

## Chapter 2 Site & Water

Sustainable design and site planning integrates design and construction strategies to minimize environmental site impacts, reduce construction costs, maximize energy, water, and natural resource conservation, improve operational efficiencies, and promote alternative transportation. Water management practices help to protect salmon.

## Site Management

### 2-1 **Essential:** Complete a comprehensive site inventory.

<b>WHY</b>	<ul style="list-style-type: none"><li>• A thorough site inventory identifies design and construction opportunities and barriers.</li><li>• Solar and wind exposure affects building performance, including: resident comfort, energy costs, and building functionality.</li><li>• Accurate identification of easements, utilities, and other right-of-way</li></ul>
<b>HOW</b>	<ul style="list-style-type: none"><li>• Obtain a site survey including information relevant to zoning, utilities, adjacent buildings, easements, elevation and drainage patterns, streets, curbs, sidewalks and curb cuts.</li><li>• For projects that present site design opportunities, perform a comprehensive site inventory prior to preparing a schematic site plan. In addition to typical survey information have project manager or design team members assess information about conditions that may effect building performance and energy consumption such as seasonal wind patterns, solar access and environmental features (trees, vegetation, wetland areas, etc.) and surface water drainage patterns. Evaluate how natural conditions can work within the other sustainable building strategies in your plan.</li></ul>
<b>COST</b>	<ul style="list-style-type: none"><li>• An accurate and complete site survey will assist designer and identify savings.</li></ul>

### 2-2 **Essential:** Perform level 1 site assessment to determine soil conditions and previous uses of site.

<b>WHY</b>	<ul style="list-style-type: none"><li>• Level 1 site assessment is a records investigation of the site's geo-technical conditions, often performed before purchase of the property. The assessment should include: past uses of site, water table, underground water streams, drainage conditions, and compaction and overall soil quality and/or fill capacity for supporting structural footings, slabs, new drainage and surface pavement.</li></ul>
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<b>HOW</b>	<ul style="list-style-type: none"> <li>• Consult a licensed geotechnical engineer for level 1, site assessments.</li> <li>• It is not sufficient to use an earlier survey for your project - a geotechnical investigation is relevant only to the proposed building and site design. Site conditions may have changed since the last study. Soils may have been contaminated with hazardous materials.</li> <li>• The studies should clearly assess all major portions of a site to avoid problems in the construction phase. For example, if the soil is found to be of poor quality (infiltration and compaction) during foundation excavation, bringing in new fill and hauling away existing soils will add significant costs to the project.</li> </ul>
<b>COST</b>	<ul style="list-style-type: none"> <li>• The cost for a level 1 site assessment, often required by lenders, begins at approximately \$2,000-3,000 depending on site and accessibility.</li> </ul>

## 2-3

Perform level 2 site assessment for a more comprehensive geotechnical soil survey.

<b>WHY</b>	<ul style="list-style-type: none"> <li>• Level 2 site assessment is a physical, on-site survey performed if a level 1 site assessment indicates potential geotechnical risk.</li> <li>• A geotechnical (soil) survey identifies soil conditions—soil drainage conditions, compaction, underground water sources, bearing capacity—underneath major proposed structures. It is performed after preliminary</li> </ul>
<b>HOW</b>	<ul style="list-style-type: none"> <li>• Consult a licensed geotechnical engineer for geotechnical (soil) survey, level 2 site assessments.</li> </ul>
<b>COST</b>	<ul style="list-style-type: none"> <li>• Geotechnical (soil) surveys are approximately \$2,000 for a single-family lot; \$4,000 for a one-acre multi-family site; and \$10,000-15,000 for a five-story mid-rise structure with adjacent party walls.</li> </ul>

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**2-4** Preserve existing trees and shrubs on site, including street trees.

<p><b>CODE</b></p>	<p>Code allows for tree preservation <i>or</i> tree planting, but emphasizes the preservation of large (over 6" diameter) healthy trees. There are no restrictions on tree removal for structural additions, only for new construction. There are other considerations to determine which regulations apply, see DCLU Client Assistance Memo (CAM) 242, available on-line at <a href="http://seattle.gov/dclu/publications">seattle.gov/dclu/publications</a>.</p>
<p><b>WHY</b></p>	<p>Mature trees can provide excellent protection against winter winds and summer sun — improving comfort and lowering energy costs. In addition, trees provide food sources, such as fruits, and cover for wildlife habitat.</p>
<p><b>HOW</b></p>	<ul style="list-style-type: none"> <li>• Protect root systems of existing trees from damage.</li> <li>• During building layout, identify existing plants, including trees and understory plants that you want to save. For vegetation that needs to be cleared, reuse on site.</li> </ul>

- Retain trees over 8" caliper unless they're hazardous or cannot be incorporated into site plan. Such trees must be replaced 1-to-1 in landscaping. Trees may be relocated to accommodate new construction.
- Define protected areas on plans and field stake or flag on site. Fence critical areas, including tree root zones.
- Clear only areas actually needed to install driveways, parking areas, and building foundations. Avoid constructing paved areas over sensitive tree roots.
- Review site areas to be graded with excavation crew to ensure compliance with preservation plan. Check grading operations frequently to prevent accidental damage to marked areas.
- Never park heavy equipment or store heavy materials under trees.
- Many native plant species don't grow well in alkaline soils and should not be planted where their root systems will be near concrete.

## Surface Water

2-5

**Essential:** Manage surface water. Minimum requirement is to design on-site stormwater facilities to City of Seattle's stormwater specifications.

### CODE

- All projects are required to implement a stormwater management plan using the City of Seattle's DCLU Construction Stormwater Control Technical Requirements Manual. (Director's Rule 16-2000: [seattle.gov/dclu/codes/Dr/dr2000-16.pdf](http://seattle.gov/dclu/codes/Dr/dr2000-16.pdf))
- The City requires stormwater treatment for new parking lots of 5,000 square feet or more when the ultimate discharge point will be a lake, stream, or Puget Sound. A variety of treatment strategies are allowed,

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*Bioswales reduce erosion and cleanse stormwater before it enters the water table.*

*A bioswale is a shallow trench planted with trees, shrubs and ground cover that detains and filters stormwater before allowing it to infiltrate the groundwater system.*

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### WHY

- Maximizing on-site treatment of stormwater runoff increases on-site filtration, prevents pollutants from entering waterways, and reduces soil erosion.
- Effective stormwater management can help reestablish proper water functions that may have been disrupted during site development.
- Water storage and nutrient collection processes contribute to forming a healthier ecological community within the landscape.
- Federal funding requires State Department of Ecology stormwater rules, which may require biological assessment if within a certain distance to water sources.

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### HOW

- Use Best Management Practices (BMPs) to retain and treat on-site stormwater. Stormwater facility design depends on site drainage, soils, and space constraint factors. See DCLU's stormwater specifications for spe-

- Minimize situations where rain has no chance to infiltrate into the ground. Limit total impervious areas, surfaces that do not allow stormwater infiltration, including roofs, driveways, sidewalks, and streets. Disconnect impervious surfaces from each other as these magnify stormwater runoff problems. A paved driveway, for example, should not drain onto a paved street. Separate impervious surfaces with areas of turf, other vegetation, or gravel.
- Amend disturbed soil with compost to a depth of 8 to 10 inches to restore soil environmental functions.
- Projects can receive impervious surface reduction credits by employing practices that increase pervious surface.
- Another option is a "green" or "eco-roof" — a roof system designed to capture stormwater and infiltrate into a roof-top planting system. The remaining runoff from an eco-roof can also be directed to retention ponds, bioswales, and landscapes.

2-6

**Essential:** Provide erosion and sedimentation control during construction and minimize site disturbance. Design site erosion control plan to City of Seattle's erosion control specifications.

**CODE**

- The City of Seattle standard specification for erosion control and roadside planting sets minimum requirements for all development and ground-disturbing activities.
- The City's drainage code requires erosion control for all construction projects. Small projects may be required to provide an erosion control checklist with the building permit application. Projects that include 5,000 square feet or more of new impervious surface are required to provide an

**WHY**

- Erosion control during site development keeps valuable topsoils on site and reduces pollution, stormwater, and sediment runoff into local waterways. Erosion control Best Management Practices (BMPs) help avoid stormwater related problems that can delay construction, add costs, cause environmental degradation, and damage public and private properties downstream.

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	<ul style="list-style-type: none"><li>• Compacted soils resulting from construction are less able to absorb water, resist plant root penetration, and lack the porosity needed for adequate aeration. As a result, they increase stormwater runoff.</li><li>• Federal funding requires State Department of Ecology stormwater rules, which may require biological assessment if within a certain distance to water sources.</li></ul>
<b>HOW</b>	<ul style="list-style-type: none"><li>• For relatively flat sites consider using a pin foundation system.</li><li>• Submit a site plan that outlines erosion control mitigation measures for all phases of site work with building permit-application. Select from the menu of Best Management Practices (BMPs) in the City's erosion control specifications to minimize runoff.</li><li>• BMPs include retaining all native topsoil on site and protecting stockpiles from erosion, compost barriers or filter berms, limiting equipment use zones, mulching exposed areas, sediment fencing, gravel construction entrances, and filter swales.</li><li>• Check and maintain all BMP strategies regularly to avoid BMP failure, or implement supplemental BMPs as back up, in case of primary BMP failure.</li><li>• Construct stormwater detention facilities as a first step in grading.</li></ul>
<b>COST</b>	<ul style="list-style-type: none"><li>• Minimal: For most sites, erosion mitigation strategies are inexpensive. More complicated sites, for instance those with steep slopes or adjacent to waterways, may have higher costs associated with more sophisticated strategies and monitoring. Using compost for erosion control has been shown to reduce overall construction costs.</li><li>• <b>Note:</b> Using compost for erosion control is a relatively new application. Check with your local code enforcers and stormwater management officials first. Slightly coarse to coarse types of compost are well suited for holding surface soil in place even during heavy rainfall.</li></ul>

## Landscape/Irrigation

2-7

**Essential:** Avoid herbicides and pesticides during site prep. Select least toxic natural products.

### WHY

- Seattle code prohibits the transport or introduction of pollutants, in addition to sediment, into stormwater. See DCLU Director's Rule 16-2000, Construction Stormwater Control Technical Requirements Manual, p. 107, for requirements and Best Management Practices related to pesticide control, handling of petroleum products, nutrient application control, solid waste handling and disposal, and use of chemicals during construction.

- Pesticides and herbicides pose a significant long-term health hazard to people and local ecosystems. Many substances do not safely break down, putting play areas, buildings, and groundwater at risk of contamination. Many products have been restricted or banned only after prolonged use and testing reveal long-term hazards. For example, the EPA now classifies diazinon, a common garden pesticide, as a Restricted Use Pesticide, to be used only by professional pest control operators.

### HOW

- There are many less-toxic alternatives to most herbicides and pesticides on the market today. Vinegar-based herbicides and insecticidal soaps are effective alternatives.

- To remove invasive species like blackberries or horsetail, herbicides will rarely be effective — their roots must be completely dug out of the

2-8

**Essential:** Incorporate sustainable principles in landscape plan.

### WHY

- Site development alters natural site conditions. Simple planting choices can support or recreate habitat for birds, insects and other wildlife.

- Strategically locating vegetation reduces overheating of buildings, resulting in reduced operational costs for the owner, greater comforts for residents, and less energy use. A well-placed windbreak of evergreens can reduce a building's heating bill by up to 20%.

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	<ul style="list-style-type: none"><li>• A landscape provides opportunities for residents to use and enjoy the outdoor environment such as garden spaces with edible plants, and places where children can learn about the natural cycles of a landscape.</li><li>• Grass lawns and some ornamental plant species can be invasive and costly to maintain. They require more water, labor, herbicides, pesticides and fertilizers to maintain.</li></ul>
<b>HOW</b>	<ul style="list-style-type: none"><li>• Optimize existing site vegetation.</li><li>• Consider xeriscaping. Xeriscaping embodies the principles of water conservation through creative landscaping.</li><li>• Specify that disturbed soils will be amended with 8 to 10 inches of compost or for turf areas, use a combination of sand and compost to ensure proper drainage.</li><li>• Plant native and drought-tolerant plants, grasses, shrubs, and ground cover. Cluster plants with similar water needs (“water-use” zones). Keep in mind some low water use plants may have certain needs, such as shade, which when not met can lead to increased water use. Maintain a 3-inch minimum layer of mulch in planted areas.</li><li>• Limit lawn to play or recreational areas. Centralize into one shared space.</li><li>• Locate trees for shading and wind breaks. Provide plantings on the south to create shade and channel breezes in summer without obstructing sun in winter and provide plantings on the east and northeast to filter the sun without blocking the light.</li><li>• Build paved areas away from south windows and shade with plantings. Use light-colored pavement.</li><li>• Create community or apartment gardens. This can be as simple as setting aside land for resident use, or developing a formal community garden and management plan. Make information on gardening available to residents in their native languages.</li></ul> <p><b>See also</b> Chapter 2: Site and Water, Action Item 10.</p>



*Community gardening can be as simple as designing land to be available to residents.*

## 2-9

**Essential:** Install landscape plan that incorporates sustainable principles.

### WHY

This Action Item is specifically called out to emphasize the importance of installing the specified landscape.

### HOW

Instruct crews and/or subcontractors in methods, materials and sustainable practices specified in the plan.

**See also** Chapter 2: Site & Water, Action Items 8 and 10.

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*This lush landscape is comprised of native and drought-tolerant plants.*

### 2-10

**Essential:** In new construction and when replacing existing landscaping, use native and drought tolerant plants and trees for landscaping, except for edible landscaping. Limit lawn to play and recreational areas.

#### WHY

- In the summer, up to 50% of the water used by municipal systems is for outdoor irrigation at a time when water reservoirs are at their lowest.
- Grass lawn is water intensive—needing about 35 inches of water per year to thrive, most of it during the summer. While lawn is appropriate for some landscaping, such as for play areas; it should be minimized wherever possible.
- Reduce maintenance costs and water use by replacing underutilized turf with native and/or edible landscaping.
- Native vegetation is well adapted to our climate and in a landscape provides excellent erosion, sediment, dust, and pollution control. Native plants are also more resistant to naturally occurring disease, insects and low levels of nutrients, reducing need for fertilizers, pesticides or herbicides.

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**HOW**

- Design landscape with native, drought tolerant plants and include edible plants for resident use, if appropriate. Maintain a 3-inch minimum layer of mulch in planting areas.
- Avoid plant species with invasive growth or seeding habits. Do not plant English Ivy (*Hedera helix*). Landscape designs should be checked against the Washington State Department of Ecology and King County lists of noxious weeds.
- Select disease resistant cultivars and avoid insect-prone species.
- Vigorous groundcovers, shade canopies and plant spacing are factors that can reduce the need for weed control.
- Select plants that can adapt to summer heat created by buildings and pavement.
- Involve landscape designer in architectural design process to identify appropriate areas for landscaping.
- Combine the landscape plan with stormwater management. A well-designed system will provide surface water filtration and aesthetic benefits.
- For lawn, don't plant turf in heavy shade or in areas with saturated soils or steep slopes.
- Select a grass mix that is suitable for the sun conditions and the lawn's intended use, and also one that grows slowly and requires less irrigation or maintenance, such as "eco-turf" or locally adapted rye-fescue seed blends. Limit the use of lawn to play or recreational areas.

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**COST**

• This measure can save money by reducing maintenance and irrigation costs. Native plants usually do not cost more than conventional ornamental planting materials.

2-11

**Essential:** If irrigating with potable water, install high-efficiency drip irrigation system.

**WHY**

• On average outdoor water use accounts for about 50% of residential water use. Native landscapes or carefully selected plantings can tolerate no irrigation even in dry periods once they have been established.

• Drip irrigation, the slow application of water to a plant's root zone, can cut water use by half or more. Accurate delivery reduces evaporation and eliminates overspray, and proper scheduling eliminates wet/dry fluctuations that stress plants. Drip systems can easily be modified to accommodate changes in a landscape or to provide separate schedules for different watering requirements, i.e. in amount and frequency.

**HOW**

• If irrigation is necessary, use high efficiency drip irrigation equipment and scheduling.

• Native, drought-tolerant landscapes are hardy and well-adapted to our climate. Use manual or drip irrigation system for generally 1-2 growing seasons to establish the landscape. After they have been established, the temporary irrigation system can be removed.

• Design and installation of drip irrigation systems should be accomplished by a certified irrigation specialist and conform to local water use ordinances. The system should include a clock timer, filter to prevent clogging and pressure regulator to reduce incoming City water line pressure. To prevent vandalism or accidental damage, lines can be buried 6" below ground. Installers can advise regarding spacing and size of emitters as well as watering schedules.

• Plants with similar water needs should be grouped together in "water use" zones, with irrigation schedules matching their needs.

• Drip irrigation systems require regular monitoring to ensure system is operating properly. Also, there is the possible damage from landscape maintenance equipment. Be sure to include as-builts with locations clearly defined as well as information about how the system works in the Operations & Maintenance Manual.

## 2-12

**Essential:** Clearly label all storm sewer inlets to inform residents about proper surface water protection.

### WHY

Storm sewer inlets are not places to dump paints or landscape wastes such as fallen leaves. Providing a visual reminder that storm sewer inlets connect to area waterways can help to educate community members. For example, a simple painted stencil can be used that reads, "Caution—leads to stream!"

### HOW

See the Resources Section for information on where to obtain free stenciling materials in the City.

## 2-13

Specify and install permeable surfaces and paving in low traffic areas (fire access, overflow parking, patios, driveways, pathways, etc.).

### WHY

Permeable surfaces facilitate on-site stormwater infiltration by reducing the percentage of hard surfaces.

Projects can receive impervious surface reduction credits for employing this strategy, decreasing the size and cost of stormwater detention infrastructure required on their projects.

### HOW

A variety of permeable surfaces are available: special permeable concrete/pavement; brick or stone pavers; and manufactured products made of concrete, plastic and/or gravel. Some products support turf growth.

When installing permeable parking surfaces, carefully follow manufacturer's installation instructions to ensure proper drainage and durability. Properly maintain these areas.

Permeable paving is most suitable in areas such as low-traffic parking areas, footpaths, patios, and common outdoor gathering spaces.

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- COST**
- Pervious paving materials may cost more than conventional paving materials (such as asphalt), but pavement replacement is simplified, and expensive measures such as asphalt cutting for underground repairs are eliminated. Also from an integration standpoint, there may be some cost savings by minimizing or eliminating connections to City stormwater systems. Possible reductions in stormwater management installations may also be cost saving.

**2-14**

Install rainwater catchment system for non-potable water reuse.

- CODE**
- The City of Seattle does not currently allow rainwater collection on residential projects. DCLU, Seattle Public Utilities and Public Health
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- WHY**
- Rainwater can be harvested for landscape irrigation and/or for flushing toilets, reducing water/sewer utility bills.
  - The City of Seattle may allow rainwater collection when the system is used for irrigation or non-potable water uses (toilet flushing).
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- HOW**
- A rooftop rainwater collection system consists of a suitable roof and guttering system, storage tank(s) or cistern and a simple filtration or screening system. The irrigation system can be supplied using the tanks and a small-scale pressurized pump system. Consider space constraints for cistern(s).
  - Use appropriate roofing materials such as metal, tile, or fiber cement. Lead-containing materials, such as flashing, should not be used in catchment roofs. Likewise, ensure that no zinc galvanized ridge caps, copper flashing, or copper wires for moss prevention are used.
  - Construct cistern or tank storage sized for the rainfall amount and roof size, with appropriate overflow devices. Cisterns can be made of concrete, ferro-cement, stone, or prefabricated metal, plastic, or fiberglass. Use only watertight, opaque materials and provide a cover to discourage mosquito breeding.
  - Provide an overflow route to direct excess flows away from building and in such a manner as to avoid impact to downstream properties.
  - Whether a rooftop cistern will be sufficient to meet all of the irrigation demands during the dry season will be dependent upon the irrigation

## 2-15

Evaluate use of greywater for irrigation.

### CODE

Greywater systems are currently treated as an “exception” to the code. Systems are approved, on a case-by-case basis as “experimental” systems, requiring compliance with stringent local and state regulations. If approved, greywater irrigation systems are required to be subsurface. Factors affecting the approval and use of greywater irrigation systems include soil depth and characteristics as well as drainage and flooding patterns. Other guidelines include setbacks for greywater irrigation lines from property and potable water lines.

### WHY

Greywater is all wastewater generated in the building except from toilet flushing. Sometimes referred to as “reclaimed” or “recycled” water, this includes wastewater from laundries, showers, tubs and sinks.

Greywater can be collected and stored for irrigation conserving water.

Irrigation can be responsible for up to 50% of residential potable water use during the dry summer months.

### HOW

To use greywater, a dual plumbing system must be installed to separate it from blackwater, which is wastewater generated from toilet flushing. Note: If you choose to plumb for greywater irrigation, you should also consider providing plumbing to use greywater for toilet flushing.

In cases where greywater for irrigation is acceptable, plumbing for greywater would be hooked up to the irrigation system. The irrigation system can be supplied using the tank(s) and a small-scale pressurized pump

### COST

The best opportunities for financial benefits may be in properties with common laundries and large irrigation needs, rather than trying to make use of greywater from individual units. Linking these systems could yield up to 20% savings on water bills.

## Indoor Water Conservation

**2-16** **Essential:** Install water conserving plumbing fixtures: 1.6 gpf toilets, 1 gpf for urinals, 2.0 gpm showerheads (or better) & 1.0 gpm faucet aerators. Option for urinals: waterless type.

<b>CODE</b>	<ul style="list-style-type: none"> <li>1.6 gpf toilets, 2.5 gpm faucets and showerheads.</li> </ul>
<b>WHY</b>	<ul style="list-style-type: none"> <li>Showers and faucets account for approximately 25% of indoor water use. Saving water translates into utility savings for residents.</li> <li>Water-conserving fixtures can reduce the amount of water used in</li> </ul>
<b>HOW</b>	<ul style="list-style-type: none"> <li>Specify fixtures that minimally meet performances thresholds of the requirement.</li> <li>Specify the gpm (gallons per minute), not just "low flow," which can refer to shower fixtures up to 3.5 gpm. For showerheads, 1.5 gpm fixtures are available at competitive prices. Specify showerhead with on/off toggle.</li> <li>Include flow controls in common area faucets.</li> <li>Specify low water use toilets that are durable and perform well. Not all low water use toilets are alike. Dual flush toilets, which have a half-flush/full flush feature, provide water savings beyond the standard low flush toilets. "Waterless" urinals use almost no water, relying on a</li> </ul>
<b>COST</b>	<ul style="list-style-type: none"> <li>The added cost of higher-performance low-flow showerheads is minimal, generally less than \$25 per unit. These measures may save more than \$100 per year in combined water and energy costs.</li> <li>A durable and effective water-conserving toilet typically costs \$90-130. Less expensive models may be less durable and result in high maintenance costs. No premium for waterless type urinals, but additional janitorial considerations necessary.</li> <li>Seattle Public Utilities offers various incentives for water conservation.</li> </ul>

## 2-17

Install water conserving appliances: Energy Star® or front-loading (horizontal or H-axis) clothes washers and energy efficient or Energy Star® dishwashing machines.

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| <b>WHY</b>  | • Horizontal-axis or front loading washing machines offer up to 30% water and energy efficiencies compared to vertical or top-loading machines. The most water efficient dishwashers use as little as 3.9 gallons per cycle at the economy setting. |
| <b>HOW</b>  | • Specify Energy Star® rated washing machines and dishwashers. For washing machines, specify horizontal-axis or front-loading styles.   |
| <b>COST</b> | • Seattle Public Utilities offers incentives through its Washwise Program.  |



Seattle Office of Housing

*Broad roof eaves improve aesthetics, reduce thermal gain in summer and divert rain away from foundation.*

## Design

## 2-18

**Essential:** Design exterior to properly drain water away from the buildings including patios, decks, window sills, and thresholds.

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| <b>WHY</b> | • In Seattle's rainy climate, a well-designed roof that includes a substantial roof eave, protects buildings against water and sun damage, significantly increasing a building's durability. |
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	<ul style="list-style-type: none"><li>• Generous roof eaves and other water-draining details can add to the aesthetic value of the structure, street appearance and tenant satisfaction.</li><li>• Damage from bulk water entry is a significant problem in housing, contributing to moisture related problems such as mildew and wood rot.</li><li>• Additional architectural features like covered porches and patios greatly increase the usability of limited exterior spaces. Careful architectural detailing and construction supervision ensures proper water drainage.</li></ul>
<b>HOW</b>	<ul style="list-style-type: none"><li>• Properly flash all roof penetrations. Extend eaves out far enough to keep water off windows. Although a 12" minimum overhang is sufficient, an 18-24" eave overhang is the most effective at draining water away from a structure.</li><li>• Slope new and rebuilt walkways, stairs, patios and thresholds away from the buildings.</li><li>• Grade site and grounds to drain away from the building. Garage floor and driveway are sloped to drain out.</li><li>• Divert water away from building. Direct gutters and downspouts to flow onto splash blocks or approved drain system so water drains away from building and in the best case infiltrates on site. Use bioswales as a strategy to stormwater management. Bioswales are a shallow trench planted with trees, shrubs, and ground cover that detains and filters stormwater before allowing it to infiltrate the groundwater system.</li><li>• Include and emphasize durable water resistant and long-lasting products or techniques.</li></ul>
<b>COST</b>	<ul style="list-style-type: none"><li>• Some upfront costs for decking and roofing materials. Trusses that overhang 12" should add little or no cost.</li><li>• Costs are reduced through long-term operations and maintenance savings.</li><li>• Eaves may add value to the property.</li></ul>



*Include bicycle parking in convenient, secure public areas, such as courtyard or near auto parking.*

## 2-19

**Essential:** Provide secure bicycle parking.

### CODE

In certain zones, the City of Seattle requires long- and short-term bicycle parking based on number of units in multi-dwelling buildings (SMC 23.54.0151).

### WHY

- Bicycle parking requires only 12-20% of the space and cost of a single auto parking space.
- Bicycling reduces pollution. The majority of auto trips in a city are less than two miles and could easily be made by bicycle, especially with the aid of bike baskets or trailer.
- Secure bicycle parking is a popular amenity and keeps bicycles out of living units.
- Bicycling is a healthy and cost-effective transportation alternative.

### HOW

- Provide convenient and secure long-term bicycle parking sized to the number of units. Include repair work area.
- Construct well-covered and visible outdoor bicycle parking facilities for residents and guests.
- Develop a plan that would encourage bicycle use and draw tenants to your building.

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**2-20** Provide pedestrian-friendly design amenities.

<b>WHY</b>	• Making the streetscape more inviting for walkers and bicyclists creates opportunities for social interaction and increases safety.
<b>HOW</b>	• Design for minimum front yard setbacks, include porches or bay windows. Provide interesting and varied materials for fencing to enhance appearance and security and exterior finishes to add character and
<b>COST</b>	• Some amenities may add more up-front costs; others do not, if designed carefully.

**2-21** Provide on-site transportation shelters *or* create easy access to existing public transportation options/facilities.

<b>WHY</b>	• Provide user-friendly shelters for residents who use public transportation to encourage ridership. • If you cannot provide shelters, then creating easy access to existing facilities provides residents with convenient alternatives and minimizes unnecessary destruction of landscaping features that may be in the path to existing public transportation.
<b>HOW</b>	• Shelters should be conveniently located to bus stops and other transit opportunities, and provide necessary protection from the weather elements. Make sure the shelters are attractive, safe, and include amenities like benches, landscaping, public art, and phones. • Create pedestrian paths to promote easy access to public transportation, services, or simply to facilitate movement throughout the complex and to

## 2-22

Size parking capacity to meet minimum local zoning requirements.

### WHY

- The biggest contributor to “global warming” is burning fossil fuel, primarily car emissions.
- New parking lots in Seattle must mitigate all stormwater on site.
- It is not an economical or efficient use of land to create surface parking lots.
- Parking lots concentrate and deposit toxic “automobile dandruff” — oil,

### HOW

- Supplement auto parking with bicycle parking. Contact DCLU for minimal parking requirements.
- Survey the tenants’ actual parking needs and parking capacity of the area.
- Consider sharing parking with other buildings in the area.
- Consider on-site car sharing program to reduce per unit parking needs (Flex-Car). This is currently only available in certain neighborhoods.

## 2-23

On larger projects with internal streets, install traffic calming devices, such as curb bulbs.

### WHY

- To maximize and facilitate pedestrian traffic, reduce risk, and provide for

### HOW

- Devices that “calm” traffic include pedestrian crosswalks, curb bulbs, and traffic circles or roundabouts. Neighborhoods in Seattle have employed these devices; especially curb bulbs and traffic circles, with great success.

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- The City has allowed reducing the width of the street by including reinforced shoulder on both sides that allow for emergency vehicles and parking on both sides.
- Contact Seattle Department of Transportation to request traffic calming devices. (206) 684-5008.