



CHAPTER 4

BUILDING DESIGN

Quality building design ensures that individual development projects contribute to the overall character of a community, particularly the public realm. Buildings need to be designed to facilitate pedestrian activity and access to transit facilities. Buildings should also include architectural features that reflect the local vernacular and are appropriate to the local climate. This chapter provides guidance for building design that responds to the local context and encourages further high-quality development.

4.1 Building Frontage

A building's frontage shapes the public realm. A well-designed and thoughtfully proportioned building frontage that uses appropriate architectural detail provides visual interest and contributes to a community's character.

4.1.1 Building Rhythm

The rhythm of building façades along a street front can create great visual interest and activate the pedestrian realm.

- ◆ Establish a rhythm on building façades that is small-scale, with individual building bay widths of 25 to 50 feet.
- ◆ Design each building with varying wall planes, heights or contrasting materials to break up visual mass and avoid large, featureless structures.
- ◆ In residential buildings, use changes in massing and detailing to provide identifying features for individual units, where appropriate. Features that may be appropriate include bay windows and recessed elements.
- ◆ Use contrasting colors, a family of window sizes and architectural ornamentation to establish a rhythm to a façade and street frontage.



A residential development in San Diego uses varying wall planes and bay windows to create a rhythm on the building's façade.

4.1.2 Multiple-Tenant Spaces

Where multiple-tenant spaces are incorporated into a building, individual tenant spaces should characterize a building's bays, or structural elements.

- ◆ Use columns, piers or pilasters to differentiate the façade's horizontal elements.
- ◆ Incorporate vertical slots or recesses between horizontal façade elements.
- ◆ Vary the building façade by recessing the storefront entrance or creating a niche for the interior use to expand onto the sidewalk.

4.1.3 Mass and Proportion

The mass of larger buildings should be broken into proportional components that more readily relate to the human scale.

- ◆ Subdivide horizontal mass into portions or segments compatible with the scale of adjacent buildings.
- ◆ Employ vertical architectural elements such as columns, piers or pilasters to subdivide buildings into smaller increments at the ground floor and upper stories.



Vertical architectural elements subdivide the mass of a building into smaller increments.



Dividing the horizontal elements of this building in Coronado helps it relate to its surroundings and the human scale.

4.1.4 Building Façades

A building's façade, and the level of detail to which it is designed, plays a significant role in shaping the public realm and encouraging pedestrians to use the sidewalk.

- ◆ Design the façade to have a distinct base, middle and top.
- ◆ Design building façades to include details that add visual interest, distinctiveness and human scale.
- ◆ Establish depth and shadow by incorporating features that project from the building face, such as window bays and pilasters.
- ◆ Provide building reveals, or offsets in the wall plane, such as entryways and recessed windows.
- ◆ Design façade details that are integral to the architectural and structural design of the building and not tacked onto the surface.



Building details such as recessed windows and entries can add depth and solidity to a building's façade.

See Also
“Pedestrian Sidewalk Zones”
on page 65



Architectural details highlight a building's primary entrance in La Mesa.



Ground floor retail windows in Coronado activate the pedestrian realm.

4.1.5 Entries and Ground Floor Activities

Buildings should be designed so that all of their entries are easy to find. This is particularly important for mixed-use buildings, which generally should include ground floor uses that encourage pedestrian activity.

- ◆ Accentuate all entries with features such as moldings, lighting, overhangs or awnings.
- ◆ Accentuate primary building entries with strong architectural definition such as recessed entry bays, in order to create transitional spaces between the building and street.
- ◆ Locate residential entries on the front façade of buildings and provide direct access to the sidewalk or street.
- ◆ Locate public and publicly-oriented uses on the ground floor of buildings to encourage pedestrian activity.
- ◆ Where adequate sidewalk space exists, design doors or sliding windows that enable ground floor restaurants and retail to expand onto the sidewalk.
- ◆ In buildings with a vertical mix of uses, reserve the ground floor for activity-generating retail storefronts. Locate residential uses on upper floors.

4.1.6 Windows

Windows can enliven the pedestrian environment and provide opportunities for ground floor businesses to be seen by passersby.

- ◆ In buildings containing retail, commercial, community-serving or other active uses, position windows for visibility by both pedestrians and motorists at street level.
- ◆ Include façade openings and windows that are vertically proportioned, with a greater height than width. Appropriate height-width ratios typically range from 1.5:1 to 2:1.
- ◆ Maintain a minimum of 60 percent of the ground floor linear dimension as evenly distributed display windows.
- ◆ Use clear glass in ground floor windows and doors of all commercial businesses to promote visibility into the ground floor space.
- ◆ For ground floor retail windows, utilize a larger window proportion than for upper floor windows.
- ◆ Enhance upper story windows with architectural details such as sills, molded surrounds and lintels.
- ◆ Where possible, employ operable windows to take advantage of breezes and reduce energy costs.
- ◆ In fire hazard areas, use smaller windows on any side of a building that faces an area with high fire risk.

Residential Building Types in Smart Growth Areas

Table 4-1 shows the types of residential buildings that are typically most appropriate in Smart Growth Areas. Building types should be chosen based on the anticipated housing needs of a community, as well as SANDAG's density targets for each Smart Growth Place Type.

Table 4-1 Residential Building Types

Building Type	Typical Net Density	Typical Square Footage	Typical Bedrooms	Typical Height and Construction Type	Typical Parking
 <p>Small-Lot Single Family Home</p>	8 to 20 du/ac	800 to 1,200	1 to 2	2 to 3 stories, wood frame	Attached or detached garage and/or driveway
 <p>Townhouse*</p>	15 to 40 du/ac	800 to 1,600	1 to 3	2 to 4 stories, wood frame	Tuck-under garage
 <p>Low-Rise Apartments / Condominiums**</p>	20 to 75 du/ac	800 to 1,600	1 to 3	2 to 4 stories, wood frame	Tuck-under garage and/or surface lot; potential for structured parking
 <p>Mid-Rise Apartments / Condominiums**</p>	50 to 125 du/ac	800 to 1,600	1 to 3	3 to 5 stories, concrete podium with wood frame	Structured parking
 <p>High-Rise Apartments / Condominiums**</p>	100+ du/ac	800 to 1,600	1 to 3	7+ stories, steel and/or concrete frame	Structured parking

* Townhouses can be combined with apartments and condominiums, either on the ground floor or on upper stories.

** These building types also support mixed-use development with commercial uses on the ground floor.

Adapted from Metropolitan Transportation Commission, 2007, *Station Area Planning Manual*.



Awnings can complement the character of buildings while providing functional benefits, as shown in this example from Oakland, California.

4.1.7 Awnings, Canopies and Arcades

Awnings, canopies and arcades provide shade and cover from the elements and help to reinforce the pedestrian scale.

- ◆ Design awnings, canopies and arcades to be consistent with the character of the building.
- ◆ Design arcades to provide at least ten feet of clear space between the building façade and the edge of the arcade, so that there is adequate space to walk along the arcade as people enter and exit buildings.
- ◆ Design awnings and canopies to provide a minimum clearance of eight feet between the sidewalk and the bottom of the canopy or awning valence.



Changes in color help to distinguish different parts of this building in San Diego.

4.1.8 Building Color and Materials

Visually appealing buildings typically incorporate a limited number of complementary colors and materials.

- ◆ Where one building material is used to simulate another, use it in a way that is in keeping with the character and properties of the material being simulated.
- ◆ Where the building includes accent materials such as metal and wood, incorporate these materials on all façades of the building, not just the front façade.
- ◆ Limit the colors and materials used on the exterior of a building to an appropriate and varied palette.
- ◆ Allow building exteriors to use innovative new materials, or to use traditional materials in unconventional ways, as long as these innovative treatments fit the desired character for the neighborhood.
- ◆ In fire hazard areas, use fire-resistant materials such as stucco, stone or tile on the exterior of buildings.
- ◆ Use changes in color as well as materials to differentiate between different components of a building.
- ◆ Consider applying different colors and materials on the upper floors of taller buildings, to help differentiate between the building's base, body and top.



The materials and colors of this building in Coronado reflect local architectural character.

4.1.9 Universal Access

Buildings and their entrances must provide access for individuals of all levels of mobility.

- ◆ Design the main entrance of a building so that it is accessible to all people, regardless of their level of mobility.
- ◆ Where a person must change direction as they approach a building’s entrance, provide at least 60 inches of clear space for turning.
- ◆ Provide a pedestrian path width of at least 36 inches leading to the building’s entrance.
- ◆ Incorporate levers, U-shaped handles or door pulls, or magnetic push-release hardware on doors, so that they can be opened without grasping or twisting movements.



In this example from Berkeley, California, a ramp with a gentle slope provides a transition from the sidewalk to shops located above it.

4.2 Resource Conservation

Design solutions should incorporate strategies to conserve resources during both construction and operation of the building.

4.2.1 Water Conservation

There are numerous systems for conserving water that can be incorporated into the design of new and newly-renovated buildings.

- ◆ Employ rooftop catchment systems to collect rainwater for reuse as a supplemental landscape water supply.
- ◆ Establish “greywater” plumbing systems in new buildings where practical, in coordination with local health standards. Greywater is previously used water from washing machines, dishwashers and other on-site uses that can be collected and reused for limited purposes, such as watering plants and flushing toilets.
- ◆ Install low-water-use fixtures and appliances in all new and renovated buildings.

See Also

“Energy Conservation and Landscaping”
on page 42

See Also
“Energy Conservation and Landscaping”
on page 42



A projecting feature on this building in Emeryville, California, provides shade for a window.

4.2.2 Energy Conservation

Sustainable building design features can help buildings to conserve energy. This is particularly true in the San Diego region, where there is very little rain and ample exposure to sunlight throughout most of the year. Energy conservation techniques can be tailored to the climate of the San Diego region to minimize the energy needed for heating, cooling and ventilation.

- ◆ Maximize the number and size of north-facing and south-facing windows. Use smaller and fewer windows on the east and west sides of the building.
- ◆ Minimize direct sunlight by incorporating strategically placed overhangs, louvers or similar shade-producing features.
- ◆ Provide fully operable windows that can be adjusted throughout the day for maximum ventilation.
- ◆ Design building interiors to take advantage of natural ventilation by orienting rooms so that breezes can blow through them.
- ◆ Properly insulate and seal all new and renovated buildings to contain and extend the climatic influence of heated or cooled air.
- ◆ Use energy-efficient heating, ventilation and cooling systems that regulate the interior temperature of buildings throughout the day.

4.2.3 Materials Conservation

Cost-efficient and sustainable construction materials and practices should be utilized in all development.

Green Building Certification

The United States Green Building Council (USGBC) initiated its Leadership in Energy and Environmental Design (LEED) Green Building Rating System in 1998. The system encourages sustainable building practices through a universal certification process, in which buildings are scored for their on-site sustainability, water efficiency, energy conservation, materials, indoor environmental quality and design innovation. LEED-certified developments have positive environmental, financial and political benefits for the communities that support them.



LEED-certified development can have both financial and environmental benefits.

Another popular certification system for green buildings is Build it Green’s GreenPoint Rated, which provides guidelines for single-family and multi-family residential construction. Many cities have also chosen to develop their own system for rating green buildings, which requires more work by the local jurisdiction but makes it possible to tailor the system to local conditions.

- ◆ Where feasible, reduce waste and minimize use of new resources by renovating or adding to existing buildings rather than building new structures.
- ◆ Use “rapidly renewable” materials such as bamboo, engineered lumber and paper-based cellulose where appropriate.
- ◆ Use high-quality materials to reduce maintenance and replacement costs.
- ◆ Use recycled construction materials, such as cellulose insulation, recycled carpet and recycled glass, for at least 5 percent of the project’s materials.
- ◆ Use locally manufactured building products to reduce transportation impacts and costs and support local industry.
- ◆ Sort demolition debris and construction waste on site, for delivery to recycling centers, in order to ensure that materials are being recycled. Divert at least 50 percent of these materials to recycling centers.



Recycled construction materials, shown here in an example from San Francisco, California, can be attractive, affordable and environmentally friendly.

4.2.4 Adaptive Reuse

Adaptive reuse is the practice of reusing existing buildings for new uses while preserving some or all of the building’s structural elements or architectural features. Adaptive reuse helps to conserve natural resources by reducing the need to use new materials for construction. In addition, adaptive reuse of historic structures can preserve history and reinforce neighborhood character and identity.

- ◆ Reuse buildings that can accommodate a modern development program and help to achieve a long-term vision for the neighborhood.
- ◆ Determine the best possible new uses for existing buildings with respect to their contribution to neighborhood character, economic feasibility, economic revitalization and interior conversion potential.
- ◆ When adaptively reusing historically significant buildings, preserve the defining historic features of buildings wherever possible.
- ◆ Ensure that parking standards provide flexibility for adaptive reuse, using measures such as counting on-street parking spaces towards minimum parking requirements, providing shared public parking areas, and allowing developers to pay in-lieu fees for parking.

See Also
Chapter 9: Parking



This building in San Diego is a successful example of adaptive reuse.

LEED for Neighborhood Development (LEED-ND)

The United States Green Building Council (USGBC), with support from the Congress for the New Urbanism (CNU) and Natural Resources Defense Council (NRDC), has developed a rating system for green neighborhood design. Building on the Leadership in Energy and Environmental Design (LEED) rating systems that already exist for individual buildings, LEED-ND emphasizes principles that tie buildings, public infrastructure and open spaces together into neighborhoods. It is designed to be applied to new neighborhoods that have a variety of different scales.

LEED-ND rates new neighborhoods based on their location and relationship to existing development, infrastructure and natural features; their overall design and land use mix; and their ability to support a variety of transportation and housing options. Additionally, a neighborhood will receive a higher rating if its buildings reflect green building and site design principles.

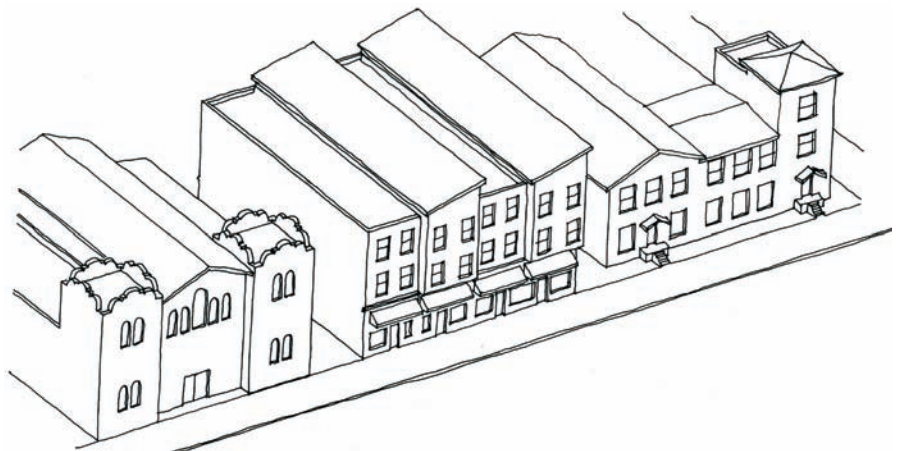
4.3 Roof Design

Well-designed buildings address the form, color and texture of the roof as an integral part of the overall building design.

4.3.1 Form

The shape of the roof should fit with the overall architecture of the building.

- ◆ Design the roof's shape to reflect the configuration of the building's mass and volume.
- ◆ In fire hazard areas, limit the size of eaves and overhangs.
- ◆ Use roof forms that have a consistent character from all vantage points.



Roof forms along a street can reflect various styles and eras of development.

4.3.2 Detailing

An attractively detailed roof can enhance and strengthen the overall character of the building.

- ◆ If appropriate to the building's architectural style, strengthen the roofline with cornice or parapet detailing on flat roofs, or detailing around the eaves on sloped roofs.
- ◆ Avoid false fronts and flat, thinly applied mansard forms.
- ◆ Screen all roof-mounted mechanical and electrical equipment, as well as communication equipment such as satellite dishes and cell phone towers, from public view. Design the screening to be architecturally consistent with the building.



Visible rafter tails provide details that strengthen the roofline of this building in Coronado.

4.3.3 Materials

A building's roofing materials should be carefully chosen, particularly if the roof is visible from public rights-of-way.

- ◆ Use roofing materials that are appropriate to the architectural style of the building.
- ◆ In fire hazard areas, use fire-resistant roofing materials such as clay tiles, fiberglass shingles or cement shingles.
- ◆ Avoid highly reflective roofing materials on visible roof surfaces.

Green Roofs

Green roofs are an extremely effective storm-water management tool that can also provide multiple environmental benefits, including carbon sequestration; reduction in pollutants and stormwater surges from roof runoff; energy conservation; heat island reduction; and creation of wildlife habitat. While green roofs have higher installation costs than a standard roof, they also have lower lifecycle costs. When their long-term benefits are considered, including increased life-span of the roof, greater insulating properties and reduced heating and cooling costs, the cost savings from a green roof can be considerable.



This green roof on the California Academy of Sciences building in San Francisco includes native plants that are well adapted to long, dry summers.

For example, the American Society of Landscape Architects (ASLA) installed a green roof on their

Washington, D.C., headquarters in 2006. From July 2006 to May 2007, the green roof captured nearly 75 percent (27,500 gallons) of all precipitation on the roof. Roof runoff occurred only during rainfalls that exceeded one inch, and during repeated heavy rains. The runoff was also much cleaner and contained fewer pollutants than typical rooftop runoff. The green roof also lowered the ambient air temperature by as much as 32 degrees Fahrenheit in the summer when compared to a neighboring tarred roof, which helped to mitigate the urban heat island effect and reduced the energy demand for cooling.

San Francisco's California Academy of Sciences also incorporates a green roof on its new building in Golden Gate Park. The roof uses native plants that were selected to provide habitat for native birds, butterflies and beneficial insects. Its undulating form is overlaid with porous trays made from coconut husks, which were installed on the roof as individual tiles.

In dry climates, such as those in the San Diego region, it is essential for a green roof to use plants that can thrive with limited water and that do not create a fire hazard during dry periods. Sedum and succulents are often appropriate choices. While some irrigation will be required, it can be designed with low-volume emitters or subsurface systems that conserve water. A landscape architect can help to select plant species that are climatically appropriate and suited to the building's local climate, planting depth and exposure to the elements.

After a green roof has been installed and its plants are established, maintenance requirements are usually minimal. Typical maintenance of a green roof includes trimming and weeding of plants; monitoring the irrigation system; and inspecting the roof to check for blocked drainage channels and leaks in the waterproof membrane. Because green roofs protect the roof membrane from direct sunlight, they can prolong the life of the roof membrane compared to a standard roof. If gaining access to the membrane for maintenance is a concern, the green roof can be designed to use modular plastic trays that can be temporarily removed for maintenance.

4.4 Signage

The primary purpose of signage is to identify the occupant or occupants of a particular building. A building's signage should be designed accordingly.

- ◆ Limit information on signs to occupants and addresses; do not use signs for the purpose of advertising.
- ◆ Avoid standardized or corporate signage that does not conform to the architectural detailing of the associated building.
- ◆ Incorporate building scale, design and materials selection and site aesthetic into the design of all signs.
- ◆ Develop a master sign program for multi-tenant buildings to minimize potential visual conflict, clutter and competition.
- ◆ Limit freestanding signage to a single sign for each development that contains the names and addresses of all occupants.
- ◆ Do not obscure architectural details such as recesses, structural bays or fenestration with wall-mounted signs.



A projecting sign in San Diego clearly identifies the business inside.



This canopy sign in San Jose, California, is integrated into the overall design of the canopy.