) to help keep children adequately hydrated while playing.
When designing accessible play areas, it is important to provide accessibility for children and for parents with disabilities in order to provide a safe, enjoyable experience for all users.

4 For accessibility guidelines for play areas, see: www.access-board.gov/play/finalrule.htm
Common Areas

Introduction

Common areas (sometimes referred to as "public areas") include both areas of utility (such as restrooms and hallways) and spaces for social interaction (such as lobbies and community rooms). Common areas are typically places of heavy traffic and use requiring materials that are especially durable and easy to maintain. Consulting with property management personnel and maintenance staff during the design phase will help to ensure the choice of appropriate building materials. Ideally, even the more utilitarian spaces such as hallways or stairs can be designed in such a way that casual social interactions can occur and are even encouraged. For example, paths of circulation that are integrated with or adjacent to common areas, and which incorporate natural light, views, and provide sitting areas (including space for people with mobility impairments who use wheel chairs) can become prime locations for casual interaction among neighboring residents.
Lobbies

Lobbies serve a variety of important functions in multifamily residential buildings. A lobby may act as the living room, reception area, mailroom, security desk, and even loading dock. Durability is the number one “key concept” because almost everyone passes through the lobby when they enter and leave the building. In addition, since the lobby is, among other things, the “grand entry and living room” of the building, aesthetic concerns are very important. In spite of these multiple, and sometimes conflicting uses, lobbies should be inviting, accessible and safe for visitors and residents alike.

Key Concepts

**Durability and Ease of Maintenance:** In light of the anticipated heavy use of the lobby, property management should be invited to provide input on the design. Durable, easy to maintain finishes, fixtures and furnishings will offer savings over time (“life cycle costs”). Since a lobby represents a relatively small area within the overall building, this is an area where durable materials may be specified that may be too expensive to be used throughout the entire project.

- **Front door:** The main entry door, including any hardware or electronic lock release, needs to extremely durable because it is used almost constantly. The consequences of having a broken or unusable entry door can be significant in terms of security, accessibility and inconvenience.

- **Flooring:** The incredible durability of marble or granite floors can sometimes justify the high initial cost in limited high traffic areas such as the entrance and elevator lobbies. Other preferred flooring materials include: stained concrete, terrazzo, linoleum, wood or bamboo, and tile. Though usually the first choice for initial cost considerations, carpet should be the last choice for durability in high traffic areas. In addition, carpet presents certain indoor air quality (“IAQ”) concerns (see Section 3, Materials: Carpet).

- **Walls:** Dirt and damage to walls is inevitable in high traffic areas such as entries and lobbies. Placing “wainscoting” on walls for extra protection helps to reduce future maintenance and repair costs. Wainscoting can be made from almost any durable material, including wood, tile, plastic, or stone. Tall wood baseboards, chair rails, and corner guards also help to protect walls against normal wear and tear and damage caused by furniture moving.

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*Ample glazing and a clear line of site to the front door ensures that reception staff at this transitional housing facility for women can control access to the building.*

**specification tip...**

*Often the first choice for initial cost considerations, carpet should be the last choice for durability in high traffic areas.*
Furniture: Lobbies use a variety of furnishings, including chairs, benches and couches. Opinions vary on the relative merits of hard vs. soft surfaces (durability vs. comfort). Regardless of the ultimate decision, furnishings need to be easily cleanable and sturdy.  

Cleaning and Replacement Supplies: "Ease of maintenance" means more than simply choosing durable materials. It also means that supplies should be located nearby in order to simplify cleaning. In addition, fixtures and finishes should be easily repairable or replaceable with ready available supplies from local sources. Things that are complicated to fix, or that require special parts that are difficult to obtain, will remain broken for a longer period of time.

Indoor Air Quality ("IAQ"): IAQ starts at the front door. One of the easiest ways to minimize the amount of pollutants within a building is to limit the amount that are tracked in from outside. That means a good floor mat, or series of floor mats, at the front entry door. Recessed floor mats have the added safety advantages of reducing a potential trip hazard. However, recessed mats may need to be custom ordered, so it is a good idea to consult with property management, and to prepare for it early in the design process.

Recycling and Trash

Recycling: Insuring that the design includes space for recycling is particularly important if there will be vending machines or if newspapers will be available in the lobby.

Rehabs & Trash Removal: If at all possible, the lobby should not be used as the route for removing trash from the building. However, on some rehabs it is difficult to avoid. In that case, the lobby floor covering should be easily cleanable and durable enough to handle the type of trash containers that will be used, sometimes on a daily basis. If the building has a trash compactor, the floor choices are limited because relatively few surfaces can handle the tremendous weight that a fully loaded dumpster concentrates on the few square inches of hard wheels.
Other Design Considerations

Lobby as "Living Room": Units in affordable housing are sometimes rather small, especially in older residential hotels ("SRO's"). The Lobby can act as a grand living room for all tenants, providing a place outside of one's unit to relax, socialize, or wait for a friend. However, the demands on a lobby are tremendous. Unlike most living rooms, the lobby may be "home" to a hundred people or more who all share the same space.

- **Windows**: Lobbies should "connect" to the street with windows (or "storefront" glazing) that allow residents sitting in the lobby to see the street and sidewalk. Windows can improve energy efficiency by provide natural lighting ("daylighting") inside the lobby during the day.\(^5\)

- **Rehabs and existing finishes**: Some old lobbies have intricate crown moldings and other beautiful trim. Sometimes the moldings and trim are intact, but have been covered by previous rehabs. Cost effective restoration of original millwork is desirable, but not always feasible particularly if the millwork is only discovered after construction has started. Exploratory demolition can uncover hidden architectural elements during pre-construction when it may be easier to include restoring the original millwork in the scope.

**Reception Desk**: It is important to understand the function and needs of front desk staff. The reception desk sometimes resembles a "control station" where multiple tasks are performed from a single location. Some reception desks are staffed around the clock, others may only be staffed at certain times. Some important design considerations include:

- **General Design and Storage**: Almost all reception desks have at least a telephone and some file cabinets. It is generally cheaper to purchase stock file cabinets than it is to custom build them. Many reception desks now have computers, printers, and security monitors. Sometimes desk staff have specialized duties, such as maintaining sign-in sheets and distributing mail, equipment (such as vacuums), or laundry (particularly in older SRO's). The design should accommodate all of the known functions of the desk staff, and should provide adequate storage space for the intended uses.

- **Security**: The desk should be situated so that staff has a clear view of the entry door and front of the building in order to "buzz people in" through the front door and to be able to speak to people outside of the building using an intercom. If security cameras will be used, the desk will need adequate room for video monitors and possibly video recording equipment. The electronic door release (to "buzz people in"), intercom and video monitors all must be located at parts of the desk where the desk person typically works, so that it is easy to use them while keeping an eye on the front door. If multiple cameras are used, "split screen" monitors allow for simultaneous viewing of.

**Amenity Checklist**

- A bulletin board for community messages
- Vending Machines: Space needs to be provided in the original design to prevent vending machines from being viewed as an afterthought "plopped down" in the middle of the lobby, or interfering with the path of travel through the lobby.
- Shelves or benches to rest groceries on, particularly near the elevator.
- Drinking fountain: Consider providing two, a "high" one (for folks who have a hard time bending over) and "low" one (for people who use wheelchairs and for children).
- An accessible pay phone for persons with hearing disabilities ("TDD").
- Storage areas and bins near manager's office for reading material, communal toys, etc.
multiple images (otherwise significant space is needed for multiple monitors). If the security system has recording capabilities, it will be necessary to provide storage space for the recording equipment. Security of desk staff themselves can also be an important consideration. Some desks are designed so that staff is on a platform slightly elevated above visitors so that it is difficult for someone to physically reach the desk staff. In addition, some security designs have even included emergency buzzers and an “escape route” for desk staff.

- **Fire Life Safety:** The fire alarm panel is typically located behind, or adjacent to, the reception desk. This location allows staff to monitor the panel, and the fire department to quickly find the panel when they respond to a call.

- **Accessibility:** The desk should be designed with adequate turnaround room and knee space so that a staff person with mobility impairments who uses a wheelchair is able to work behind the desk. In addition, the front of the desk should be accessible to visitors that use wheelchairs. The main section of the visitors’ side of the countertop should be low enough for people in wheelchairs to be able to reach and transfer packages, or fill out forms.

- **Connection to other areas:** Sometimes the front desk is connected to the manager’s office, counseling rooms or other staff areas. It is important to understand the relationship of the front desk to other areas and insure that the design provides an accessible, secure path of travel between these areas.

- **Occupied Rehab:** If a building is occupied during a rehab, then the demands on the front desk can increase dramatically, even as the desk itself is being relocated. Any additional burdens on the front desk should be carefully planned (such as signing in construction workers). In addition, it is important to provide for temporary relocation of critical elements (door release, intercom, phones, fire alarm panel, computer, monitors, etc.) if the existing desk needs to be temporarily relocated while a new reception desk is constructed.

**Mail:** Residents’ mailboxes are frequently located in the lobby. This provides a secure place for mail distribution. Mailboxes that are located in full view of the reception desk tend to improve security.

- **Accessibility:** Mailboxes should be located within the reach range for people with mobility impairments who use wheelchairs.

- **Seating:** It is a good idea to provide some sort of seating near the mailboxes to facilitate the natural socialization that blossoms when residents congregate to check their mail.
Occupied Rehab: If mailboxes must be moved during construction, it is important to coordinate with the Post Office to insure that temporary construction does not interfere with the normal delivery of the mail. (Tenants can become justifiably upset if mail is disrupted.)

1 Wainscot is a wall covering for the lower part of an interior wall.

2 Open areas should be provided out of the path of travel and immediately adjacent to seating areas so that people with mobility impairments who use wheelchairs have a natural place to gather, relax and join conversations with others.

3 In general, anywhere a trash can is provided, equivalent space should also be provided for recycling.

4 For example, new ceramic tile installed in a lobby as part of a major rehab cracked rather quickly when fully loaded dumpsters were rolled over it a few times.

5 Windows with good NFRC ratings (see Section 3: Windows) provide excellent thermal insulation, thereby improving energy efficiency and insuring that the area next to the windows is comfortable, and therefore more likely to be used.
Guidelines for sustainable affordable housing
Hallways and Stairs

Hallways, corridors and stairs are places of high traffic. Investing in high quality, durable materials, and anticipating areas of wear and damage, will save money in operating and replacement costs over the long term (“life cycle costs”). Communicating with maintenance staff early in the design phase helps to avoid common mistakes, and insure that supplies are readily available for maintaining these high traffic areas.

Hallways, corridors and stairs also play important roles in the social life of a residential building. Chance meetings and interactions between residents are likely to occur along paths of circulation. Benches or seating along or adjacent to corridors create a natural space for such casual interaction to occur, thereby helping to foster a sense of community among tenants. Ample landings and sitting areas (for resting) at stairs can be helpful, especially in facilities for seniors. Adequate light enlivens buildings and increases residents’ sense of safety. In addition, natural light (“daylighting”) saves energy that would otherwise be used to power light fixtures that may be left “on” 24 hours a day, seven days a week.

Key Concepts

Durability and Ease of Maintenance

- Floors: In general, hard surfaces, such as linoleum, tile, wood/bamboo, etc., are preferable to carpet in hallways because of the high traffic associated with areas of circulation. Even the most durable carpet will likely need to be replaced every 5 to 10 years while a surface such as wood/bamboo, linoleum or tile can last upwards of 30 years. Longer life span means improved affordability due to lower life cycle costs.

- Carpet on stairs is particularly problematic because it wears out very quickly. Rubber treads offer a more durable stair covering that provides excellent slip-resistance.

- A carpet runner can be used over a hard surface for aesthetic and comfort purposes, while maintaining the relative ease of cleaning and maintenance associated with hard floor coverings. Carpet runners must be adequately secured in order to minimize trip hazards and to maximize accessibility for persons with mobility impairments.
When carpet is used in corridors, hard durable surfaces should be used in particularly high traffic areas, such as in front of the elevators, stairs and trash chute.

Walls can take a beating in high use areas. Large pieces of furniture and appliances are very difficult to navigate through narrow hallways and stairs. The walls typically bear the brunt of these assaults. In particular, corners can be easily damaged, and should be protected by corner guards. In addition, wainscoting or a chair rail can provide an attractive design feature as well as an extra layer of wall protection.

Cleaning: An adequate number of easily accessible janitor closets facilitates cleaning and maintenance. Hard surface floor coverings typically require access to plumbing for mopping while carpeting requires regularly spaced electrical outlets for vacuuming. Preferably, janitor's closets would be located on each residential floor to help insure an attractive, well maintained building.

Energy Efficiency

"Single loaded corridors" (hallways with units on only one side) can provide opportunities for cross ventilation (improving IAQ) and natural daylighting (saving energy). Although single loaded corridors tend to increase the amount of space devoted to circulation (thereby driving up initial costs), they can lower life cycle costs by reducing ongoing energy costs for lighting and ventilation. Single loaded corridors that "wrap around" common outdoor space, such as courtyards, are particularly effective in encouraging a communal environment.

Windows and skylights can enliven spaces and reduce reliance on electric lighting during the day. To promote energy efficiency, artificial lights can be wired to a light sensors or photocells so that the amount of artificial lighting used is limited to what is needed to compliment natural light.

Indoor Air Quality ("IAQ")

Hard surfaced floors promote good indoor air quality ("IAQ") because they don't harbor dust and allergens the way carpeting does.

New carpeting may also degrade IAQ if it "off gasses" volatile organic chemicals ("VOC"). Sponsors concerned about IAQ should consider low or no-VOC, carpet and adhesives (See Section 3, Materials: Carpets).
Recycling and Trash:

- Corridors often include small trash rooms as a convenience so that tenants don't have to carry their recycling and trash all the way to the basement. The corridor adjacent to a trash room needs durable floor surfaces to handle the inevitable spills.

Other Design Considerations

Accessibility

- Durable, visually contrasting stripes at the top and bottom tread of each run of stairs improves accessibility for many people with vision impairments (and is required by Code).

- Consider how people with mobility impairments who use wheelchairs will exit the building in case of an emergency when the elevator is inoperable.

- If fire sprinkler risers or standpipes are located in a stairwell, they should not encroach upon the required clearance space for the stairs and landings. In addition, it may be necessary to install bars around any hose bibs so that a blind person using a cane can sense the overhanging obstructions. Communication with the fire department can help ensure that emergency access to hose bibs is not impeded by the location of the bars.

- Fire alarm strobes are discouraged in fire exit stairs because flashing strobes can be disorienting and pose significant problems for people with certain disabilities, including epilepsy.

Amenities

- Benches or other places to rest along hallways help create areas for casual interaction as well as assist residents who need somewhere to place groceries or other items. Any seating in common areas should include an immediately adjacent space that can accommodate a wheelchair.

- Security systems that include coverage for hallways and stairs need to be carefully located to provide the best coverage. Door alarms are available in a range of options, from inexpensive, battery operated models that only sound locally when a door is opened, to more expensive, hard wired alarms, that notify staff at the security desk or manager's office and identify which door has been opened.
**Guidelines for sustainable affordable housing**

**Safety:** Long hallways may feel unsafe to tenants. “Blind” corners, niches and hiding places along circulation paths can present both real and perceived safety concerns.

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1 One multifamily residential building had some corridor carpeting irreparably stained during tenant move-in, leading the sponsor to replace the corridor carpeting prior to the grand opening. A hard, cleanable floor covering would have saved the owner the considerable expense and trouble of replacing carpeting that was virtually brand new.

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**installation tip...**

Some owners elect to use multiple colors of carpeting in hallways. The border of the carpet contrasts with the center of the carpet. While carpet is generally not recommended for hallways, if you do specify carpet, consider using multiple colors where the edge contrasts with the center. This can allow for replacement of the higher traffic center while leaving the border intact.
Community Rooms

Community rooms can be an important resource for resident meetings and organized activities. Community rooms need to be used regularly in order to justify their cost and space. The most successful community rooms are central to the building's overall design rather than removed from residents' daily pattern of living. Connecting community rooms to other areas of high use, such as courtyards, lobbies, laundry facilities, communal kitchens, or main paths of circulation, will encourage their use, and improve their security.

Actual use of community rooms may depend on management policies. Spaces that require special permission by management will be less used than others. However, unsupervised spaces can quickly become a property management problem, and can present a real security risk to other residents in the building. Some community rooms are locked during certain hours of the day in order to balance use and maintenance/security needs. Scheduling activities after school in family buildings can increase the use of these spaces.

Key Concepts

Durability and Ease of Maintenance

- Floors: As with all high use common areas, hard, cleanable surfaces are preferred, including: wood, bamboo, cork, tile, linoleum, stained concrete, etc. In order to provide some of the benefits of carpeting (noise dampening and "sense of warmth"), consider area rugs on top of hard, cleanable floor surfaces.

- Walls: Wainscoting made of wood, tile, marble, glass reinforced fiber board or other heavy duty wall covering is advisable to help protect walls against children playing, or other daily wear.

- In combination with wainscoting, or if wainscoting is economically infeasible, high baseboards, chair rails and cornerguards can help protect walls and add architectural interest. If they are painted, use semi-gloss at a minimum to insure that they are easy to clean. Even providing a painted "wainscot" below a chair rail will simplify touch up and repairs. When damage occurs, only a portion of the wall surface will need to be re-painted.
The best community rooms receive a lot of use, and therefore benefit from a janitor's closet in close proximity in order to simplify cleaning and maintenance.

**Energy Efficiency**

- HVAC: Avoid falling into the trap of sizing "too big" of an HVAC system, "just in case." An oversized system will cost more to purchase and to operate, and will prematurely wear out due to constant "cycling" (starting and stopping). Size your system to be effective most of the time, rather than sizing it for the "worst case scenario."

- Lighting: Occupancy sensors should be used to turn off lights in unoccupied rooms. In addition, energy efficient lighting, such as fluorescents, should be provided to suit the various functions of the room: bright for meetings and for cleaning, and more subdued for daily use. Finally, dimmers which alter light intensity in response to available daylight ("daylighting") can be used with some fluorescent lights.

**Indoor Air Quality ("IAQ"):** Ventilation can be a challenge in a community room because the occupancy load can fluctuate dramatically, being rather high at times. Even rooms with operable windows typically need to provide mechanical ventilation.

**Other Design Considerations**

**Safety:** Connecting community rooms to other areas of high use will improve security by encouraging lots of "eyes and ears" to be nearby to pay attention to what is going on in the room.

**Accessibility:** Partition doors are sometimes used to divide a larger community room into two or more smaller rooms for small group meetings. However, partition doors can present accessibility problems if they require more than 5 lbs of force, or tight pinching, grasping or twisting to operate. In addition, they typically do not provide adequate privacy for full confidentiality.

**Rehabs:** Sometimes the only place for a community room in a rehab is in a rather isolated part of the building, such as the basement. In those cases, it may be a good idea to consider installing a security camera in the room to improve security.

**Noise**

- Acoustic insulation is important if the room is adjacent to living units.

- Carpet (although not very durable) is considered better at dampening noise...
than hard cleanable surfaces. It is prone to staining, however, and frequent cleaning and/or replacement should be included in the maintenance budget if it is used.

General Design Issues:

☐ Adequate storage is typically needed for supplies, such as folding chairs and tables.

☐ Locating mail boxes in an area with visual access to the community room allows tenants an excuse to "check out the action" in the room before deciding if they want to join whoever might be using it.

☐ An accessible restroom adjacent to the community room is very desirable, but it can present security/maintenance/property management challenges, particularly if it is rather isolated from other common areas.

1 A common play or recreation area is important for family projects, and group activity facilities are important for seniors.

2 When using an area rug, make sure it does not create a trip hazard, nor present a barrier for someone using a wheelchair.
DESIGN
COMMON AREAS

Guidelines for sustainable affordable housing
Communal Kitchens

Communal (or "community") kitchens provide a common space for residents to prepare meals and socialize. These spaces can be an important (albeit expensive) amenity, particularly in older residential hotels with small units that lack private kitchens. Including an eating area as part of the design will help to create a kitchen that is a center of activity and circulation. Most successful communal kitchens have been designed to be extremely durable, easy to maintain, with good ventilation and ample lighting.

Actual use of communal kitchens varies widely depending on resident population and property management practices (particularly cleaning and maintenance). Poorly designed or poorly managed communal kitchens can become unpleasant, unsanitary, unsafe, and therefore under-utilized.

Successful communal kitchens benefit from vigilant maintenance and regular cleaning. Therefore sponsors should consult with property management staff (and residents if possible) throughout the design of a communal kitchen. Even the best-designed communal kitchen will become an eyesore, or worse, without adequate resources devoted to the maintenance and cleaning of the space.

In rehab projects, it is often difficult to find a suitable location for a communal kitchen. One popular option, particularly in older residential hotels, is to locate the communal kitchen in the basement, an often underutilized area. Designing a basement communal kitchen requires commitment on the part of the owner and project team to overcome likely challenges including: fire safety and egress, lack of natural lighting and ventilation, security, and maximizing accessibility for people with mobility impairments.
Countertops in communal kitchens encounter more use, and unfortunately sometimes more abuse, than is commonly encountered in private, residential kitchens. Scratches, burns, holes and delamination are commonly reported problems. Therefore countertops need to be “bombproof” (extremely durable) or easily replaceable by in-house maintenance staff. The materials must also be easily cleanable and fire resistant. Solid surfaced materials are preferred for easier cleaning. Integral “backsplashes” eliminate an unsightly seam and provide a durable, waterproof surface right where it is needed. All edges, such as the interface between the wall and the counter, should be properly sealed or caulked to prevent water intrusion, and to eliminate a path for insects and vermin.

Stainless steel countertops, such as those used in commercial kitchens, are an excellent choice because they are very durable, fire resistant and easy to maintain. Unfortunately stainless steel requires a very high initial investment. In addition, manufacturers sometimes recommend specialized cleaning agents to maintain the appearance. Finally, if it is ever damaged (such as due to impact, or by vandalism), the cost to repair can be prohibitive.

Other solid surfaces, including natural stone (such as granite) or synthetic materials such as cultured stone, aggregate stone (Silestone), solid surface (Corian), or even concrete, can perform very well in community kitchens, though some are susceptible to burn marks when hot pans are placed on them.

Ceramic tile countertops can also be durable, but the grout between tiles tends to collect grime and dirt. In addition, larger tiles are susceptible to cracking and breaking due to impact. Particle board or plywood should not be used as the substrate directly under a tile countertop due to problems associated with swelling and delamination caused by water absorption. Rather, a mortar bed or products such as “Durarock”, “Wonderboard” (glass fiber reinforced cementitious board) or equivalent, should be specified over a plywood base for improved durability and lower life cycle costs.

Another viable countertop option includes wood butcher block, which makes an excellent cutting surface, and can be strikingly attractive. In fact, it is possible to mix different counter top materials to match the use in the particular area of the community kitchen.
Plastic laminate, such as Formica, can be problematic in high use community kitchens because it is susceptible to burn marks, and it can delaminate if water is allowed to "stand" near a seam. However, due to its low initial cost, and relatively low cost to replace, plastic laminate can be considered by owners who are prepared to regularly inspect the surface and make repairs as necessary. Providing a fire-resistant pad near the stove can reduce burn damage due to hot pots and utensils.

Walls in communal kitchens need to be durable, easily cleanable, moisture resistant, and in some locations, fire resistant. As with other common areas, wainscoting and chair rails can be used to improve durability. The common complaint of grease stains on walls can be addressed by providing durable, cleanable wall surfaces, and an ongoing program of regular cleaning. Painted surfaces in communal kitchens should be coated with a glossy paint to make cleaning easier.

Floors in communal kitchens must stand up to heavy use, spills and moisture (humidity from cooking and water from cleaning). Therefore only the most durable, water resistant, cleanable floor coverings should be considered, including: linoleum, tile, stained concrete, epoxy flooring (such as "dexotex"), or high quality sheet vinyl with integral color (rather than cheaper vinyl that simply has a color or pattern only on the surface that quickly wears off). Vinyl composition tiles ("VCT") are not typically recommended for communal kitchens because the tiles result in a floor surface with a lot of seams that can provide an avenue for water to penetrate down to the subfloor and cause delamination of the VCT from the subfloor. A floor drain can simplify maintenance and clean up.

Cabinets in communal kitchens need to be the most durable available, even more durable than those used in residential units (and far more durable than those used in office areas where water is not a problem). Sponsors should consult with property management to help specify cabinets that are durable and easily repairable by in-house staff with parts that are readily available.

Cabinet faces or edges sometimes delaminate if they get wet from water running off the countertop, or even from high humidity if there is not adequate ventilation in the kitchen. Solid wood door and drawer panels are much less likely to delaminate than veneers. Particle board substrate will degrade rapidly if it comes in contact with water, and therefore should be avoided in communal kitchens.

Metal cabinets can be extremely durable, though they may be rather expensive to purchase, easily dented, and can have an "institutional feel."
☐ Maintenance storage: Communal kitchens must have adequate storage space, preferably a janitor's closet, for maintenance and cleaning supplies.

**Energy Efficiency**

☐ "Energy Star" rated appliances, such as refrigerators and dishwashers, realize energy savings over the life of the appliances that more than pay for the marginal increased purchase cost of the appliances. Therefore they have lower "life cycle costs" that improve long term affordability and should be used whenever possible.

☐ Occupancy sensors should be used to insure that lights are turned off when the kitchen is vacant. In addition, fluorescent lighting (required by Code) provides high quality light in an energy efficient manner.

**Indoor Air Quality ("IAQ")**

☐ Adequate ventilation, including a ducted range hood to exhaust cooking odors, smoke, etc., is very important to protect indoor air quality.

☐ All seams, cracks, penetrations, and openings, including spaces between cabinets and walls, must be properly sealed and caulked in order to exclude pests (such as roaches and mice, both of which are asthma triggers) and minimize the need to use harmful chemical pesticides in the future. This requirement should be highlighted in the specifications and verified by careful inspection during construction.

**Recycling:** Communal kitchens need adequate space for recycling, including "green" waste such as food scraps. As a general rule, for every square foot of space devoted to garbage, one to two square feet should be devoted to recycling.
Other Design Considerations

Safety

☐ Fire safety is always a very important concern. In San Francisco, only electric cooking appliances are permitted in community kitchens for fire safety reasons.\(^6\) In addition, community kitchens must have self-closing doors to prevent the spread of fire from the communal kitchen to other areas.\(^7\) Finally, check with local fire authorities to determine whether an Ansul-type hood and duct fire suppression system will be required (like the kind found in commercial kitchen exhaust hoods).

☐ The personal safety of people using the communal kitchen can be improved by locating the communal kitchen near other areas of high use to help create visual connection between the kitchen and other common areas. Alternatively, security cameras can help staff to "keep an eye" on the communal kitchen, even if it is located in a remote area of the building, such as in the basement.

Accessibility: Obviously, communal kitchens need to be accessible to people with disabilities, including people with mobility impairments who use wheelchairs. Common accessibility problems include: lack of turn around space; counters not at proper heights or lacking knee space underneath; non-compliant "reach range" for cabinets, closets, appliances, outlets and controls; steep, high thresholds between the kitchen floor and adjoining floors; and floors with a slope greater than 2%.

Rehabs: High-density existing buildings, such as residential hotels, may only have adequate space for a communal kitchen in the basement.\(^8\) The basement location may be difficult due to issues related to accessibility (including elevator service) and fire safety (including a rated fire exit corridor).

Noise: Due to the relatively high level of noise associated with many people simultaneously cooking (and eating), acoustic insulation is recommended when communal kitchens are located adjacent to units, offices or other spaces that are used for activities that might be disrupted by such noise.

Tenant storage: Storage in a communal kitchen is a challenge because things tend to "disappear" if they are left unsecured. However, when each tenant is provided with locked storage, improperly stored food can create a real nuisance that can be difficult to remedy. One option is to organize tenants into smaller groups and assign space to each group within an energy efficient refrigerator and a ventilated cabinet/food locker space.\(^9\) Whether communal or individual, it is typically preferable for all food storage areas to be located away from the shared cooking surface. Heat and steam from the cooktop can hasten the spoiling of food, and separating cooking and storage can facilitate the use of the space by more than one person at a time.
1 "Delamination" occurs when different layers separate from one another, such as when a plastic laminate countertop surface peels off from the substrate (typically particle board or plywood) to which it had been glued.

2 "Countertops shall be of noncombustible construction." 2001 San Francisco Building Code ("SFBC") sec. 310.2.4.3. In addition, one commonly reported problem with communal kitchens is a lack of place to set hot pans.

3 "Where a wall of combustible construction is located closer than 24" to an electric plate, a wall guard consisting of sheet metal … or other approved materials, shall be secured to the adjacent wall directly to the rear of the electric plates … extend[ing] a minimum of 24" above the cooking top for the full width of the appliance." SFBC sec. 310.2.4.2.

4 SFBC sec. 310.2.4.4 requires that communal kitchen floors be waterproofed.

5 A cabinet veneer is a thin layer (often wood or plastic "melamine") glued to the substrate (often plywood, MDF, or even particle board) to improve the appearance without the initial cost of solid wood.

6 SFBC sec. 310.2.4.2.

7 SFBC sec. 310.2.4.4.

8 Generally speaking, communal kitchens should have more than ten square feet of space (not including cabinets or other fixtures that are not readily removable) for every guest room served. SFBC sec. 310.2.4.1.

9 One storage cabinet with 4 square feet of storage is required for every guest room. SFBC sec. 310.2.4.3.
Common Restrooms and Bathrooms

Common (or "communal") restrooms are typically located on the ground floor adjacent to common areas for use by staff and residents. Common bathrooms are most commonly located on each residential floor in older residential hotels ("SROs") that lack private bathrooms within each unit. Common restrooms and bathrooms should be extremely durable, easily cleanable, well-lit, and fully accessible.

Restrooms and bathrooms are inherently private spaces. Unfortunately, this privacy can provide an opportunity for people to engage in destructive behavior, for example, by damaging toilets. While some damage may be unavoidable, common bathrooms and adjacent areas should be designed to minimize water damage caused by overflowing plumbing fixtures.

The rehabilitation of an existing common bathroom should always be preceded by careful exploratory demolition to determine the presence and/or extent of dryrot (deterioration of wood due to water infiltration), as well as to verify assumptions regarding plumbing and electrical systems. One of the most common change orders in many rehab projects involves repair due to dryrot in bathrooms. Unexpected dryrot repair costs can be minimized by careful inspection and exploratory demolition prior to bidding the work.

Key Concepts

**Durability and Ease of Maintenance:** Common bathrooms are "wet environments" that are used 24 hours a day, 7 days a week. Virtually every durability issue raised in this Handbook applies to common bathrooms. Since repairing communal bathrooms in an occupied building can be extremely difficult, only the most durable materials should be selected, and they must be installed and maintained properly.

- **Flooring:** Tile or epoxy (including "Dryvit") flooring performs well in communal bathrooms. Sheet vinyl is generally not recommended because it typically lacks the durability necessary to withstand heavy, constant use. "Coved" flooring is excellent for preventing standing water from seeping into the wall cavity at the joint where the flooring meets the wall, although it
Lighting: One of the most common complaints about common bathrooms is that they lack adequate light. Common bathrooms typically need a mix of general (typically overhead) lighting plus task lighting at mirrors for personal grooming. Specifying energy efficient lights controlled by occupancy sensors.

Toilet Partitions: Various options are available for toilet partitions, including: coated steel, plastic laminate, phenolic and solid polymer plastic, and stainless...
1 Common restrooms do not include bathing facilities (shower or bathtub).

2 Common bathrooms include bathing facilities, though sometimes in older buildings the communal "shower room" may be physically separated from the common "toilet room."

3 For excellent accessibility design criteria, see the San Francisco Mayor’s Office on Disabilities (“MOD”) website at, www.sfgov.org/site/sfmod_index.asp. Click on the “Resources” link, to the “Quick Sheets” link, and scroll down to “Lavatories and Showers.”

4 “Coved” flooring forms a curve and wraps up the wall, replacing typical base molding.

5 Some sponsors have provided a waterproof membrane under common bathroom floors when the bathroom is located over a ground floor commercial space.

6 Water resistant sheetrock (commonly referred to “greenboard”) may not be used in MOH-funded projects as a substrate for tile in shower or tub surrounds because if the paper surface is exposed to water it can delaminate from the gypsum core causing the tile surface to fail. Rather, cement board (such as “Durarock” or “Wonderboard”) is recommended in these applications.

7 Wall hung sinks in particular need to be regularly inspected and maintained to insure that the “caulk line” between the sink and the wall is intact.

8 Sponsors concerned with Indoor Air Quality should carefully consider the chemicals and cleaners used by maintenance and janitorial staff.

9 Operable windows can supplement, but should not be considered as a replacement for, adequately sized, ducted exhaust fans. Recirculating fans should be avoided because they provide little benefit even though they consume energy, make noise and represent another piece of equipment that needs to be purchased, maintained and eventually replaced.
Service Areas

Introduction

Service areas (also known as "utility spaces"), or areas dedicated to cleaning and maintenance, often receive scant attention during design. If service areas are not made a priority by the owner during the programmatic and design phases, then the designer may try to “squeeze them in” after all other programmatic issues have been addressed. As a result these important spaces can frequently be found tucked into left-over areas, too small to accommodate maintenance equipment and personnel, or too far from the spaces they are intended to serve.

In contrast, owners who communicate the importance of service areas early in the design process are more likely to enjoy the benefits of a properly maintained building over time. In order to insure that this input is timely and fits into the development schedule, maintenance staff should have the opportunity to review the schematic design before the project moves on to subsequent design phases. By understanding and valuing the needs of maintenance staff, developers of affordable housing can help to insure that buildings continue to work well and look great for the long term.
Guidelines for sustainable affordable housing
Laundry Rooms

Many of the design challenges for laundry rooms are similar to those for common bathrooms and community kitchens. All are shared common areas that are heavily used, are likely to experience water leaks or flooding, and must be capable of exhausting significant quantities of water vapor in order to manage interior humidity levels and thereby preserve indoor air quality.

Laundry rooms require some unique amenities, such as tables for folding laundry. In addition, they present some unique challenges, such as the need to maximize energy efficiency and accessibility with equipment that is often leased by property management staff, rather than provided as part of the construction process. Another challenge involves the need for careful coordination between the supplier of the laundry equipment and the mechanical engineer in order to insure that the dryer exhaust system (ducts, and fans if necessary) properly removes moisture from clothing being dried, without exhausting heat from the dryer prematurely.¹

While laundry rooms are areas of utility, they can also be considered places of social interaction. Most residents will make frequent use of a laundry facility if it is provided. Residents are perhaps more likely to meet their neighbors while doing laundry than any other activity. Such social interaction can be encouraged by designing pleasant environments with adequate light and places to sit (space permitting). Also, locating laundry rooms adjacent to other communal areas or kids' play spaces will increase security and ease the burden on parents with small children. Finally, locating laundry rooms next to courtyards (or any open space) can make the space lighter and more pleasant.
Key Concepts

Durability and Ease of Maintenance: In order to simplify maintenance, and thereby help to insure that the laundry room is kept clean and properly maintained, the design should include a janitors closet (located within, or adjacent to laundry room) a floor drain, and a utility or laundry sink.

- Floors: Ideally, flooring should be a continuous membrane with an integral cove. VCT (vinyl composition tile) is not recommended as it may not hold up over time because water tends to penetrate the seams between the individual tiles causing them to buckle and peel. Any flooring should be able to withstand bleach and soap spills. Recommended floors include:
  - Colored concrete
  - Epoxy flooring (such as Dex-o-tex) or concrete with epoxy resin
  - Self leveling Portland cement based topping, such as Ardex
  - Tile over "Wonderboard," mortar or "Hardibacker." Smaller tiles, such as 6"x6" tiles or smaller, help to prevent cracking.

- Washing Machine "Pans": Unfortunately, washing machines may occasionally overflow and flood the laundry room. A three-sided trough under each washing machine that slopes to a central laundry room floor drain can minimize water damage to the rest of the floor. In the alternative, a four-sided metal pan under each washing machine with a 1" drain that connects to the plumbing waste line can serve the same purpose.

- Counters: Counters provided for folding clothes are sometimes improperly used as benches for sitting. Therefore folding counters need to be adequately designed (including attached to blocking within the wall assembly) so that they will not be torn loose from the wall.

- Walls: Walls should be painted with semi gloss or high gloss for ease of cleaning.

Energy Efficiency

- Clothes Washers: Washing machines should be Energy Star rated models, or equivalent, to maximize energy efficiency and water conservation. Since laundry equipment is often leased by property management after construction, rather than purchased and installed by the project during construction, coordinate with property management staff to insure that energy efficient laundry equipment is leased.

Design Tip...

Locate laundry rooms next to courtyards (or any open space) to make the space lighter and more pleasant. If appropriate, provide spaces where kids can play while parents do laundry.
Dryers: In general, gas dryers are significantly more efficient than electric dryers, and therefore promote long-term affordability.

Lights: Lighting in laundry rooms should be highly efficient fluorescent, and should be controlled by occupancy sensors to insure that the lights are off when the room is vacant. Where possible, windows allow for natural lighting that can augment, or even replace, artificial lighting during daylight hours. When windows are provided, it is possible to incorporate daylighting strategies, such as light sensors that control the operation of the artificial lighting depending on the quantity of natural light available.

**Indoor Air Quality:**

Ventilation: Washing and drying clothes can create very high humidity within the laundry room. Therefore it is important to provide adequate ventilation, preferably both mechanical (ducted fans) and natural (operable windows) in order to prevent the growth of mold and mildew and to provide a pleasant environment for tenants.

Caulk: All cracks bigger than 1/16" should be caulked to exclude pests such as mice or roaches that may be attracted to the laundry due to the presence of water. All holes in walls, such as plumbing penetrations, should be covered with an escutcheon, and caulked as necessary.

**Other Design Considerations**

**Security:** Ideally, laundry rooms are located adjacent to other high use areas to integrate the laundry room into overall building activities. However, sometimes laundry rooms are located in the basement, or other relatively remote areas of the building. Security cameras can help to minimize the sense of isolation that may occur if the laundry room is located in a remote portion of the building. In addition, property management may elect to lock the laundry room during certain hours of the day, such as late at night, in order to minimize unauthorized activities, especially during times when it is difficult to monitor.

**Accessibility**

Laundry Equipment (washers & dryers): A mix of top loading and front loading equipment will accommodate people with a range of differing abilities, including people with mobility impairments who use wheelchairs as well as people with back problems who have difficulty bending over. Alternatively, all front loading equipment can be used if they are stacked so that some washers and some dryers are on the top and some are on the bottom. Since the leasing of laundry equipment is frequently the responsibility of property management, project developers should consult with property management staff to insure maximum accessibility.
Folding tables: Tables used for folding laundry should similarly provide accessibility to accommodate a range of differing abilities, including people using wheelchairs as well as people with back disabilities that make bending over difficult (or impossible). Therefore sponsors should consider designs with varying folding table heights (and clear space underneath, as appropriate) to insure maximum accessibility.

Seating: Any time seating is provided, an open space should be provided adjacent to the seating (and out of the path of circulation) that allows a person with mobility impairments who uses a wheelchair to join in the "conversation circle."

Fire/Life Safety: Building codes typically require that communal laundry rooms be separated from other areas by one-hour fire-rated walls, including one-hour fire-rated door and window assemblies. This often means that doors (including frames) must be steel, and any glass in a door may not exceed 100 square inches. In addition, windows typically cannot exceed 25% of the wall surface and must use fire-rated glass (often having visible "wires" running though the glass in a criss-cross pattern).

One-hour fire-rated doors also require a closer. If leaving the laundry room doors open is desirable (to connect to a play area, for example), magnetic hold open devices may be used that automatically release the doors in case of fire. Otherwise the doors may be improperly "propped open" and not provide the fire protection when needed.

Acoustical Design: Acoustic isolation ("sound-proofing") is desirable (and may be required by Code) for walls, floors and ceilings adjacent to residential spaces because laundry rooms tend to be noisy spaces.
Household Waste Facilities

The collection and disposal of household waste\(^1\) from multifamily affordable housing is a daunting task because the average multifamily unit disposes of almost 1,000 pounds of household waste per year.\(^2\) In the recent past, a building's "waste management" plan may have simply provided facilities for the collection and disposal of trash. However, limited capacity of existing landfills, increasing disposal costs and significant environmental concerns led California to require that at least 50% of waste be diverted from landfills through "source reduction, recycling and composting" by 2000.\(^3\) Having met the 50% requirement, San Francisco\(^4\) and Alameda\(^5\) counties established the goal of diverting at least 75% of waste from landfills by 2010. In order to meet these goals, both San Francisco and Alameda are implementing a system that allows for the separate collection of recycling (including paper, glass, metal, and plastic), compost (including food scraps,\(^7\) food soiled paper and yard clippings) and trash. Multifamily affordable housing has an important role to play in these efforts, and therefore needs to provide adequate space for each of the three distinct components of household waste: recyclable materials, compostable materials and trash.\(^8\) Finally, since waste collection rates are typically based on the amount of trash that is collected,\(^9\) by recycling and composting as much as possible, developments will save money in operating costs through lower trash collection fees.

Service areas used for household waste within a building may include a variety of elements, including: "satellite" rooms (typically on each floor), termination rooms (typically in the basement), chutes, compactors and bins.
**Satellite waste rooms** are used by tenants to dispose of their household waste. Often these rooms include a door that opens to a chute, though sometimes there is only a can or bin that maintenance staff periodically empties.

- These rooms should include adequate space for compost¹⁰ and recycling¹¹ bins.

- Commonly reported problems are that a "trail of stains" leads to the satellite waste room and that it is located too far away from tenants. By centrally locating satellite rooms, and by providing hard, cleanable floor surfaces in the corridors, this common problem can be minimized.

- As described in more detail below, these rooms must be extremely durable, easy to clean, and accessible to persons with mobility impairments. In addition, the design should provide for energy efficient lighting, adequate ventilation, fire protection (because fires commonly start in trash), and soundproofing.

**Waste termination rooms** are typically located in the basement. Household waste collected from satellite rooms is stored here until hauled out to the collection point (typically the curb).

- The room must be adequately sized to handle the estimated quantity of household waste that the building will generate between collection cycles.¹² For example, if the building will have waste collected on a daily basis, the room can be significantly smaller than if collection will only occur on a weekly basis.

- In addition to the requirements noted for satellite rooms, the termination room should be located as close to the collection point as possible, preferably on a straight line and on the same level, to eliminate the need to haul waste up to the street, or to have to negotiate turns while maneuvering heavy carts. Of course, the path of travel from the termination room to the curbside collection point must be adequately sized to accommodate the bins that will be used.

**Chutes**

- Chutes are preferred for convenience and pest control. Currently, chutes in multifamily affordable housing in San Francisco are only used for trash because chutes that allow for the segregation of the different components of household waste are quite expensive.

- Finding a place for a chute in an existing building can be extremely difficult. Sometimes chutes have been located off fire escapes, thereby offering open ventilation (though noise generated by falling trash can disturb tenants and neighbors).
As with satellite rooms, sound insulation is recommended for chutes to minimize disturbance and complaints.

The door to a chute should be as large as possible, but no larger than the size of the chute itself.

The chutes in older buildings may not comply with current standards for size or fire protection. Any work on an old non-conforming chute may trigger mandatory upgrades to bring the chute up to current standards.\textsuperscript{13}

\textbf{Compactors}

- Compactors can reduce the volume of trash to be picked up by the collection agency and may therefore reduce operating expenses as well as reduce the amount of space that needs to be devoted to trash storage in the termination room.

- The route from the compactor to street must be as straight, wide and level as possible because bins containing dense, compacted trash may be too heavy to maneuver on slopes or around tight corners.

\textbf{Bins}

- Satellite waste rooms and waste termination rooms need separate bins to segregate recyclables, compostables and trash.

- Bins should have lids to minimize problems with odors, pests, and wind dispersing the contents. Fortunately the bins currently provided by most waste collection agencies now have lids.

\textbf{Key Concepts}

\textit{Durability and Ease of Maintenance}

\textbf{Flooring}

- All flooring within and adjacent to waste rooms, including the path of exit used to move bins from waste rooms, needs to be extremely durable.

- For service areas such as satellite rooms and termination rooms, flooring can be highly functional, such as concrete or an industrial-grade epoxy surface.

- Any common areas that may be used for the path of exit for household waste, including the hallway side of the door to the satellite rooms, should have a hard, durable floor surface, such as real linoleum.
The path of exit for compacted waste must be able to withstand the tremendous forces that are generated when the weight of extremely heavy bins is concentrated onto a relatively small area by the wheels of the bins. Ceramic tile, typically considered a very durable surface, has failed under these conditions. Therefore, whenever possible, bins containing compacted material should not traverse finished floors in common areas. Rather, a direct route to the curbside pick-up location should be provided through service areas with highly functional flooring, such as concrete or industrial-grade epoxy.

- Walls & Doors: Protective coverings, especially sheet metal, provide a highly durable surface within satellite and termination rooms. They also are easily cleanable and fire resistant while providing excellent "vector control" (keeping roaches, mice, etc. out). The entire path of travel that will be used to move bins, especially corners and narrow doorways, should be designed to withstand “bumping” of bins into walls and doors.

- Satellite and Termination Rooms

- A commonly reported problem is that these rooms are hard to clean and that they smell. In order to make clean-up easier, these rooms should have a hose bib (preferably including hot water) and a floor drain. Recessed hose bibs are less likely to be inadvertently damaged or to be tampered with.

- A janitor’s closet should be adjacent to each waste room, so that appropriate cleaning supplies are readily available.

- Chutes: Ideally chutes should be straight because they tend to get plugged at any bend, thereby rendering them unusable.

Energy Efficiency

- Lighting: Lighting in satellite and termination rooms should be fluorescent connected to a motion detector so that the light comes on when the room is entered and turns itself off after the person has left the room.

Indoor Air Quality

- Pest Control

- All cracks or openings in satellite rooms, termination rooms and chutes must be sealed and/or caulked to exclude pests such as roaches or mice. This also improves fire safety and reduces any unpleasant odors that may otherwise emanate from these facilities.
Sheet metal covering of walls and ceilings will similarly help to exclude rodents that might otherwise gnaw through other types of materials.

Property management should include waste rooms in any routine pest control program.

Ventilation: Adequate ventilation is very important for satellite and termination rooms.

Other Design Considerations

Accessibility

Chutes: One of the most commonly reported accessibility deficiencies involves chute doors that are hard to operate for people with low hand strength. Since chute doors are "fire rated assemblies," it may not be possible to alter or modify them in the field to provide greater accessibility. Unfortunately, chute doors are often designed with "T" handles that require tight pinching, twisting or grasping. In addition, they sometimes require significant force to open. One solution is to use power operated chute doors, though this can be rather expensive. In the alternative, many sponsors provide assistance with disposal of household waste as a reasonable accommodation for tenants with disabilities who are unable to use the chute.

Satellite Waste Rooms: If tenants need to enter the room to dispose of their household waste, then typical accessibility requirements apply, including the need for adequate clear space for a person with mobility impairments using a wheelchair to turnaround within the room.

Fire/Life Safety: A fire-rated door with a closer is typically required between any chute or room used for the storage of waste (including satellite and termination rooms) and the adjacent hallway.

Acoustic Insulation: Minimally, two layers of gyp board with insulation should surround the chute and/or satellite waste rooms. The best solution is to provide a sound cavity (an air space between layers of finish materials).

General Design Issues: A cleanable shelf or bench adjacent to the door to the satellite waste room allows tenants can set their household waste down while opening the door without soiling the floor.
1 "Household waste" includes recyclable materials (paper, plastic, metal, and glass), compostable materials (also referred to as "organic" or "greenwaste," including food scraps, food soiled paper and yard clippings), and trash.


3 California Public Resources Code sec. 41780 (a) (2) states that all cities or counties "shall divert 50 percent of all solid waste on and after January 1, 2000, through source reduction, recycling, and composting activities."

4 In 2002, the San Francisco Board of Supervisors adopted an interim goal of 75% waste diversion by 2010, with a long-term goal of zero waste. "Under the Waste Disposal Agreement for San Francisco's waste at the Altamont landfill, approximately 7 million tons of capacity remained as of January 1, 2001, which is less than 10 years capacity at 2000 disposal levels, and a new landfill contract could significantly increase San Francisco disposal costs". See, Resolution #679-02.

5 In 1990 Alameda County voters passed "Measure D" that established 75% and higher goals for reduced landflling. See, "Alameda County Source Reduction and Recycling Plan, Vision 2010: 75% and Beyond" (2003) www.stopwaste.org/rplan.html (hereinafter, "Vision 2010").

6 Approximately 45% of the household waste disposed of in San Francisco is recyclable (paper, plastic, metal, and glass). See, "Profile for San Francisco County", CIWMB, www.ciwmb.ca.gov/Profiles/County/CoProfile1.asp.

7 "Food waste is the single largest category of landfilled waste..." Vision 2010, pg. 49. In fact, food waste alone accounted for almost 21% of the landfilled waste generated by multifamily housing in Alameda County in 2000. Vision 2010, Appendix B, Table ES.7, pg. 103. Similarly, food waste comprises 20% of the waste disposed of by San Francisco households, by far the single largest specific material type. www.ciwmb.ca.gov/Profiles/County/CoProfile1.asp.

8 For additional information about recycling in San Francisco, see the SF Environment website at, www.sfgov.org/sfenvironment/aboutus/recycling/fantastic3.htm. For further information about recycling in Alameda County, see www.stopwaste.org.


10 In San Francisco all compostable materials can be disposed of in a single bin. This is a very broad category that includes: meat scraps, bones, pizza delivery boxes, and waxed cardboard milk containers. www.sfgov.org/sfenvironment/aboutus/recycling/fantastic3.htm

11 In San Francisco all recyclable materials can be disposed of in a single bin. There is no longer a need to segregate paper, glass or metal. However, tenants or building managers may elect to voluntarily segregate those materials that have a redemption value. www.sfgov.org/sfenvironment/aboutus/recycling/fantastic3.htm

12 The average San Franciscan disposes of 1.9 pounds of household waste (recyclables, compostables and trash) per day. See, CIWMB, www.ciwmb.ca.gov/Profiles/County/CoProfile1.asp.
13 Since trash chutes are typically housed within a "chase," it can be very difficult to increase the diameter of the chute without building a larger chase. Therefore, anytime a rehab project is considering an upgrade to an existing chute, it is recommended that a "Pre-Application Meeting" be held with the fire department in order to determine the extent of any mandatory upgrades that may be triggered by the proposal to renovate the existing chute.

14 Power operated chute doors also introduce the potential for mechanical failure, which can render the chute totally unusable.
Janitor Closets

Janitor closets are small spaces used by janitorial staff to store cleaning supplies and equipment close to where they are typically needed. Although sometimes considered a “luxury” by designers, well-designed janitor closets make cleaning easier, and therefore cheaper. In order to minimize long term operating costs, and to help insure that buildings maintain their "sheen" long after their Grand Openings, sponsors should stress the importance of janitor closets. The best way to properly design and locate janitor closets is to discuss cleaning requirements with maintenance staff early in the design phase.

Key Concepts

**Durability and Ease of Maintenance:** Janitor closets tend to get "banged up" by carts, mop buckets and vacuum cleaners being moved in and out, so durable finishes are a must. Another important consideration is the location and number of janitor closets.

- Where possible, there should be one janitor closet on each floor, located near areas requiring the greatest amount of housekeeping such as kitchens, common restrooms, lobbies, laundries, or trash chute openings.

- It is a good idea for janitor closets to contain a sink. Floor sinks work best because they require less lifting for the janitor. Ideally, there would be both a floor and a wall hung sink to accommodate different types of tasks.

- Floor drains, located well away from the door, with positive drainage to the floor drain inlet, are highly recommended by maintenance staff.

- Janitors' closets dispersed throughout the building typically compliment, but do not replace, the need for a secure storage and work area with a desk or table for janitorial and maintenance staff elsewhere in the building.

- Flooring: Tile, epoxy (such as "dex-o-tex"), concrete, or linoleum with good slope to a floor drain is recommended. (Carpeting in janitor closets is discouraged.) In addition, it is a good idea for the flooring immediately in front of the janitors closet to also be extremely durable, and preferably water resistant.
**Walls:** Fiberglass-reinforced or plastic wallcoverings work well. Any exposed wall corners that might be damaged by carts, vacuums or mops should be protected.

**Shelving:** Particle board shelving is not recommended because it may get wet and swell. Instead, provide plywood or heavy duty (not residential grade) metal grid shelving with broom hooks. All shelving should be secured for earthquakes.

**Energy Efficiency:** Lighting in janitor closets should be controlled by occupancy sensors to insure that the lights are turned off when the rooms are vacant.

**Indoor Air Quality:** Due to the presence of cleaning chemicals and a sink, janitor closets should have mechanical ventilation. A small, ducted fan controlled by a timer may suffice. Perhaps more importantly, sponsors concerned about IAQ should carefully evaluate the cleaning chemicals used by janitorial staff. Otherwise a building designed and constructed to protect indoor air quality can be polluted with volatile organic chemicals from the supplies used to clean the building.

**Other Design Considerations**

**Fire Safety:** Janitor closets located off hallways require a rated door and door closer. A magnetic hold open device at the closet door can hold the door open when necessary but release in case of fire.

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1 For information on environmentally sensitive cleaning supplies, see: General Purpose Cleaners (.pdf file) (www.greenseal.org/recommendations/CGR=GPCleaners.pdf), a Green Seal Fact Sheet.
The design of individual units has a direct impact on the quality of life of tenants and the operations of a building. It really doesn't matter whether it is a room in a residential hotel (also known as a single room occupancy hotel, or "SRO"), a multi-bedroom family apartment or a multi-level townhouse, residents are likely to spend most of their time in, and feel the strongest sense of “ownership” for their own individual units. From the standpoint of building operations, the benefits of good design decisions made for individual units are multiplied many times throughout a building. For example, hard surfaced flooring that doesn't need to be replaced at “unit turnover” saves the cost of replacing carpet every time a new tenant moves in.

What isn't so obvious is what constitutes "good design"? For example, there is a range of opinion regarding the ideal size or configuration for individual units. Rather than establishing a fixed set of rules intended to define "good design," this section examines and makes recommendations with an emphasis on three important areas within units: Entrances, Kitchens, and Bathrooms. In addition, some recommendations are provided for SRO units. Following are concepts and considerations which apply to units in general.
Key Concepts

Durability and Ease of Maintenance

Multifamily rental units often require more durable finishes and fixtures than what are typically provided in detached single-family homes. Higher quality products can often pay for themselves over time by requiring less frequent repair and replacement. Similarly, family units typically encounter heavier use than senior units, and therefore require more durable finishes and fixtures.

Most design decisions for units are multiplied throughout the building by the total number of units. For example, the "simple" decision of selecting the type of unit entry door hardware can become a significant issue for maintenance staff if it means fixing or repairing every entry door lock. Sponsors that manage more than one building can simplify maintenance across buildings, and thereby lower operating costs, by consistently specifying design solutions that work for them.

Energy Efficiency

☐ Lighting: Fluorescent fixtures are preferred because they are extremely energy efficient, provide high quality light, are cost effective, and have a proven track record. All rooms, including bedrooms, should have at least one hard wired fluorescent light.

☐ Windows: New windows should be dual glazed (two panes of glass), preferably with a "low-e" coating to improve thermal insulation and to exclude unwanted heat gain. Wood, vinyl, fiberglass, and thermally broken aluminum frames are the most energy efficient. Existing windows in buildings being rehabbed frequently need repairs and weatherstripping to improve energy efficiency.

☐ Heat: Hydronic heating is preferred for energy efficiency. Electric baseboard heat should be avoided unless a life cycle cost analysis demonstrates that it is cost effective.

Indoor Air Quality

☐ Ventilation: One of the best ways to promote healthy indoor air quality in a moderate climate like the Bay Area is to promote natural ventilation through operable windows on opposite sides of a unit ("cross-ventilation"). However, some form of mechanical ventilation is also recommended for almost all units.
Older buildings in the Bay Area typically had "dual hung" windows that allowed the upper sash to be lowered so that warm air at the ceiling could flow out the top of the window to the outside. Unfortunately, over the years, the upper sashes frequently have become inoperable, often from being painted shut, thereby reducing the natural ventilation in the unit below the standard for which it was designed. To make matters worse, the older units frequently had an operable “transom” window above the entry door that provided a degree of cross-ventilation between the transom and the dual hung windows. For fire safety reasons, these transoms have typically been sealed shut. When the original design intent is frustrated, it is imperative that some mechanical ventilation be provided to insure that residents have adequate fresh air.

Hard Surface Flooring: Hard surface flooring, such as linoleum, tile, wood, sheet vinyl, etc., is easily cleanable and does not harbor mold, dust, mites and other allergens the way carpeting does. Therefore, hard surface flooring is generally preferred for IAQ reasons.

Caulking and Sealing Cracks: All cracks, particularly in the kitchen and bathroom, should be caulked or sealed to exclude pests such as mice and roaches. By excluding these pests, a common asthma trigger (mice and roach detritus) is eliminated from the unit, and the need to use toxic pesticides is greatly reduced.

Volatile Organic Chemicals (“VOCs”): Paint, furniture, cabinets, countertop substrate, and carpeting (to name a few) can all "outgas" "VOCs" that may be harmful to residents, particularly to those with multiple chemical sensitivities. One way sponsors can reduce VOCs in units is by limiting, or eliminating the use of particle board. When particle board is used, sealing all exposed particle board surfaces will drastically limit emissions. Similarly, the use of low-VOC paint and materials with no added urea-formaldehyde can also significantly reduce VOC emissions within units. In addition, certified low-VOC carpet is now available.

Other Design Considerations

Avoid dedicating excessive space to circulation in order to minimize unit size while maximizing room size.

Design rooms that can accommodate multiple activities. For example, a dining area which includes an accessible nook or corner table to be used as a desk for homework can be a nice amenity for a family with children.

Where possible, provide a visual connection between the more public areas of the unit (living, kitchen, dining) to give a sense of spaciousness to an otherwise small apartment.
Test out various furniture arrangements to ensure that the space can be easily furnished in an accessible manner and work in a variety of different ways.9

Consider placing windows at 36" (min) above the finished floor. This will permit the placement of furniture (beds, tables, desks, chairs, etc.) beneath the window. However, remember that the maximum sill height allowable for egress windows is 44" above the finished floor.

In general, provide as much accessible storage space as possible.

Every sleeping room below the 4th story is required to have a second means of egress to a public way (the door to the bedroom being the first means of egress). This second egress or exit is most commonly a window that must have a clear opening of at least 5.7 square feet.10

1 California Housing Finance Agency ("Cal HFA") offers minimum dimension guidelines for units they fund in Attachment II to their Multifamily Program Architectural Processing Requirements available online at www.calhfa.ca.gov/multifamily/financing/app-process/arch-manual.pdf (hereinafter "Cal HFA Development Standards."). However there has been considerable debate whether it is better social policy to build fewer, larger units, or more, smaller units.

2 Hydronic heating uses a central boiler, or individual boilers within each unit, to heat water that is distributed through pipes to radiators to provide heat. A central boiler is more energy efficient (and space efficient) than multiple, individual boilers. However, individual boilers are sometimes preferred because they allow for individual metering for space heating.

3 Due to the inherent inefficiencies in using electric resistance for a heat source, electric baseboard heat is only permitted under the Code (Title 24) when the designer can demonstrate that sufficient energy savings are realized by other building systems. Thus the "true" initial cost of electric baseboard heat should include the costs of other energy efficiency measures that create sufficient energy savings to allow electric baseboard heat to be used ("whole building analysis"). However, it is very difficult to exceed the Code in a cost effective manner when using electric baseboard heat using the prescriptive method. www.energy.ca.gov/title24.

4 In rehabs, all operable windows should be checked to insure that each window has at least one operable sash. Surveying and repairing existing windows can be quite time consuming and expensive, but it is very important so that the building can at least function as it was originally designed, even though it may no longer meet current codes for ventilation.

5 Many resources recommend "airing out" materials, and even buildings, prior to occupancy. However, the demand for affordable housing is so great that rarely, if ever, are units held vacant in order to allow VOCs to offgas prior to occupancy. In addition, many of the materials that may emit VOCs are often installed rather late in the construction schedule, including caulking, painting and carpeting. Therefore, the better solution is to limit the use of materials that offgas VOCs, thereby allowing residents to move quickly into completed affordable, healthy units.
www.huduser.org/publications/destech/rehabgds.html

7 The use of low VOC finishes, such as interior paint and carpet, is something that should be coordinated with maintenance staff in order to insure that once the building is occupied, low VOC finishes will continue to be used. In fact, the maintenance staff itself can receive the greatest benefit from using low VOC finishes because maintenance workers are frequently exposed to off-gassing of materials when painting and installing carpet in occupied buildings.

8 The Carpet and Rug Institute has established a voluntary "Green Label" program that uses an independent laboratory to certify that certain carpet products (carpet, pad and adhesives) are low-VOC emitting.  
www.carpet-rug.com/drill_down_2.cfm?page=8&sub=6


10 When a window serves as the second means of egress, the width cannot be less than 20" and the height not less than 24”. Calif. Building Code section 310.4.

11 Greenspec Directory, Building Green, Inc., Siegel and Strain Architects, p.146
Entrances

Entrances can either be exterior spaces, such as townhouse entrances, or interior spaces, such as entrances connected to an interior corridor. While exterior entrances introduce the need for weather protection, all entrances need to be inviting, well lit, secure and extremely durable. Whenever possible entrances should promote “visitability” by being designed to be accessible to people with mobility impairments who use wheelchairs, regardless of whether the entire unit is considered accessible.

Key Concepts

**Durability and Ease of Maintenance:** Door hardware should be high quality so that it works properly over time. Broken entry door hardware undermines security, inconveniences tenants and creates a significant burden for property management. In addition, the flooring just inside the entry should be a hard, durable surface, even if carpeting is used throughout much of the rest of the unit. Linoleum or sheet vinyl with integral color throughout the thickness of the material can work very well in this application.

**Energy Efficiency:** Units with entrances which front an outdoor area should have an exterior light on a motion sensor or photo cell to ensure energy conservation during daylight hours.

Other Design Considerations

**Accessibility:** Entrances should be accessible to people who use wheelchairs. Even if the entire unit is not technically “accessible,” providing accessible entries will increase “visitability,” allowing family, neighbors and friends with mobility impairments to visit more easily.

**General Design Issues:**

- Recessing the door from the path of circulation and providing a plant ledge, bench, or niche will provide areas for placing groceries or supplies when entering the home as well as give the resident an opportunity to personalize their entryway. However, be mindful that exterior recesses can, in some neighborhoods, become a magnet for unwanted behavior by members of the public, including using the recess as a sleeping area, or worse.
Providing some visual connection between the unit and exterior corridor, or path, can help to increase security as well as heighten possibilities for casual encounters. For example, windows from a kitchen area to the path of circulation will encourage "eyes on the street security" as well as give neighbors the opportunity to greet each other when entering or leaving nearby apartments.3

1 HUD promotes the concept of visitability in order to offer “the opportunity for a disabled person to visit the home of a friend without having to be lifted up the stairs, to enjoy a meal and be able to use the first floor bathroom ...” See, “Suggestions for Providing Accessibility & Visitability for Hope VI and Mixed Finance Homeownership,” 1/2000, available online at www.huduser.org/Publications/pdf/strategies.pdf

2 Cal HFA Development Standards require that "Locksets shall be primarily of steel construction with a five pin tumbler lock, and a one-sided, keyed, dead-bolt installed above the lockset. Schlage series F or equivalent is acceptable." Part II, page 10 of 25. www.calhfa.ca.gov/multifamily/financing/app-process/arch-manual.pdf. Some sponsors of affordable housing recommend using durable, commercial grade door hardware.

3 However, per California Building Code Section 2406.4, glazing within 24” of either side of a door jamb (lock side or strike side) and whose bottom exposed edge is within 60” of the walking surface, must be tempered safety glazing.
Kitchens present significant design challenges because of high levels of use coupled with the presence of food (including trash, recycling and compostable scraps) and water (including steam from cooking). Kitchens also present tremendous opportunities for energy efficient lighting and appliances (particularly refrigerators). The presence of food and water make kitchens a likely target for roaches, mice and other pests whose detritus can be an asthma trigger for a significant percentage of the population. In addition, the steam and odors from cooking can degrade indoor air quality and promote the growth of mold and other allergens if they are not properly exhausted to the exterior.

Key Concepts

Durability and Ease of Maintenance

- **Cabinets**: A common design mistake is to select cabinets that look attractive but are not designed to withstand the real world demands of multifamily affordable housing. Sponsors should consult with their maintenance department to understand which types of cabinets are working well, and which are not, at other buildings. In general, cabinets with plywood boxes, solid wood doors and solid back panels are preferred. Particle board is discouraged because it may deteriorate rapidly when it gets wet. In addition, cabinet hardware should be carefully selected for durability and ease of maintenance. Some sponsors prefer simple, exposed "barrel" hinges that can be easily replaced by maintenance staff without special tools or skills. (See Section 3, Materials: Cabinets).

- **Floors**: Water-resistant flooring is required. "Sheet goods" (resilient flooring that comes in wide rolls) are typically more durable than similar material in tiles because sheet goods minimize seams. Flooring tends to "peel up" at seams because seams trap dirt and water. Linoleum, vinyl flooring with color/pattern extending through the full thickness of the material, laminates, tile, and even wood can all be extremely durable floor coverings in individual unit kitchens.

- **Countertops**: The range of materials for countertops is increasing rapidly. By far the most common type of countertop material used in multifamily affordable housing is laminates (such as Wilson Art, Formica, etc.). These surfaces have low initial cost and are easy to clean. An important advantage is that they can be shaped to include an "integral backsplash" to...
commonly reported problems...

- Stoves set against the wall with no hood can cause paint to peel from the adjacent wall and dirt to build up between the stove and the wall.
- Grease can build-up at walls and especially at the old vent pipe. Sheet metal or ceramic tiles at the wall approx 18" above the stove surface will help to protect the wall but can be subject to similar grease build up.
- Cabinets above the stove also become areas for grease build up. Varnished cabinets create a fire hazard.
- Grease can build up at exposed pipes in the kitchen. It is recommended that all pipes in kitchens be concealed.

eliminate a seam where the counter meets the wall, as well as a drip edge, to minimize water from dripping onto the lower cabinets. Unfortunately, laminate counters are relatively easily burned, and typically are not as durable as other counter top material choices, such as cultured stone, aggregate stone (Stilestone), solid surface (Surell, Corian, etc.), ceramic tile, stone, butcher block, stainless steel, or even concrete. However, some maintenance departments have staff experienced in replacing laminate countertops, thereby minimizing the burden on operating costs by performing the work in-house.

Energy Efficiency

- Refrigerators (and dishwashers if they are provided) should be EnergyStar rated. In addition, refrigerators should be auto-defrost whenever possible.
- The Code requires that the most accessible light switch in a kitchen be wired to a fluorescent lamp. If more than one light fixture is provided in a kitchen, all should be fluorescent to maximize energy efficiency.

Indoor Air Quality

- Ducted range hoods that exhaust to the exterior are very important for removing steam, smoke and cooking odors from indoor air. Recirculating range hoods are strongly discouraged because they do very little to improve IAQ even though they can be noisy, use energy and represent another piece of equipment that needs to be maintained, repaired and ultimately replaced by maintenance staff.
- All holes or cracks bigger than 1/16" should be caulked or filled in order to exclude pests such as roaches and mice, particularly around plumbing and electrical penetrations, cabinets, countertops and baseboards. The presence of such pests can trigger asthma problems in many individuals.

Recycling: The kitchen should be designed with space for at least two receptacles (recycling and trash), and preferably three (recycling, compost and trash).
Other Design Considerations

Accessibility: Countertops in accessible units need to be repositionable (raised or lowered) without the use of specialized tools or knowledge. In addition, controls, such as for range hoods, need to be within specified reach ranges to be usable for people with mobility impairments who use wheelchairs.

Fire/Life Safety: Cabinets above the stove provide an area for grease to build up and create a fire hazard. A ducted range hood above the stove is preferred to reduce this fire hazard.

General Design Issues

☐ All counter top outlets (plugs) must include a Ground Fault Circuit Interrupter (GFCI).

☐ Grease builds up at exposed pipes in the kitchen, therefore all pipes in kitchens should be concealed.

☐ A visual connection to other spaces within the unit can make a small kitchen feel more spacious. A dropped soffit between the kitchen and living areas may serve to delineate each area and to contain grease vapors within the kitchen.


2 One of the contributors to the original Materials Handbook, George Drake had very specific recommendations for cabinets: a sturdy plywood box with panel doors and solid wood rails and stiles. The solid wood rails and stiles were critical because hinge screws hold best in solid wood, and the solid wood held up best when water dripped on it. George also was fond of pointing out that these types of cabinets are readily available, frequently at a lower initial cost than those specified in many projects.

3 However, vinyl composition tiles ("VCT") are preferred by some sponsors because individual tiles can be replaced as necessary, rather than triggering the replacement of the entire floor covering when a limited area is damaged.

4 Laminate floor coverings, such as "Pergo" can be extremely durable. However, laminate floor coverings are made of layers, and therefore they do not have an integral color/pattern extending through the full thickness of the material. Instead the top layer (wear layer) is bonded to a central core (typically high density fiberboard). The performance of the product is dependent upon the durability of the top "wear layer." Therefore, not all laminate floor coverings "are created equal."

6 EnergyStar rated appliances can be found at www.energystar.gov. On January 1, 2003, the Department of Energy expanded the ENERGY STAR refrigerator category to make all classifications of refrigerators and freezers eligible for ENERGY STAR qualification. The category expansion allows all refrigerators and freezers 7.75 cubic feet or greater in volume to qualify for ENERGY STAR if they are 10% more efficient than the federal standard, regardless of configuration or defrost type. All refrigerators and freezers less than 7.75 cubic feet are eligible for ENERGY STAR qualification if they are 20% more efficient than the federal standard.

7 Title 24 (2001 AB 970), Part 6: Subchapter 4, Sec. 130(b)(1) and Subchapter 7, Sec. 150(k)(1).

8 Cabinets should be installed with "tight backs" to exclude pests. Careful attention should be paid to cabinet installation, particularly where plumbing pipes penetrate the back of a cabinet, such as under the sink.

9 Calif. Building Code sec.1112A.

10 Rehab projects frequently are required to upgrade and add outlets in kitchens, even if no other electrical work is being performed. If possible, it is a good idea to clarify these requirements with the building department prior to submitting for a building permit in order to minimize unforeseen code interpretations, and costly change orders, during construction.
Bathrooms

Bathrooms present design challenges similar to kitchens because of the combination of high levels of use and the presence of water (including moisture vapor). Finishes need to be extremely durable, easily cleanable and able to withstand moisture. Rehab projects frequently encounter dryrot in bathroom framing due to plumbing leaks which have occurred over time, so exploratory demolition in these areas can help to minimize unforeseen conditions that might otherwise lead to costly change orders during construction.

Key Concepts

**Durability and Ease of Maintenance**

- **Floors:** Tile is a preferred flooring material in individual unit bathrooms, though the initial cost is comparatively high. Sheet vinyl is an acceptable option because it is a seamless flooring, and can be "coved" to eliminate the seam at the junction between the wall and the floor. Vinyl Composition Tile ("VCT") is not recommended in bathrooms because the seams collect dirt and water, leading to deterioration over time.

- **Wall hung lavatories ("lavs" or sinks) are susceptible to "sagging" or even being completely pulled off the wall because they are sometimes used as a seat or ladder. Lavs must be adequately attached to the structural framing or blocking and must be regularly inspected to insure that the caulk line between the lav and the wall is maintained.**

- **Wall surfaces around lavs are a high moisture area and therefore a water resistant wall covering such as tile, thermoplastic or fiberglass should be provided to protect the wall from splashes and spills.**

- **Tub/Shower Surrounds:** Tile is an excellent tub/shower surround material, though solid surface surrounds (acrylic or polyester) can also work very well in individual unit bathrooms. However, only extremely durable materials should be used on the floor of roll-in showers due to the weight that is concentrated on the small surface area of the wheels. Windows within a surround (as sometimes occurs in rehabs), should have synthetic sashes or frames (such as vinyl) to better withstand exposure to moisture from both the interior and exterior.
Energy Efficiency

☐ Bath exhaust fans should be EnergyStar rated to insure that they are quiet and energy efficient.

☐ Heat lamps are expensive, inefficient and should be avoided.4

☐ The Code requires that the most accessible light switch in a bathroom be wired to a fluorescent lamp.5 If more than one light fixture is provided in a bathroom, all should be fluorescent to maximize energy efficiency.

Indoor Air Quality

☐ Adequate ventilation is essential to minimize mold and other moisture related problems. Perhaps the best way to ensure adequate bath ventilation is to install a quiet electric exhaust fan ducted to the exterior and wired to a timer on the same switch as the bathroom light. The timer allows the fan to run for a pre-set period of time after the switch is turned off. Fans on their own switch are often not used (especially noisy fans).

☐ An operable window in the bathroom providing natural ventilation can compliment a simple exhaust fan.6

☐ The lightwells in many older apartment buildings and residential hotels may be quite narrow and tall, and therefore may be inadequate for venting bathrooms without some mechanical fans at the roof.7 For example, small bath exhaust fans typically do not have the capacity to "push" exhausted air up several stories to the roof level. Therefore a larger fan may be necessary at the top of the lightwell to assist in exhausting air from the bathrooms. In addition, poorly maintained lightwells can become "trash dumps" if tenants toss debris out of windows.8 Finally, like almost any protected horizontal exterior space in the City, lightwells can become "roosting" spots for pigeons, causing the air in the lightwell to be fouled by their droppings.

Other Design Considerations

Accessibility

☐ Sufficient blocking must be provided in the wall cavity next to bath tubs, showers and toilets to allow for the future installation of grab bars.9

☐ Consider using showers instead of tubs in some units because some individuals, particularly seniors, have difficulty getting in and out of bathtubs. Roll-in showers can be a tremendous amenity for people with mobility impairments who use wheelchairs.
Whenever possible, at least one toilet and sink in each unit should be accessible to persons with mobility impairments who use wheelchairs in order to promote "visitability."

Storage areas in accessible or adaptable bathrooms need to be accessible to people with mobility impairments who use wheelchairs.

**Fire/Life Safety:** Fire alarms ("horns") must be loud enough to be heard everywhere in a unit, including in the bathroom when the fan is on (another reason for using quiet exhaust fans).

**General Design Issues**

- Electrical outlets and fixtures typically need ground fault protection on dedicated circuits to comply with Code and to minimize the risk of electrical shock to users.

- Where possible, provide visual screening of the bathroom from the entry and from the living and dining areas. When more than one bedroom shares a bathroom, consider separating the lavatory from the toilet/tub area to allow use by more than one person.¹⁰

- In general, the following "bedroom to bath ratios" has worked well in multifamily affordable housing in San Francisco:
  - 1-2 bedrooms = 1 bath
  - 3 bedrooms = 1-1/2 baths (in 2-level units, 1/2 bath on living/kitchen floor).
  - 4 bedrooms = 2 full baths (in 2-level units, one on each floor).

- Bathtubs are important for bathing children. Bathtubs should have slip resistant bottoms. In addition, a tub diverter at the ends of the tub can limit splashing or overflow onto adjacent flooring.

- Approximately 95% of the water leaks in the home are caused by leaky toilets.¹¹ Even the most efficient toilets need to operate properly in order to conserve water as designed. When "after market" replacement parts are used to repair toilets, the water usage often skyrockets.¹² In order to conserve water, consider selecting toilets that perform well with the replacement parts that maintenance staff are likely to use.

- All faucets, controls, overflows, etc. should be properly caulked.
1 Some sponsors avoid tile because the grout tends to collect dirt and mildew. In general, solid surfaces are
easier to clean.

2 Some sponsors use legs under lavs for additional support. However, support legs tend to create a cleaning
problem, and can create a barrier preventing accessibility if the legs are less than 30" wide.

3 The joint between the top of the tub and the bottom of the first row of tile should be caulked. The caulk
should be inspected and replaced as necessary as part of an annual maintenance program. See, “The Rehab
Guide,” HUD, Vol. 6 Kitchens and Baths, sec. 7.2.4 Moisture Control, pg. 81, 1/2000. As noted above, some
sponsors dislike tile in units because the grout can become discolored and unsightly when it is not properly
maintained. www.huduser.org/publications/destech/rehabgds.html

4 Cal HFA Development Standards state “heat lamps are not to be used since they are not as effective as
other heat sources, and the special infrared bulbs are very expensive to replace. Part II, HVAC, pg. 16.

5 Title 24 (2001 AB 970), Part 6: Subchapter 4, Sec. 130(b)(2) and Subchapter 7, Sec. 150(k)(2).

6 Particularly for rehabs, windows in lightwells can present privacy concerns and can even present security
concerns if the distance between units is not very great.

7 This problem is exacerbated over time when lightwells are used as a “chase” to run plumbing lines and
HVAC ducts. In addition, some lightwells have been enclosed at the roof level, thereby undermining, or even
defeating, their ability to provide natural light and air to units below.

8 In rehabs it is a good idea to provide an access door from a common hallway to make it easier to
periodically clean and maintain lightwells. Otherwise it may be necessary for maintenance staff to access the
lightwell through a small window in a private unit on the lowest floor.

rehab, any time the sheetrock is removed from a bathroom wall within the tub surround or adjacent to a toilet,
adequate blocking should always be provided within the walls to allow for easy installation of grab bars in the
future.

10 See, www.designadvisor.org

11 San Francisco Public Utilities Commission,

SRO Rooms

Single Room Occupancy ("SRO") units are often subjected to heavy use and considerable wear and tear. The following conditions have been observed in an SRO hotel 10 years after its renovation:

- A pattern of dirt at the entry to the room.
- Wall hung lavatories ("lavs" or sinks) pulled away from the walls.
- Cabinets below lavs hiding leaking pipes allowing mold to grow while the cabinets and surrounding finishes deteriorate.
- Water damage and mildew at ceilings from leaking plumbing stacks and radiators above.
- Sprinkler pipes used for hanging plants and sprinkler heads painted over (and therefore not functional).

Key Concepts

Durability and Ease of Maintenance

- Units designed for individuals who were formally homeless (which is commonly the case with SROs) typically need the most durable components.
- Floors at the entry door and at lavs should be hard and water resistant, such as linoleum, vinyl (sheet goods or VCT) or wood. Given the small square footage of SRO units, it can be cost effective to continue this same flooring throughout the entire unit.
- Wall hung lavatories ("lavs" or sinks) are susceptible to "sagging" or even being completely pulled off the wall because they are sometimes used as a seat or ladder. Lavs must be adequately attached to the structural framing or blocking and must be regularly inspected to insure that the caulk line between the lav and the wall is maintained.¹

Energy Efficiency: All SRO units should have at least one switched fluorescent light. If more than one hardwired light is provided, they all should be fluorescent.

Indoor Air Quality: The problem of roaches, mice and bedbugs in some SROs is severe. Hard surfaced flooring, caulking cracks, and providing vinyl covered mattresses can help to exclude these pests, and thereby promote healthy housing.
Recycling: While hard surface flooring is generally preferable to carpet because of its durability and ease of maintenance, in some cases issues of comfort and perception promote the use of carpeting. When using carpet, consider specifying carpet with recycled content and/or carpet which can be recycled at the end of its life cycle.

1 Some sponsors use legs under lavs for additional support. However, support legs tend to create a cleaning problem, and can create a barrier preventing accessibility if the legs are less than 30” wide.