



# Good Design.

**Urban Design, Streetscape, and Sustainable Development  
Best Practices for Downtown Olympia**

APRIL 2009

**SERA**



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## BEST PRACTICES

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# Urban Design Principles

This document presents a collection of downtown design “best practices” adopted in downtown areas throughout the US and abroad. The best practices guide is intended to serve as a framework for future planning and development in downtown Olympia. In some cases, the City may have already adopted certain design principles. In other cases, the City may choose to incorporate additional guidelines suggested here, while others may be more difficult given physical, financial or policy constraints.

The following principles have been distilled from the “Urban Design Compendium,” a collection of urban design best practices developed in the United Kingdom. They have been adapted and embellished for relevancy to the unique conditions of Downtown Olympia and the Pacific Northwest.

Urban design draws together the many strands of place-making - environmental responsibility, social equity and economic viability, for example - into the creation of places of beauty and distinct identity. Without thoughtful urban design, one starts to see indistinct, homogenous urban landscapes with which people struggle to identify, and for which they have a difficult time respecting and caring. Downtown Olympia has a strong foundation of good urban design from its historic roots. As the city contemplates its future, planners, policy makers, and its citizens need to consider the following principles to develop whole and beautiful places.

## 1. Create Places for People

For places to be well-used and well-loved, they must be safe, comfortable, varied, and attractive. They also need to be distinctive, and offer variety, choice, and fun. Vibrant places offer opportunities for meeting people and watching the world go by.

The success of the public realm depends on the arrangement of its paving, planting, lighting, orientation, shelter, signage, street furniture, and the way it is overseen. It

also depends upon the routes which pass through it, and the uses in and adjacent to it.

The public realm is made up of the parts of a city or district that are available, without special charge, for use by everyone. The public realm can include streets, parks, squares, arcades and public buildings, whether publicly or privately owned. It provides the setting not only for everyday life, but also for more formal civic occasions. It is enlarged and enriched by developments designed to welcome a broad range of people, and by creative management. It is restricted and impoverished by buildings and spaces designed to keep out or discourage all but a narrow range of users, and by over-regulation. Anyone who is designing a building, or any other structure, is helping to shape or frame the public realm.

## 2. Make Connections

The convenience, safety, and comfort with which people go to and pass through buildings, places, and spaces play a large part in determining how successful a place will be. Places need to be easy to get to and be integrated physically and visually with their surroundings. This requires attention to how to get around by foot, bicycle, public transit, and the car - and in that order.

Streets are more than just traffic channels for vehicles, and should offer a safe and attractive environment for all. While the facilitation of auto and truck traffic is important, it should not come at the expense of the pedestrian. Rather, the goals should be to provide safe, direct, and interesting connections and improve the area’s legibility - the ability to inherently understand the organization of an area by the layout of buildings, spaces, and paths. Well-designed streets encourage people to use them, and make going outside a safe and pleasant experience.

### 3. Work with the Landscape to Develop Unique Character and Identity

The positive features of a place and its people contribute to its special character and sense of identity. They include landscape, building traditions and materials, patterns of local life, and other factors that make one place different from another. The best places are memorable, with a character which people can appreciate easily.

Many of the places which we now think of as being pleasantly distinctive grew naturally in response to local circumstances. Where such distinctiveness is ignored, new development may reflect only the marketing policies or corporate identities of national and international companies, the standard practices and products of the building industry, or the latest fashions among design professionals. Development that responds sensitively to the site and its setting, by contrast, is likely to create a place that is valued and pleasing to the eye.

Designing for Olympia's distinctiveness involves the creative reconciliation of local practices on the one hand, with the latest technologies, building types and needs on the other. There is no reason why character and innovation should not go together. New and old buildings can coexist happily without disguising one as the other, if the design of the new is a response to urban design objectives.

### 4. Mix Uses and Forms

A mix of uses may be appropriate at a variety of scales: within a village, town, or city; within a neighborhood or a street; or even in a particular building. In a town centre, for example, housing can provide customers for shops, make use of empty space above them, and generate activity when they are closed. In residential areas, workplaces, shops and other facilities can make the place more than just a dormitory.

Mixed-use development makes the most of opportunities for higher densities and intensive activity at locations with good access to public transit. At higher densities, it provides

the sort of environment that will suit particular kinds of household, such as single or young people, seniors, or couples without children.

### 5. Manage the Investment

For projects to be developable and well cared for, they must be economically viable, well-managed and maintained. This means understanding the market considerations of developers, ensuring long-term commitment from the community and local agencies, defining appropriate delivery mechanisms and seeing this as part of the design process. The same notion is true for public spaces. How attractive a public space is, and how well people treat it, will partly depend on the arrangements made for its management and on how easy it is to maintain.

### 6. Design for Change

The most successful places have prospered in changing circumstances. New development needs to be flexible enough to respond to future changes in use, lifestyle, and demography. Places need to be adaptable at every scale. Towns and cities as a whole have to adapt as industries rise and decline, demand for housing and the nature of workplaces changes, and buildings and infrastructure age. This means designing for energy and resource efficiency; creating flexibility in the use of property, public spaces and the service infrastructure and introducing new approaches to transportation, traffic management, and parking.

This principle holds for physical structures as well. With increasing evidence of the escalating impact of global warming, the urgency to reduce green house gas emissions is widely acknowledged. Because buildings account for 48% of all energy used in the United States and 74% of all of our electrical energy, there is a huge opportunity to reverse this trend by planning our buildings to be more resource efficient and climate responsive.

## Design Guidelines

Places that are beautifully detailed to stimulate and delight have one thing in common: buildings and open spaces are unquestionably inter-related. There are many exemplary places that demonstrate the ingredients to success. Yet debates about the detail of places, particularly building architecture, are often preoccupied by 'style'. We live in an age of both rapid technological change and eclecticism over design theory and style issues; Neo Classical, Vernacular, Modernism, Postmodernism, Deconstructivism and so on. And whatever the 'ism', the buildings vary from excellent to awful.

The focus then should be away from individual style or schools, and instead should be on 'urban architecture' - that is, buildings and open space as a whole. Viewed from this perspective, the success of a building is determined by its ability to make a positive contribution to the public realm - to face the street, animate it and make sure that all adjacent open space is positively used. It is this interaction between buildings and the public domain - this edge - that determines the relationship between inside and outside, built and open, public and private, individual and community. The following section discusses best practices as tools to create great 'urban architecture.'

*The City of Olympia has codified the concept of 'urban architecture' through its use of the Pedestrian Street Overlay District. The principles expressed on the following pages of this report embrace and build upon many of the development standards the City has developed for specific streets in Downtown Olympia. The only difference is that **all** streets in Downtown Olympia should be treated with the same deliberate and thoughtful design aesthetic as those on the Pedestrian Streets, not just along the ones that have explicit designations.*

Olympia Knitting Mills building, Downtown Olympia

# KNITTING

## Elements of 'Urban Architecture'

Again, 'urban architecture' is not about a particular architectural era or school of design, but rather the relationship of built forms and open space - or the interaction of public and private space at the pedestrian-scale. As a general rule, buildings should be complementary and cohesive, and harmonize with elements of the streetscape (through landscape, materials, light fixtures, etc.) to enhance people's experience of the area. The elements below should be incorporated in some form into all new buildings in Downtown Olympia.

1. Pedestrian-oriented ground floor
2. Pronounced entrance oriented to the corner and/or primary streets
3. Lots of windows on the ground floor. Glazed sliding or roll up doors increase ground floor flexibility.
4. Awnings for protection from weather
5. Roof parapet to break up the roof lines and hide rooftop mechanical equipment
6. Building lighting
7. Human-scale details to add interest and break up the building mass (i.e., *architectural bays, engaged columns, tri-partite facades, transom windows, window mullions, and cornices*)
8. Within the Olympia Historic District, new buildings should complement and accentuate the character of existing historic buildings



## Create Active Frontages

Design street and sidewalk-facing storefronts and entries to be inviting and easily accessible to passersby. Ensure that the ground floor promotes a sense of interaction between activities in the building and activities in the public realm. Views into a building provide interest to passersby and make its function apparent, while views out put 'eyes on streets, and contribute to the perception of safety.

Buildings should have a prominent entry and foster interaction between inside and outside by incorporating three or more of the following elements:

- *Overhangs (canopies, awnings) - at least 6 feet from either the face of the column or the street-facing elevation*
- *Clerestory or transom window as part of the large storefront system*
- *Glass windows that flank the door (no mirrored or tinted glass)*
- *Decorative lighting*
- *Large glass entry doors*
- *Creative signage*
- *Artwork*
- *Recessed entry bay*
- *Incorporating paving and color along the building frontage*

[1]



[2]



[3]



**Active Frontage.** Buildings should have a prominent entry and foster interaction between inside the building and the public realm. Ways to achieve this include [1] large storefront windows with transom windows, creative signage and lighting; [2] special paving and color; and [3] the ability for the inside uses of the building to spill into the public realm through windows and rolling doors.



Making frontages 'active' adds interest, life, and vitality to the public realm. This means:

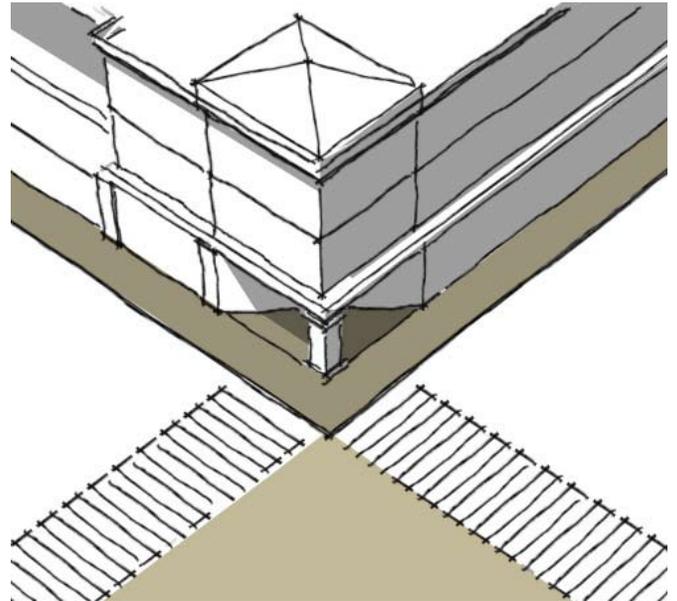
1. frequent doors and windows, with few blank walls;
2. narrow frontage buildings, giving vertical rhythm to the street scene;
3. articulation of facades, with projections such as bays and porches incorporated, providing a welcoming feeling;
4. pedestrian-scale blade signage; and, on occasion,
5. lively internal uses visible from the outside, or spilling onto the street.

## Orient Buildings to the Corner

Create dynamic public gathering spaces where streets intersect. Corner sites possess the potential to provide landmarks in the city, thereby creating a sense of place and making recognizable and memorable design elements at the corner of each block. Corner sites are visually prominent, have two frontages and can potentially offer more entrances to different parts of the building. They therefore provide special opportunities for mixing uses.

Corners are best emphasized by reinforcing the corner condition of the site with a special architectural device (prominent entrances and/or windows at the apex) or element which responds significantly to the particular angle of the corner.

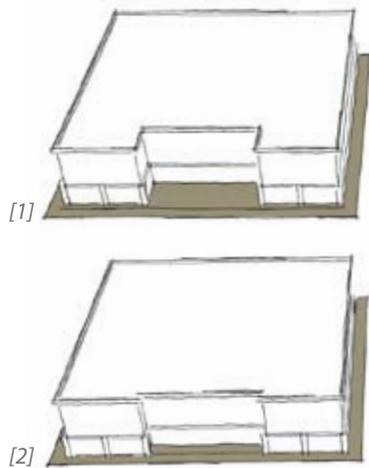
- *Locate the primary entry to the building at the corner of the building or within 25' of the corner of the building.*
- *Incorporate prominent architectural elements, such as increased building height or massing, a cupola, a turret, or a pitched roof, at the corner of the building or within 25-feet of the corner of the building.*
- *Chamfer the corner of the building (i.e. cut the corner at a 45-degree angle and a minimum of 10'-0" from the corner) and incorporate a combination of special paving materials, street furnishings, and landscaping.*
- *Where possible, incorporate double storefront doors that include large expanses of glass*



*The Corner. Corners of buildings provide excellent opportunities to set the tone for a particular block and provide a district landmark.*



*Portland, OR*



**Setbacks.** [1] Occasional, modest setbacks can greatly improve a pedestrian realm and provide additional architectural interest through public forecourts and plazas, like the one shown in the photo below; [2] Street frontages with an adequate pedestrian realm do not require building setbacks but may benefit from a modest forecourt or plaza at the primary entrance.

## Build to the Lot Line

In urban centers like Downtown Olympia, a direct frontage-to-street relationship enhances commercial viability and street liveliness. Use continuous frontages to the degree possible, by adhering to a common building line. A common building line creates continuity of frontage and provides definition and enclosure to the public realm. It can also help ensure new development is properly integrated into an existing street. Minimizing setback distances increases the ability of a building to interact with the public realm. Where buildings are permitted to be set back from the building line, care needs to be taken to ensure resulting spaces are useable and attractive.

- On street frontages with adequate sidewalks, buildings should be built to the property line (no setback).
- On street frontages with substandard sidewalks (less than 10 feet) and no on-street parking, setbacks of 5 to 15 feet may be appropriate to enhance the existing pedestrian realm and provide additional outdoor space for ground floor uses. Special care should be taken so that these spaces are well-designed and contribute to an active building frontage.



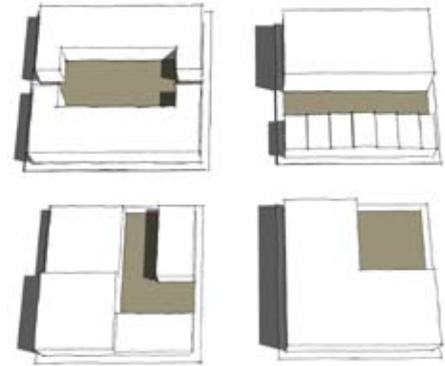
This forecourt plaza on Mississippi Avenue (Portland, OR) has a central stormwater feature, permeable surfaces, and doors and windows that open from the surrounding businesses directly into the space. The site used to be an industrial warehouse.

## No Parking In Front

Put parking behind, under, above, or to the side of the building. The manner in which car parking is arranged has a fundamental effect on the quality of place. Vehicles should not be allowed to dominate the space, or to inconvenience pedestrians and bicyclists. Parking should never be placed in the front of the building unless it is on-street. This breaks up the frontage, restricts informal surveillance, and is generally unattractive.

Structured parking is typically used in areas where there is high demand for parking and limited development area (usually due to high land costs or high land opportunity costs), as in robust retail areas, downtown milieus, and in high-density, land-constrained residential areas. The most compelling advantage of structured parking is that it uses less land area and saves valuable land for other uses. The long-term value of consolidated development and efficient land use can help justify the cost of the structure, particularly if the costs are shared between private and public entities.

Parking structures should generally only be considered when they can be designed to incorporate ground level activities such as shops or offices, and these must be carefully designed to contribute to the street scene. In a mixed-use area, the most appropriate approach for above-ground structured parking is to line the structure from top to bottom with single-loaded residential units or office space.



**On-site surface parking options.** *On-site surface parking lots can be configured in several ways to be as pedestrian-friendly as possible. Above are some examples that leave the building frontage largely intact, particularly along the primary street.*



### Structure Parking Lined With Retail and Office.

*There are some fine examples of parking garages that have been lined with a single-loaded retail and office uses. The example at left shows a parking garage of this kind in Boulder, CO. The parking garage has 1,300 parking spaces and is lined with ground-floor retail and second floor offices.*



## Streetscape

Parks, plazas, and public buildings are important focal points for civic engagement and civic pride, and the attention communities devote to their design and upkeep are crucial. As a percentage of the overall public realm, however, they amount to only a tiny fraction. The vast majority of our public space comes in the form of right-of-way - the space between taxlots or building faces, the space that is more often than not taken up by streets and sidewalks.

Streets are often relegated simply to movement, and much too often to the movement of motorized vehicles. While the facilitation of auto and truck traffic is obviously important, it should not come at the expense of the pedestrian - of the window-shopper, the business woman walking out to get lunch, the senior strolling with a cup of coffee, the casual friends running into each other on a popular corner, or the kids hitting the candy shop after school. When designed well, streetscapes can promote pedestrian safety and comfort, foster investment by private businesses, and ultimately define the type of district or city a place is or wants to be.





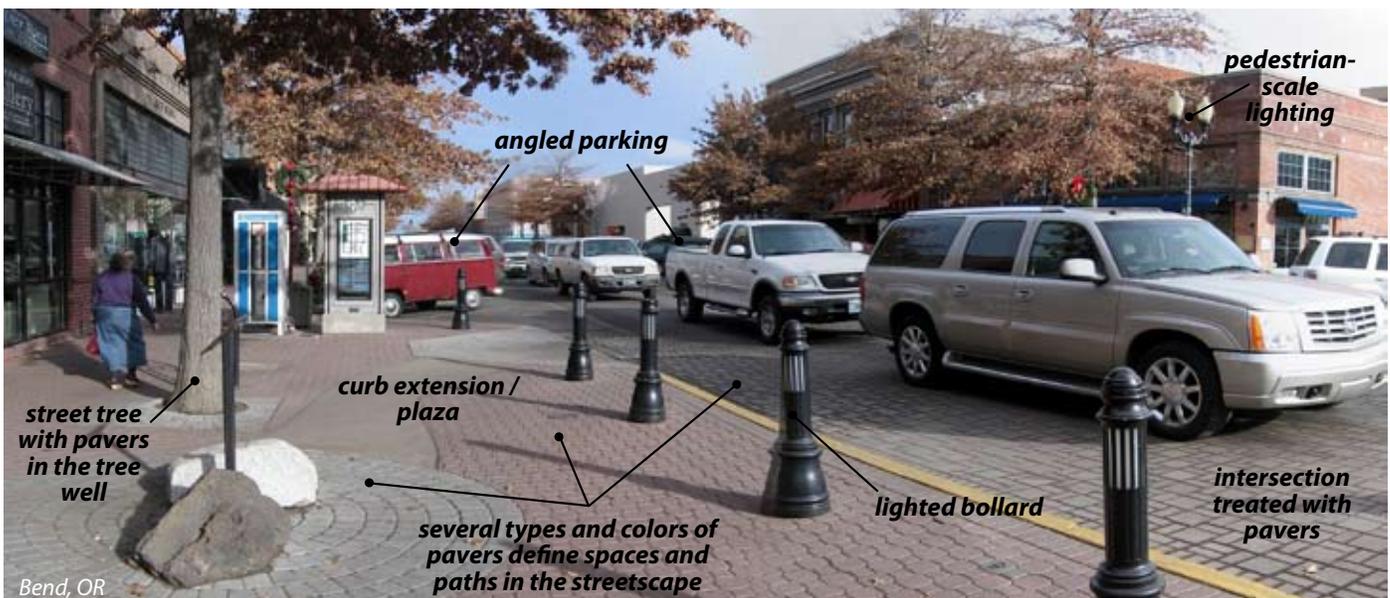
Olympia, WA

The streetscape best practices contained in this section concentrate primarily on the pedestrian realm, with emphasis on the following:

- Sidewalk Zones
- Sidewalk Paving Materials
- Street Lighting
- Street Furniture
- Public Art
- Reducing Visual Clutter
- Landscaping / Street Trees
- Green Streets
- Parking
- Traffic Calming



Gresham, OR



Bend, OR

## Sidewalk Zones

For design purposes, a sidewalk is typically thought of as having three distinct “zones,” each of which may have its own dimensions, materials, and furnishings.

**The building frontage zone** is the area directly adjacent and parallel to the building face. This area serves as a buffer between the clear zone (or primary pedestrian way) and the building facade, and may contain business signage and outdoor dining (when wide enough). The minimum standard building frontage zone for most streets is typically 2-3 feet. At the upper range, this area is wide enough to accommodate a single row of dining tables. If a larger outdoor dining area is desired along the sidewalk, new buildings should provide a greater setback in order to provide for a larger building frontage zone.

**The clear zone** is the through zone of the sidewalk where the majority of pedestrian movement occurs. Because this is the walking zone of the sidewalk, it should be kept clear of any furnishings or signage at all times. Along busy retail streets, the clear zone shall be wider than along quieter residential streets in order to accommodate higher volumes of pedestrian traffic.

**The furnishing zone** is that area of the sidewalk directly adjacent to the curb, and is the area where street trees, vegetation beds, and street furniture (such as pedestrian scale lighting, benches and bike racks) are located. Business signage (such as A-frame or sandwich boards) may also be located in the furnishing zone in accordance with local regulations. Any objects installed within the furnishing zone should be a minimum of 30” from the curb face to allow access to/from parked vehicles.





**Concrete Sidewalk.** Concrete can be less expensive and easier to install than specialty paving treatments. As shown here, different scoring and coloring can be used to define the three distinct zones of a sidewalk. (Portland, OR)



**Stamped Concrete Pavers.** Stamped concrete pavers are used here to define the pedestrian through-way, while stone aggregate is used in marked contrast for the furnishing and building frontage zones. (Vancouver, BC)

## Sidewalk Paving Materials

Sidewalk paving materials can vary widely. Concrete is the least expensive, yet can still be versatile: it can be smooth, brushed, stamped, engraved, or colored depending on a community's preferences. Specialty pavers (of concrete, brick, or stone, for example) can be used for entire sidewalks, for certain zones (usually the furnishing or building frontage zones), or sparingly to highlight certain features (such as tree wells, public art, driveways, or planters). Pavers are generally more expensive, but can make for easier maintenance. Pavers can also provide easier access to utilities that are installed beneath them.



**Brick Accent Pavers.** Brick accent pavers can be used to highlight the sidewalk's edge or special features, such as street trees. (Boise, ID)



**Brick Pavers.** Variegated brick pavers are used generously on this primary pedestrian street; granite access pavers are employed around planters and along building edges. (Charlotte, NC)

## Street Lighting

Street lighting is important for defining the night-time feel of a district, and for creating a feeling of safety during evening hours.

Cobra-head lights are a standard fixture for illuminating the roadway and, depending on block size, are usually found at intersections. These fixtures are quite tall, often employ softer, sodium or LED lights, and should project downward to minimize light pollution.

Pedestrian-scale fixtures are smaller, more closely-spaced, and may use a stronger light to illuminate the sidewalk. They are generally more decorative, and can be used to reflect or define a district's unique identity. They too should be "night sky friendly" and project their glow down to the street, not into the sky or directly into the windows of adjacent buildings.



Denver, CO



Two examples of "night sky friendly" pedestrian-scale luminaires on a crook arm pole.



night sky friendly fixture on a straight pole



Olympia, WA



**Coordinated Furnishings.** Benches, street lights, and trash receptacles can be coordinated to present a unified theme for a district. (Olympia, WA)



**Functional Art.** Bike racks or other fixtures can also be public art. (Portland, OR)



**Wayfinding.** Attractive and easy-to-understand wayfinding signage can help visitors navigate between destinations. (Charlotte, NC)

## Street Furniture

Street furniture can enhance the functionality and visual interest of a street. Fixtures such as benches, planters, trash cans, bicycle racks, water fountains, wayfinding signage, newspaper boxes, and public art generally should be installed within the furnishing zone - and at no point should impede pedestrian travel within the clear zone. These elements often work best when their designs are coordinated, thus giving the streetscape a unified appearance. To the degree possible, fixtures should be tailored to the climate in which they are installed in order to improve user comfort and reduce long-term maintenance issues. For specialty items desired by a local neighborhood or interest group, or when municipal budgets are tight, third party groups can be recruited to sign maintenance agreements.



**Don't Forget Fido.** Water fountains can be designed to serve multiple users - adults, kids, people in wheelchairs, and even dogs. (Portland, OR)

## Public Art

Public art can play an important part in any community and within any streetscape. It can reflect an area's history, be inspiring or playful, be functional, make a statement - or all of these. Representational art can be serious or whimsical. Art that engages viewers of all ages can add to the family-friendly tone of an area. Art with touchable elements can draw active engagement - transforming a street into a "magical place."



Seattle, WA



Olympia, WA



Olympia, WA



Olympia, WA



Fairview, OR



Lawrence, KS



Lake Oswego, OR

## Reducing Visual Clutter

Cities demand a great deal from their rights-of-way. They are conduits for auto, truck, bike, and pedestrian traffic; they have pipes to handle wastewater and stormwater; they have conduit for phone, cable, and electric utilities; they contain public art, restaurant seating, and on-street parking. It is easy for a city's streets and sidewalks to seem chaotic, to become cluttered and therefore disorienting.

There are several strategies Olympia can employ to continue to reduce visual clutter, such as:

- Undergrounding utilities
- Providing uniform fixtures for dispensing newspapers
- Aggregating street signs / wayfinding
- Unifying streetscape elements
- Enforcing regulations regarding private business signage, displays, and seating
- Maintaining landscaping



Olympia, WA

## Landscaping / Street Trees

Landscaping can play an important role in softening the hard edges of an urban environment. It can also add color and visual interest to cities that are often built out in dull stone, metal, or concrete.

Street trees can also provide needed shade during the hot and sunny months of summer. Depending on species and placement, trees can also help visually narrow a roadway and contribute to traffic calming. The ways that tree wells are handled - with ground cover vegetation, pavers, or grates - can also augment a streetscape.



Portland, OR



Hayden, ID



Bend, OR



Ashland, OR



Berkeley, CA



## Green Streets

While not currently used, the City of Olympia may want to consider “green streets” to help manage and pretreat stormwater runoff. “Green Streets” is a term used to describe on-site stormwater management systems that employ natural systems to handle stormwater run-off. Current designs generally utilize some combination of plantings and infiltration systems, and are often supported by a more traditional storm sewer or culvert system. Because local conditions vary widely, green street systems must be tailored for specific environments and weather patterns.

In more urban settings, flow-through planters are often utilized. These planters are structural, landscaped reservoirs used to collect, filter, and infiltrate stormwater run-off. Water flows downhill into one end of the planter; pollutants settle and filter out as the water percolates through the planter soil and infiltrates into the ground. If a rain event is intense enough, water exits through the planter’s second curb cut, flows back out into the street and enters the next downstream stormwater planter.

Depending on how intense a particular storm is, run-off will continue its downhill “dance” from planter to planter until all of the stormwater planters are at full capacity. If and when the stormwater planters exceed their carrying capacity, the water exits the last stormwater planter and enters the existing storm sewer system.

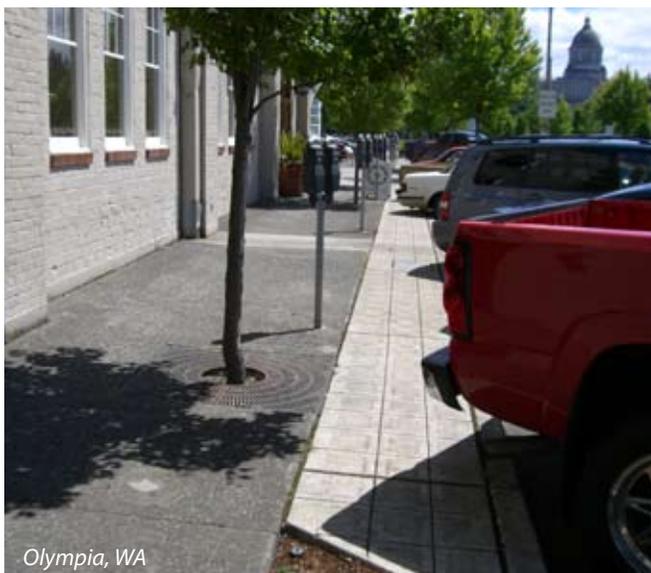


## Parking

As any retailer will tell you, parking is a necessity for commercial areas to thrive. In addition to contributing to overall parking supply, on-street parking can also play an important role in traffic calming. Where on-street parking is generally short-term (three hours or less) and parking turn-over is high (as it is often in retail districts), on-street parking adds friction to traffic flow. As drivers look for spaces, or maneuver in and out of parking spaces, drivers of through-vehicles must proceed more cautiously.

Where right-of-way width allows, angled parking can help to maximize parking supply. Back-in angled parking is generally safer, as it provides much better sight distance for drivers leaving their parking space. **For this reason, back-in angled parking is highly recommended where bicyclists are present.**

Centrally-located off-street parking can be a great way to both meet customer needs and share parking between complementary uses. Structured parking is preferred as a more efficient use of land. Where surface lots are permitted, they should be located behind or to the side of buildings, and away from public open space or primary intersections. Surface lots should be well-landscaped, especially where parking areas abut a sidewalk or public space.



## Traffic Calming

While regulatory devices, such as speed limit signs and traffic lights, play an important role in managing traffic, they do little to control driver speed and aggression.

“Traffic calming” is a term used to describe physical efforts to slow motorized traffic in an effort to create a safe and comfortable environment for all street users - pedestrians, cyclists, and transit-users as well as drivers. Traffic calming often begins with roadway design - with the narrowing of curb-to-curb distance and travel lanes. It extends to include crosswalk design, landscaping, intersection treatments, and the provision of bicycle facilities.

**Curb Extensions or Bulb Outs** “neck down” roadways both to slow traffic for pedestrian crossings and shorten the overall crossing distance. (Curb extensions or Bulb outs can also be places for additional landscaping and/or public art.)

**Crosswalks** themselves can be raised and/or constructed of special materials to better draw driver attention to the presence of pedestrians. Such treatments can be extended to entire intersections, which often draw high concentrations of pedestrians.

**Mid-block crossings**, when done with a combination of curb extensions, signage, elevating, or special materials, can help keep traffic at a consistent, reasonable speed between intersections.

**Medians and/or pedestrian refuge islands** create roadway friction while providing a safe haven for pedestrians crossing busy roadways.

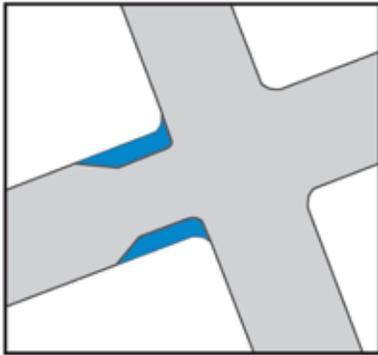
Carefully selected and well-placed **street trees** can slow traffic by visually narrowing the roadway and creating dappled shade.

Striping **bike lanes** visually narrows a roadway while prioritizing space for cyclists.

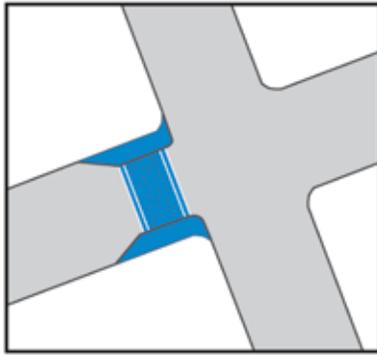
**Roundabouts** are efficient systems for traffic control at intersections, and also help regulate vehicular speed through intersections.



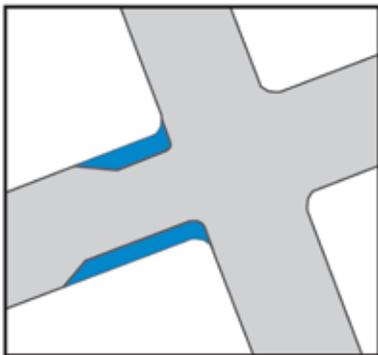
Joseph, OR



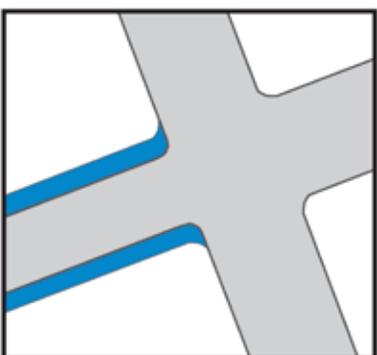
*extra long curb extensions*



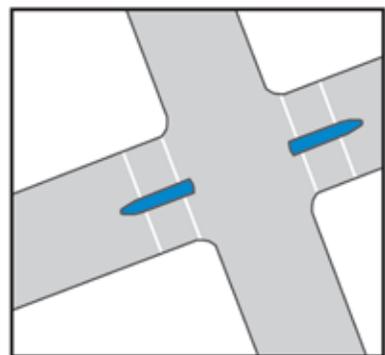
*colored / textured crosswalk*



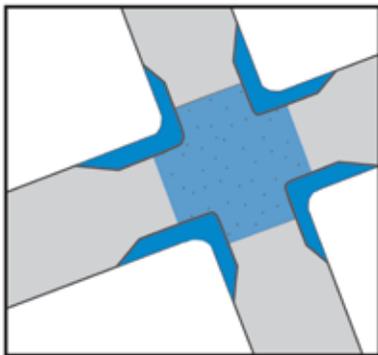
*extra long curb extensions*



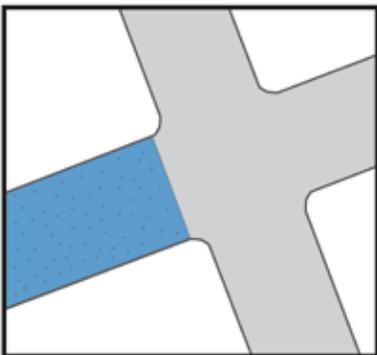
*narrowed roadway*



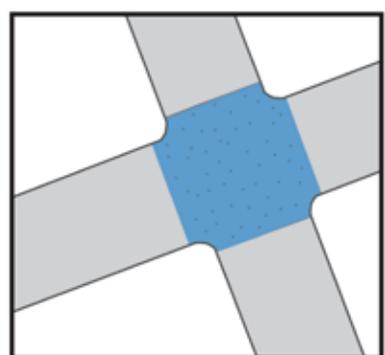
*pedestrian refuges*



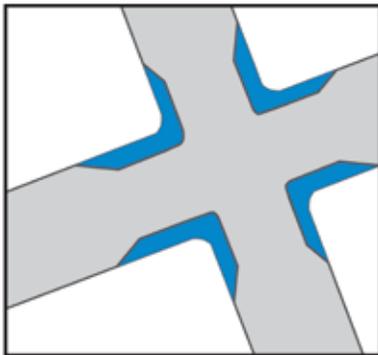
*full intersection treatment*



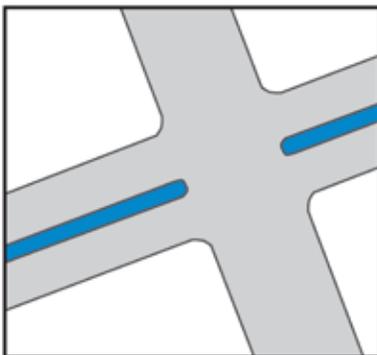
*special roadway pavers / color*



*colored / textured intersection*



*curb extensions*



*median*





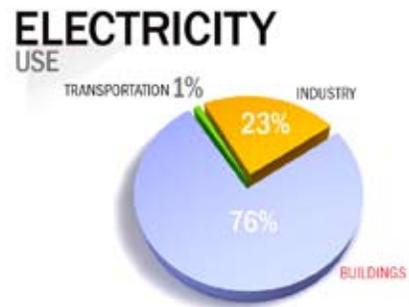
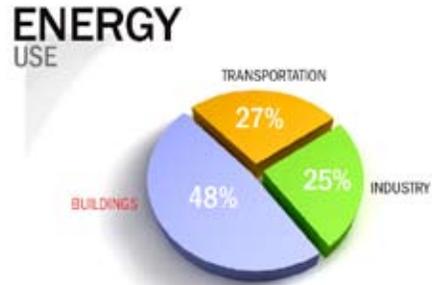
## Sustainable Building Practices

Buildings account for 48% of all energy and 74% of electricity used in the United States. By 2030, the US will have renovated 150 billion square feet of building area and constructed 200 billion square feet of new building area. Now is the time to build smart, sustainable, and with sensitivity to the surrounding context.

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## Create Low Energy / High Performance Buildings to Combat Global Warming

With increasing evidence of the escalating impact of global warming, the urgency to reduce green house gas emissions is widely acknowledged. Because buildings account for 48% of all energy used in the United States and 74% of all our electrical energy, there is a huge opportunity to reverse this trend by planning our buildings to be more resource efficient. The call to design energy and resource efficient buildings in this century requires that architects and engineers become far more rigorous about climate responsive design. In addition to reducing energy use through conservation and improved insulation, we also need to reconsider the role building orientation and form play in energy usage to achieve greater energy efficiency.



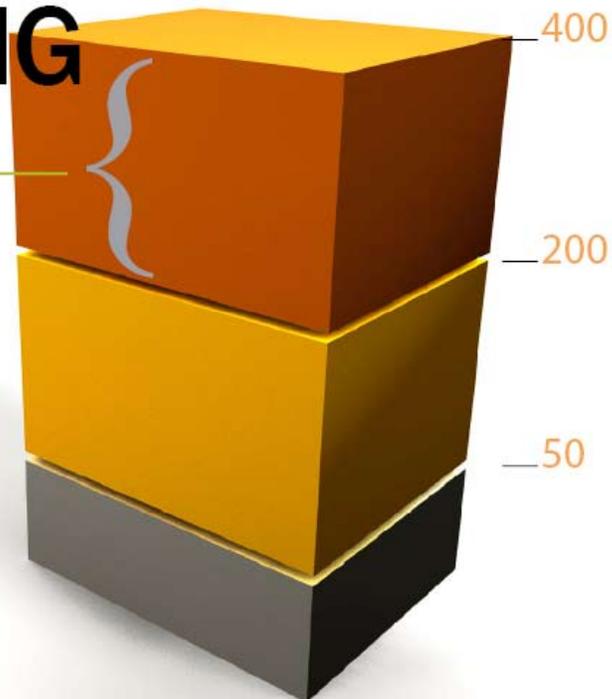
Energy Use. Buildings account nearly half of all energy use and over 75% of total electricity use in the United States.

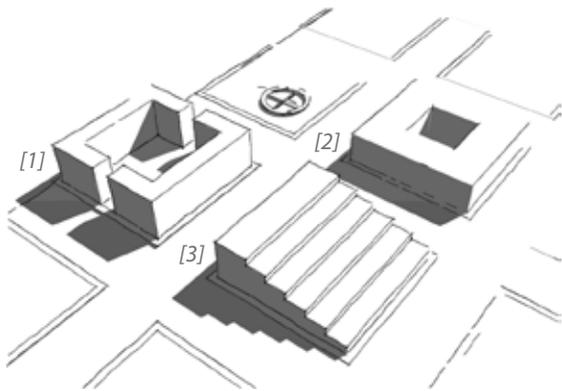
## BUILDING STOCK IN BILLION SF

**Impact.** By 2030, the US will have renovated 150 billion square feet of building area and constructed 200 billion square feet of new building area. There are about 50 billion square feet of building area today, illustrating the impact designers and developers have on the both the landscape and climate.

NEW

BUILDINGS IN 2030





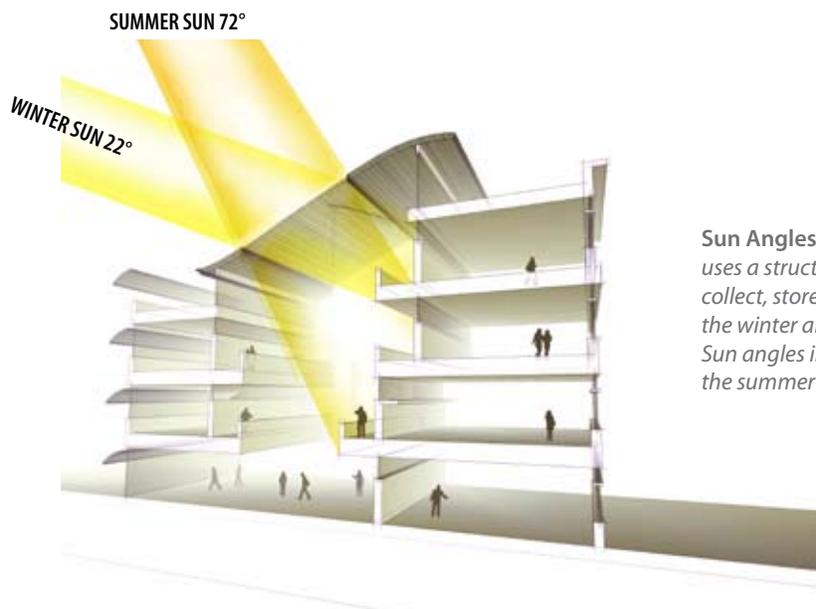
**Building shape.** Building shapes have a significant effect on the distribution of daylight. Effective building shapes for solar access include [1] U-shaped, [2] Hollow Rectangle, and [3] Stepped that are oriented in an east-west direction.

## Solar Orientation - Passive Solar

Opportunities for passive solar design should always be considered before other energy sources: sunlight comes free and with no carbon emissions. The amount of heat gained from sunlight is calculated in degree-days over the heating period. Even dull days contribute to heating spaces.

### Strategies

- East-West orientation
  - Building groups should be elongated in the east-west direction and spaced in the north south direction to ensure solar gain to each building.
- Buildings should be located and arranged to form wind-protected, sunny exterior spaces to minimize heating requirements.
- Solar envelopes (the maximum buildable volume for a given site) should be incorporated to ensure access to the sun for buildings, streets, and open spaces.
- Rooms in individual buildings should be arranged along an east-west axis to increase south facing skin available to collect solar radiation.
- Vertical glazing on solar-heated spaces should be no more than 20 to 30 degrees from true south.



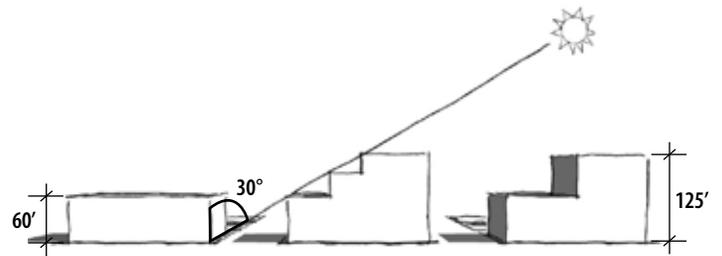
**Sun Angles.** Passive solar building design uses a structure's windows, walls, and floors to collect, store, and distribute the sun's heat in the winter and reject solar heat in the summer. Sun angles in the Pacific Northwest are 72° in the summer and 22° in the winter.

## Daylighting

Artificial lighting is one of the biggest consumers of energy in buildings, yet we have a readily available, free source of energy that can be used to illuminate our buildings during daytime hours. To ensure adequate daylighting, the following rules of thumb should be employed.

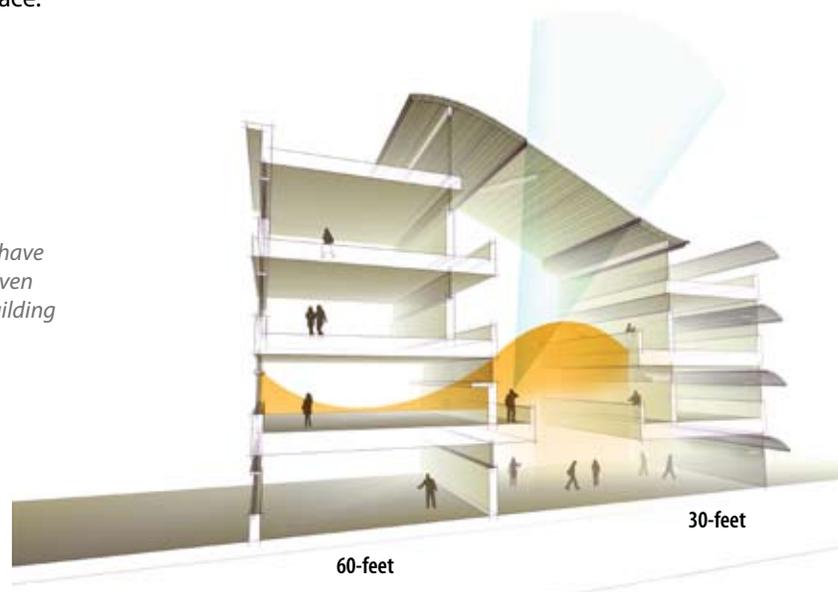
### Strategies

- A daylight spacing angle of 30 degrees should be used to shape and space buildings to assure adequate daylight access to street and adjacent buildings.
- Offset building layouts to allow significantly more daylight penetration.
- The maximum room depth should be 2 to 2 ½ times the height of the window wall to maintain a minimum level of illumination and an even distribution of light. Rooms should be organized into thin buildings to have daylight available for each space.
- If narrow buildings (<30' wide) are not possible to achieve given other green building goals, consider hollow rectangular shaped buildings, buildings with stepped floor levels or U-shaped buildings.
- Zone rooms within the building so that activities that need higher lighting levels are near the windows and activities that don't need light are in darker areas.
- Use light colored surfaces to reflect daylight and increase the light levels within the space.



**Angles.** A daylight spacing angle of 30 degrees should be used to shape and space buildings to assure adequate daylight access to street and adjacent buildings. Buildings should be stepped back accordingly.

**Daylighting.** It is important to have appropriate room depths and even distributions throughout the building for good natural daylighting.

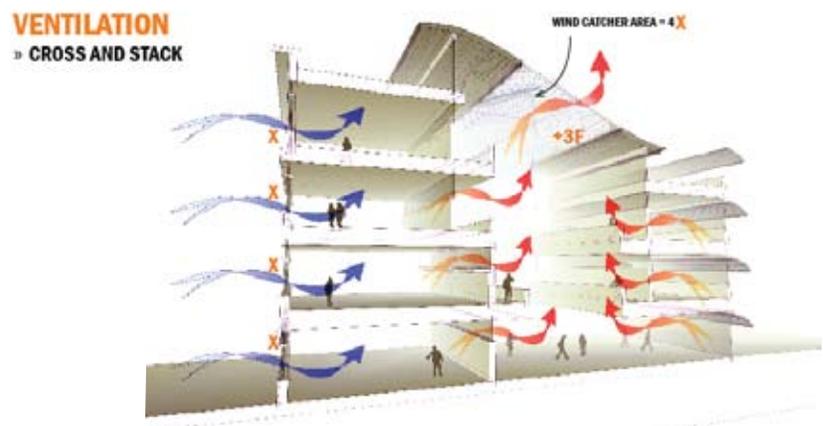
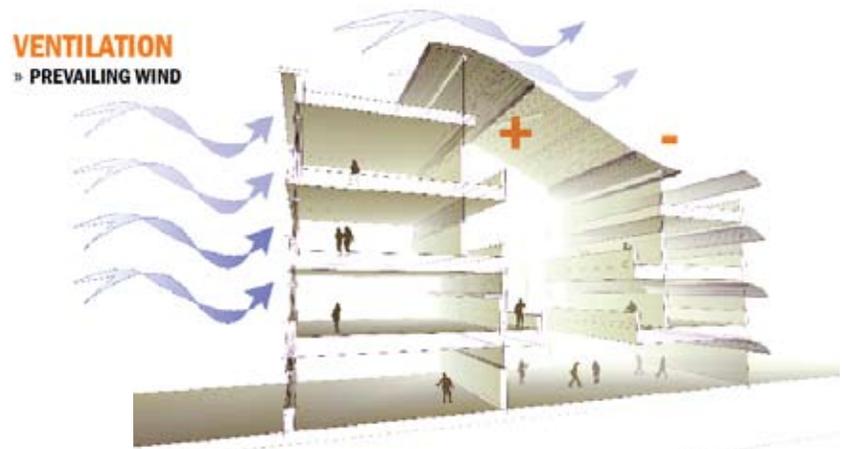


## Natural Ventilation

Research has shown that people accept, even enjoy, the more widely fluctuating temperatures available in naturally ventilated building, particularly when these conditions are under individual control. Recognizing this factor can save tremendous amounts of energy. Below are strategies to reinforce natural ventilation.

### Strategies

- Design wind breaks
  - *Wind breaks should be used to create edges that shelter buildings and open spaces thereby reducing window flow*
- Rooms and the windows within the rooms should be organized to promote cross ventilation.



**Ventilation.** Recognizing prevailing winds and organizing windows for good cross-ventilation are key principles for ventilation design.

## Use Replenishable Sources to Minimize Habitat Loss and Species Extinction

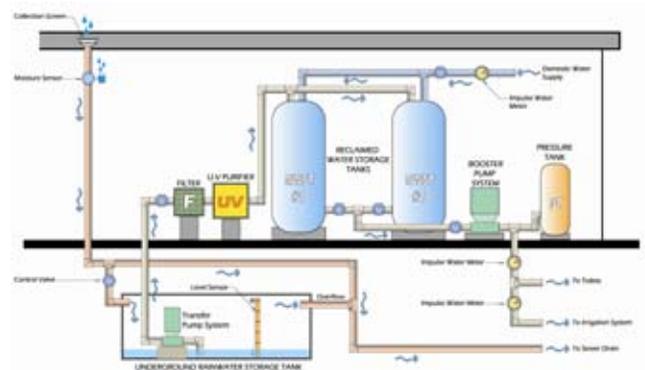
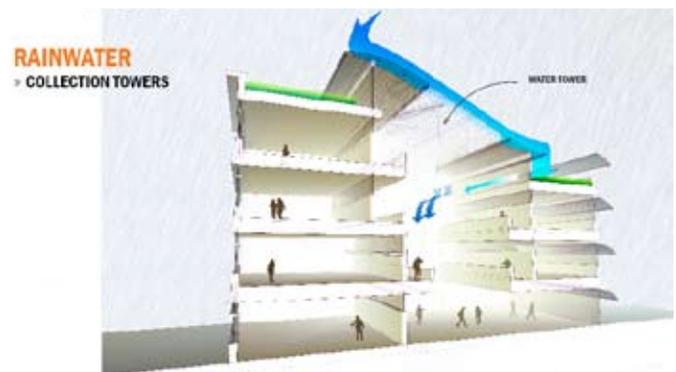
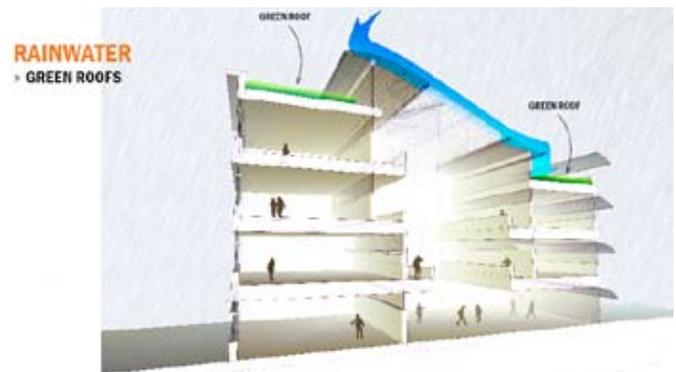
Much of the destruction wrought on the planet by industrial civilization is because standard building practices do not employ replenishable sources for energy, water, and building materials.

### Water

In the United States, approximately 340 billion gallons of fresh water are withdrawn from rivers, streams, and reservoirs every day to support commercial and residential uses. This volume accounts for about one-quarter of the total water use in the U.S. Strategies for water reuse generally have been neglected in the past.

### Strategies

- Water Capture and Processing
  - *Water efficiency measures in commercial buildings can easily reduce water usage by 30% or more. Using reclaimed water (grey water) or collected rainwater for potable systems can save an additional 30-40% of water use.*
- Stormwater Management
  - *Surface permeability is reduced as areas are developed, resulting in increased stormwater run-off volumes. The stormwater run-off contains sediment and other contaminants that have a negative impact on water quality, wildlife, navigation and recreation. Conveyance and treatment of storm water also requires costly and redundant infrastructure systems. Green roofs, bioswales, retention ponds, and permeable pavement should be planned as part of development projects.*
- Water-Efficient Landscaping
  - *Successful water-efficient landscaping depends on site location and design. It is advantageous to couple landscape improvements with water use reduction strategies. The use of native or adaptive plants can reduce site maintenance needs, as well as limit water use. Vegetation can also aid passive cooling, serve as a wind break, provide pleasant views and muffle noise, as well as provide habitat for wildlife.*



**Water Capture and Treatment.** *There are a number of ways to capture, treat, store, and use water that falls onto a building site - from simple bioswale and green roof systems to more complex capture, treatment, and storage systems.*

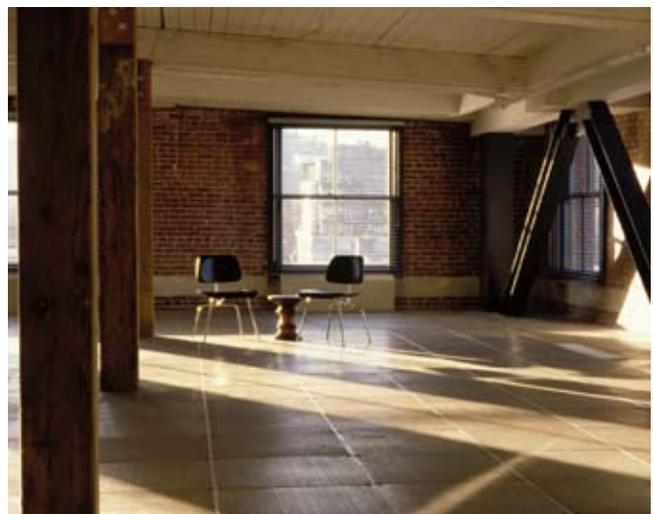
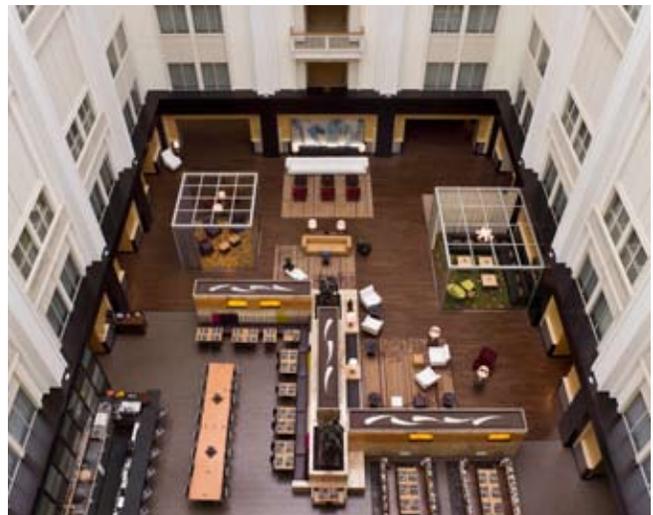
## Energy

Conventional, fossil-based generation of electricity releases carbon dioxide which contributes to global climate change.

## Strategies

- Reuse existing buildings to take advantage of embodied energy.
- *Buildings not only use energy, but they also take energy to make. This energy is called embodied energy, which is all the energy required to extract, manufacture and transport a building's materials, as well as those required to assemble and finish it.*

**Reusing existing buildings.** Below are three examples of adaptively-reused buildings in Downtown Portland: [1] The Avenue (residential), a former Meier and Frank warehouse, [2] The Nines (hotel and retail), a former department store and office building, and [3] The Creative Services Building (flexible offices space), a light manufacturing building.



## Materials

When materials are selected for a project, it is important to evaluate new and different sources. For example, salvaged materials can be substituted for new materials, a move which can both save cost and add character. Selecting recycled content materials in lieu of new materials reuses waste products that would otherwise be deposited into landfills. Using local materials supports the local economy and reduces transportation, while using readily renewable materials minimizes natural resource consumption and better matches the harvest cycle of the resources.

## Strategies

- Reduce and recycle building materials.
  - *Obsolete buildings, their materials, and components tend to be treated as waste. Yet many building materials can be recycled into new buildings and components to be adapted for long life.*
  - *Reuse building materials and products in order to reduce the demand for virgin materials, thereby reducing impacts associated with the extraction and processing of virgin resources.*
- Use non-toxic and recycled content building materials.
  - *Some modern building materials and components are non-recyclable, and produce poisonous toxins when manufactured and installed. These toxins are harmful to both the environment and the people and animals who live, work, and play in the buildings and should be avoided at all costs.*
- Recycle building waste.
  - *Divert construction and demolition debris from disposal in landfills and incinerators by redirecting recyclable resources back to the manufacturing process.*
- Enable others to recycle.
  - *Facilitate waste reduction for future building occupants by designing and creating areas for collecting and storing recyclables.*



**Deconstruct. Reuse. Recycle.** Olympia Salvage is a non-profit organization whose mission is to promote environmental sustainability, to divert building materials from the waste stream, and to provide affordable alternatives to the consumption of our limited natural resources.

## Minimize Human Activities on Flora and Fauna to Promote Biodiversity

The continued outward spread of development and sprawl threatens the few wild places that remain. Decentralized communities increase transportation and pollution. As flat, easy-to-build-on land diminishes, pressure increases to develop sensitive areas that are easily harmed or destroyed.

- Develop projects on previously developed sites.
  - *Select either greyfield or brownfield sites and don't build on the following locations: within 50-100 feet of wetlands, on or adjacent to sensitive ecological habitats, such as primary dunes, old growth forests and virgin prairie, or within the 100 year floodplain.*
- Limit light pollution
  - *Light trespass from poorly designed outdoor lighting systems can affect the nocturnal ecosystems, and light pollution limits night sky access. Through thoughtful design, outdoor lighting can address night sky visibility issues and site illumination requirements while minimizing the negative impact on the environment.*

## Community and Connection

To achieve a sustainable culture, green building must regenerate a sense of community and connection with the natural world, thus giving a sense of belonging and community. Transport, particularly automobile use, is the second largest consumer of energy after buildings. Even the most energy-efficient work place, if sited miles beyond access to public transport or other development, would do nothing to either address climate change or creating a sense of community. A building's location in terms of its accessibility and proximity to a range of other functions is thus critical in determining how green that building can be.