



SEATTLE CENTER
LANDSCAPE
MANAGEMENT
PLAN

January . 2009





SEATTLE CENTER

LANDSCAPE MANAGEMENT PLAN

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EXECUTIVE SUMMARY

SEATTLE CENTER LANDSCAPE MANAGEMENT PLAN

In conjunction with the recently adopted Century 21 Master Plan, the Seattle Center Landscape Management Plan establishes campus-wide landscape management policies and sets the groundwork for the ongoing design and maintenance of Seattle Center’s grounds, landscape, and outdoor spaces. The Plan addresses all contributing landscape elements such as plants, trees, lawns, paving, water features, and sustainable design goals, while recognizing that the Seattle Center campus is always evolving. Seattle Center has a distinct and palpable sense of place and aspires to be the nation’s “Premier Urban Park”.

One of the most important landscape issues facing the City of Seattle today is the management of canopy trees. With several new public policy decisions in place, such as the Urban Forest Management Plan (UFMP) and the Mayor’s “2 for 1” Tree Replacement Executive Order, the management of canopy trees at Seattle Center is a high profile topic that requires thoughtful policy decisions. The UFMP has set both the baseline and future target goals for additional canopy cover to be added over a thirty-year timeframe. For Seattle Center, that thirty-year goal is 15% cover of the total site area. Seattle Center has made a commitment not only to meet this threshold, but also to exceed it. Several concept diagram scenarios that lay out options for where new canopy cover could be introduced on campus are provided in this report, taking into account the phased implementation of the Century 21 Master Plan. This report also includes an inventory of Legacy and Dedicated Trees and outlines tree removal policies to reinforce the commitment to tree protection on campus.

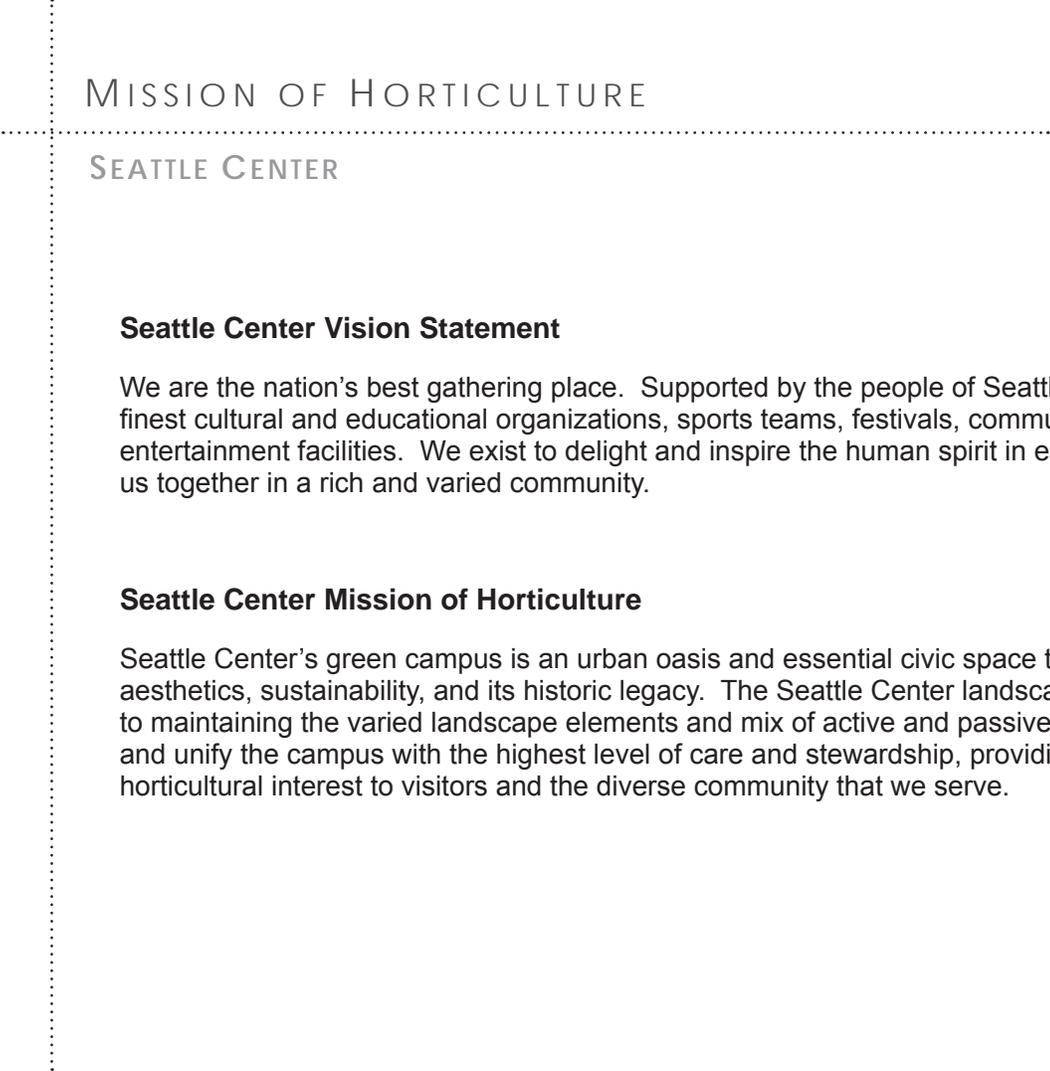
A full range and hierarchy of vegetation already exists on site and is vital to shaping the character of Seattle Center’s landscape. Understory trees, while not as closely managed as canopy trees, provide a lush backdrop for buildings and outdoor civic spaces. Shrubs, groundcovers, perennials, and annuals also add to the landscape’s verdant quality. These plants are more transitory in the landscape, as their tenure in a specific location may be years, months, or seasons at a time.

Lawn is an important landscape material that provides vegetative cover and creates much valued active, urban open space. Lawn is the most resource intensive of all the vegetative elements at Seattle Center, requiring the highest level of care and oversight to keep lush and aesthetically beautiful in the face of extensive public wear, especially from large events and festivals such as Bumbershoot, Bite of Seattle, and Folklife.

Beyond the vegetation, other landscape elements are important in shaping the character of Seattle Center and ensuring that it is a dynamic and engaging public space. While often subtle, the hardscape lends itself to wayfinding and can enrich the experience of pedestrians. Water features, whether providing ecological functions or civic and aesthetic ones, are very important in drawing visitors and engaging them with the campus. Because water features add a layer of interactivity that is difficult to find in other landscape features, their civic value justifies the resources they require.

One of the most critical considerations now and into the future is how to make the Seattle Center campus more sustainable. It is important that Seattle Center takes a balanced approach to sustainability, recognizing both public expectations for use of the campus and budget implications. Integrating ecological systems into the landscape and making thoughtful choices about sustainable design will lower environmental impacts and minimize the carbon footprint. Many landscape elements, however, will still require ample resources in order to provide important civic functions that the public desires and expects of Seattle Center.

A varied landscape and multitude of elements combine to make the Seattle Center campus unforgettable. An important legacy of the 1962 World's Fair, Seattle Center provides beauty and horticultural interest for all who enter the grounds. The philosophy and policy framework put forth in the Seattle Center Landscape Management Plan will be instrumental in guiding future landscape development and ongoing maintenance of this premier urban park, ensuring that it will always be an urban oasis that balances aesthetics, respect for the environment, and its historic legacy.



MISSION OF HORTICULTURE

SEATTLE CENTER

Seattle Center Vision Statement

We are the nation's best gathering place. Supported by the people of Seattle, we are home to the finest cultural and educational organizations, sports teams, festivals, community programs and entertainment facilities. We exist to delight and inspire the human spirit in each person and bring us together in a rich and varied community.

Seattle Center Mission of Horticulture

Seattle Center's green campus is an urban oasis and essential civic space that balances aesthetics, sustainability, and its historic legacy. The Seattle Center landscape team is dedicated to maintaining the varied landscape elements and mix of active and passive spaces that connect and unify the campus with the highest level of care and stewardship, providing beauty and horticultural interest to visitors and the diverse community that we serve.

INTRODUCTION

Seattle Center is an aesthetically pleasing and ecologically sensitive place that showcases a verdant, comfortable, and multi-functional landscape. As Seattle Center has evolved and matured since the 1962 World's Fair, its horticulture has become multi-dimensional, featuring a more complex planting philosophy while also working within budgetary constraints. The variation and “freshness” of the landscape have a strong horticultural impact on visitors, and, in an increasingly urban environment, is an attraction in itself.

Seattle Center's plant palette is selected for visitors' overall experience within the landscape. These experiences are shaped by the plants' colors, textures, fragrances, and combined visual impact. Going forward with the Century 21 Master Plan, the Seattle Center Landscape Management Plan sets the groundwork for a new mission of horticulture balanced with pragmatism and sustainability. This document establishes the management philosophies and subsequent policies for the ongoing design and maintenance of Seattle Center's grounds, ensuring the preservation of Seattle's most culturally significant civic green space.

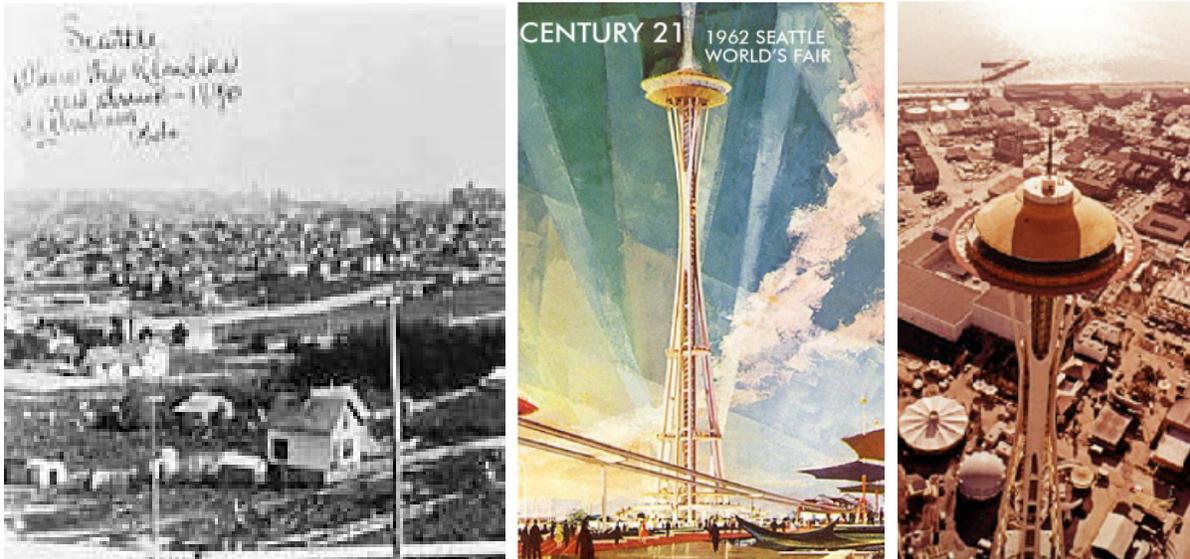


Images depicting the many landscape elements and textures that comprise Seattle Center

HISTORY

SEATTLE CENTER

Seattle Center, one of the city's major social and cultural hubs, is located at the base of Queen Anne Hill, north of downtown Seattle. The Center site, once a clearing known as the Potlatch Meadows by early settlers, remained largely undeveloped until the opening of the Civic Auditorium complex in 1928, which is currently known as Marion Oliver McCaw Hall. More development followed, including a National Guard armory in 1939 (currently the Center House) and Memorial Stadium in 1948.



Historical Seattle Center Images, from left to right: Potlatch Meadows: pre-Seattle Center; Advertising image from 1962 World's Fair; Aerial photo of the Century 21 Exhibition

In the late 1950s, Seattle began developing plans for the “Century 21 Exhibition”, the official title for the Seattle World’s Fair in 1962. Pre-World’s Fair, the area was a mix of residential blocks surrounding the Civic Auditorium and Arena, Memorial Stadium, and the Washington National Guard Armory. The World’s Fair brought the 74 acres together as one site. Paul Thiry was the supervising architect for the Fair, while Lawrence Halprin, a nationally known landscape architect, directed the landscape’s development. Some of Seattle’s most prominent landmarks such as the Space Needle, Key Arena (originally the Washington State Pavilion), the Monorail, and the International Fountain were constructed for the Fair. The site was gated and surrounded by a combination of perimeter buildings and fences, literally turning its back to the surrounding community. In the years following the Fair, Seattle Center was created as a department of the City of Seattle. In 1990, the first Seattle Center Master Plan was adopted, with one of its primary design principles to open the edges of the campus to the surrounding community and to create a series of indoor and outdoor rooms as inviting open space for Seattle’s residents and visitors. Because the campus is a mix of building types from the early 20th to early 21st century, the landscape plays an important role in creating cohesion, and, as the campus becomes more porous to the surrounding areas in the Century 21 Master Plan, the complexity and unity of the landscaping becomes even more essential.

GOALS AND OBJECTIVES

SEATTLE CENTER

The purpose of the Seattle Center Landscape Management Plan (LMP) is to first outline a management philosophy and framework for Seattle Center’s landscape and outdoor spaces that encompasses all contributing elements such as plants, trees, lawns, paving, and water features. The Plan also outlines a series of policy goals that can be applied to future design and management of Seattle Center’s landscape. The Century 21 Master Plan, adopted in August 2008, lays out the future of Seattle Center for the next twenty years as it continues to adapt to a changing world, and sets the context for this document. The LMP must be flexible enough to remain relevant, while recognizing that the Seattle Center campus is always evolving.

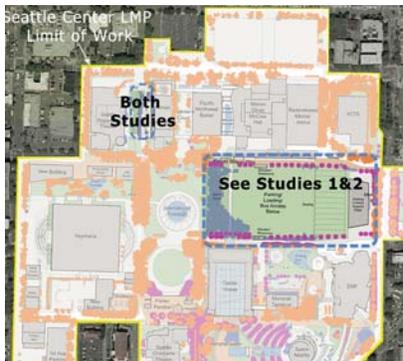
Landscape Character

The creation of a new landscape management philosophy and subsequent policy goals is the result of multiple factors, including consideration of the landscape’s existing character, the cataloging of its component parts and how they sum up to a larger whole. The use of diverse vegetation types and species is important, but what makes the landscape unique is the way in which these plants are used to shape spaces and give Seattle Center a palpable “sense of place”. As with most landscape management philosophies, once the character of a place is identified, this can then be used to inform species choice and other specific landscape decisions.

Seattle Center is an oasis of green space set within a very urban environment. From the streets that surround the campus perimeter, the Center draws you in with the portals and access points creating a distinct “sense of entry.” The campus is visually distinguished from the surrounding community, while not out of context with its surroundings. For example, the grand paved entrance adjacent to the Space Needle maintains the open, urban character of Broad Street, the surrounding Denny Regrade area and the scale of the Needle. In contrast, the access points neighboring the more residential areas to the northwest of the Center are smaller and more intimate in scale while still providing a clear sense of entry.



A sampling of sites around Seattle Center



Landscape features at the heart of Seattle Center

Many elements within the landscape contribute to Seattle Center’s park-like feel, most importantly the large open spaces. These open spaces consist of a groundplane of lawn or hardscape, often framed by canopy trees or beds of vegetation. They are mainly located in the center of the campus, an area widely considered to be the “hub” of Seattle Center. These areas, and the elements contained within, provide the largest impacts for visitors: the “big wow” moments. The center of the campus draws visitors with such elements as the interactive and dynamic International Fountain and the versatile Fountain Lawn. In the future, the Century 21 Master Plan proposes to add more than ten acres of open space to the Center’s landscape with the addition of a large lawn bordering a high-impact amphitheater/sports facility that opens up and integrates the Memorial Stadium Zone. A reclaimed Fun Forest site transforms an aging amusement park into an activity zone for all ages use, and an asphalt parking lot becomes the Theater Commons.

In addition to these large spaces, smaller spaces are also vital to the character of Seattle Center. These small spaces give the Center its unique personality and set it apart from other public spaces. Often located at the perimeter, these spaces help reinforce the architectural character of a building, as is the case with the clean, modern lines of the new Kreielsheimer Promenade adjacent to McCaw Hall. The Peace Garden, with its lush, varied planting palette and cultural significance is a small space that provides a large emotional impact for visitors.

In the distinct spaces of Seattle Center there are a number of components that provide the distinguishing characteristics for these areas. These components infuse the space with color, texture, fragrance, movement, and other forms of visual, sonic, or tactile appeal. They can be conspicuous and iconic, such as large art installations like *Iliad*, or dynamic, such as the International Fountain. They can also be subtle backdrops that provide texture and interest, evident in elements like the paving pattern on the plaza surrounding Key Arena. These elements combine to create a tangible sense of place for Seattle Center and distinguish the campus as a special place, supportive of the Center’s mission to “... delight and inspire the human spirit in each person and bring us together as a rich and varied community.”

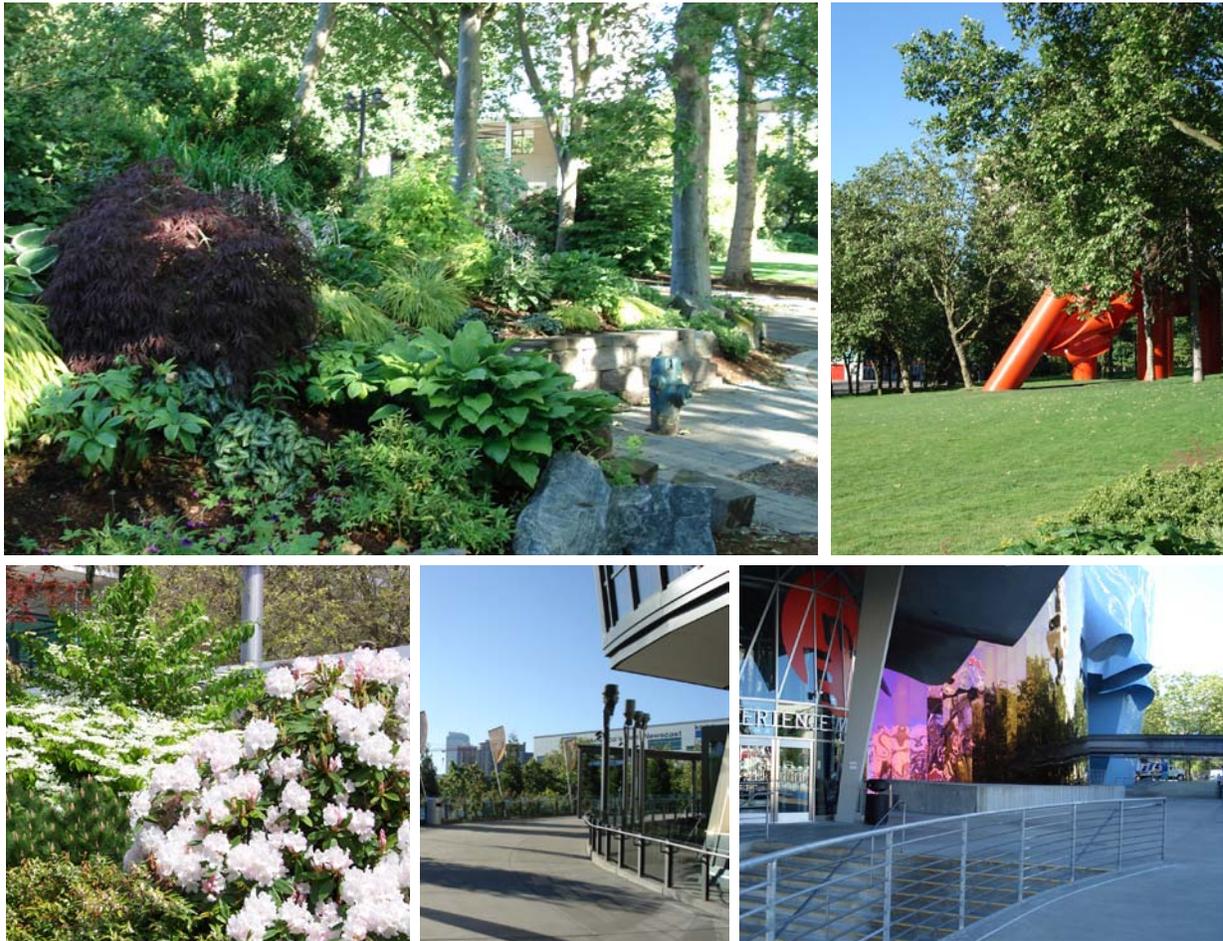
CURRENT CONDITIONS

SEATTLE CENTER

Seattle Center, as it exists in 2008, is a 74-acre campus home to more than 40 cultural, educational, sporting, festival, and community organizations. The campus contains 17 acres of diverse open spaces that accommodate both active and passive uses and a host of visitor activities. These open spaces contain a varied mix of landscape elements such as open swaths of lawn; large canopy trees and smaller understory trees; dynamic planting beds containing various shrubs, perennials and annual plants; various paving materials and hardscape along pathways; and other public amenities such as art installations and water features.



CURRENT (2008) SITE PLAN MAP

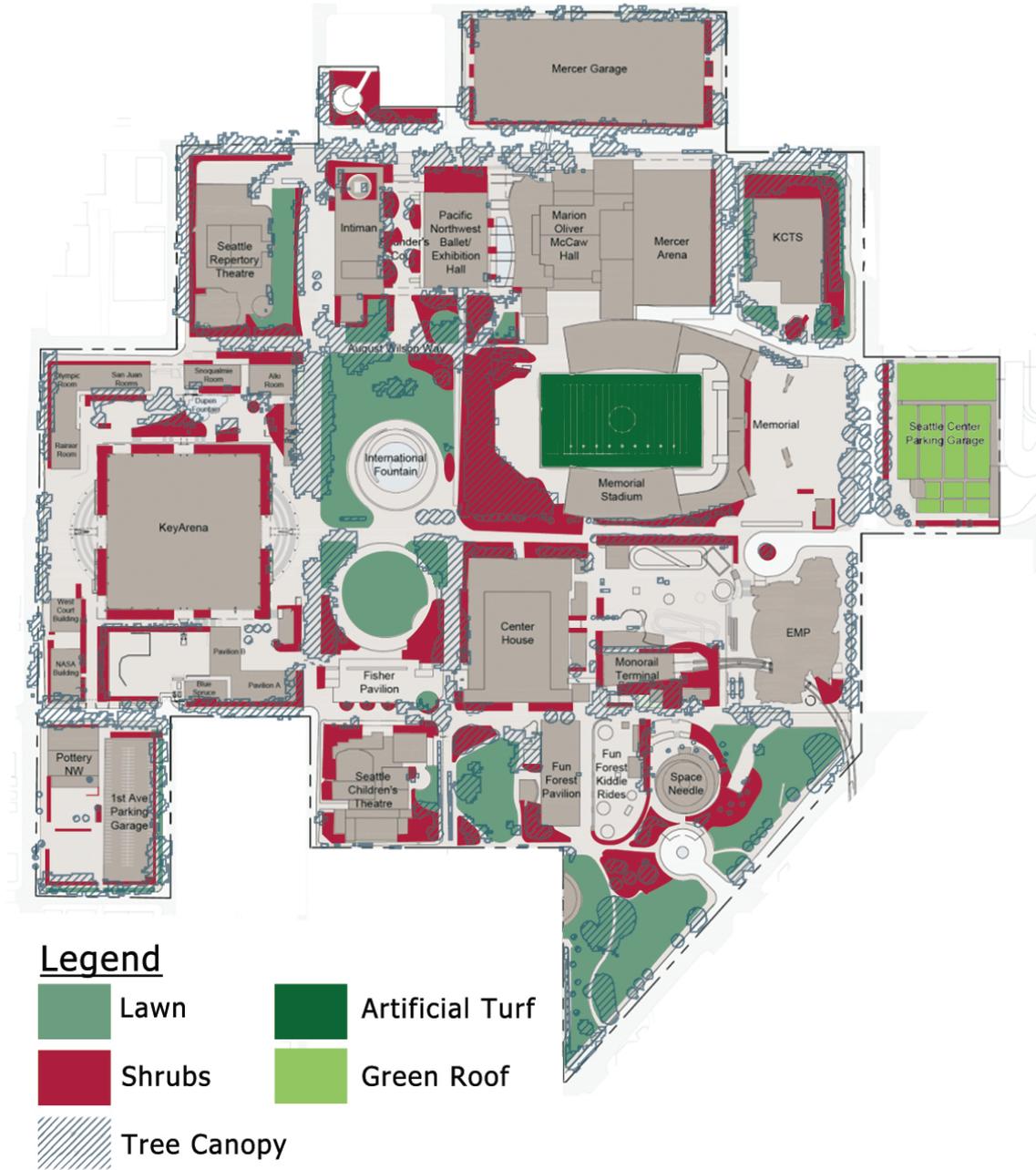


Varied mix of landscape elements that comprise Seattle Center

Seattle Center's gardening staff utilize a wide range of plants in the various landscape features on campus. This includes many species that are native to the Pacific Northwest region. However, it is not Seattle Center's philosophy or desire to limit the plant choices to any particular geographical region. The Pacific Northwest has a mild climate that is conducive for successfully growing plants from many parts of the world. Plant species are chosen that are native to many various geographical regions for their aesthetic attributes as well as durability, hardiness, form and function. A broad palette of plants are required to meet Seattle Center's landscape needs.

What stands today is largely the result of the 1990 Master Plan, which transformed the campus from a collection of mostly temporary structures remaining from the World's Fair to a more cohesive, active, and multi-dimensional public gathering place. The current Site Plan is shown on the previous page. Looking towards the future, the Century 21 Master Plan expands on what the 1990 Master Plan started. It retains the elements that currently make Seattle Center dynamic and engaging and enriches them with better connections and more unified open spaces.

CURRENT (2008) VEGETATION MAP - COMBINED



CHAPTER ONE

TREES

CANOPY TREES

Canopy trees, as defined by Seattle Department of Transportation and the City of Seattle Urban Forestry Management Plan, are trees in an urban setting, with an overhead canopy that starts at least 10' off the ground plane. These trees are a vital thread in the larger landscape fabric of Seattle Center. The benefits of these canopy trees, from an ecological, social, and functional standpoint are numerous and invaluable. Ecologically, canopy trees improve air and water quality, reduce the urban heat island effect caused by expanses of hardscape, help mitigate storm water events and runoff, and provide valuable habitat opportunities for birds and other types of local wildlife. They also aid in reducing the amount of atmospheric CO₂ within the urban core by filtering the air: a quality that has resulted in these trees being popularly termed the “lungs of the city.” Socially, canopy trees create a comfortable respite for visitors- providing cooling shade and a psychological shelter for urban spaces.

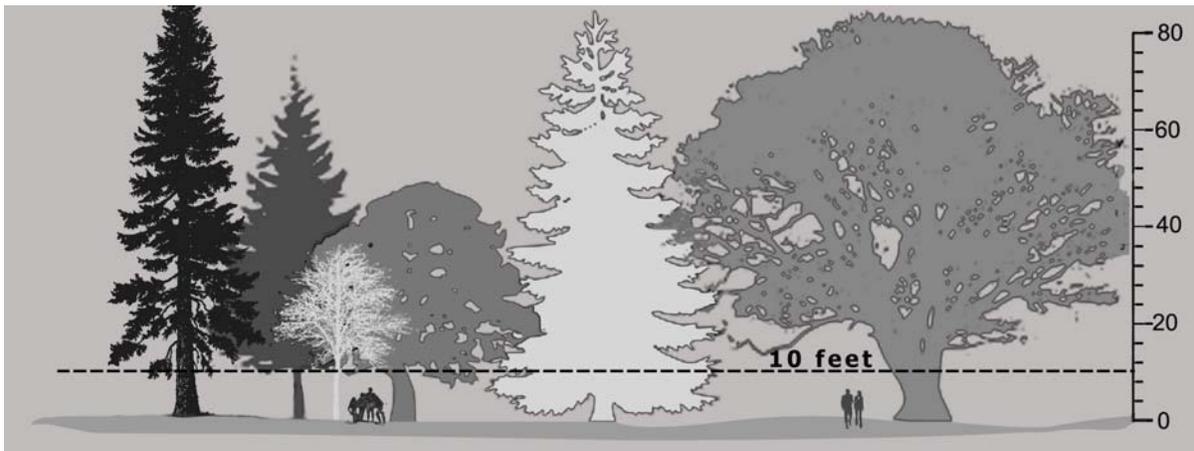
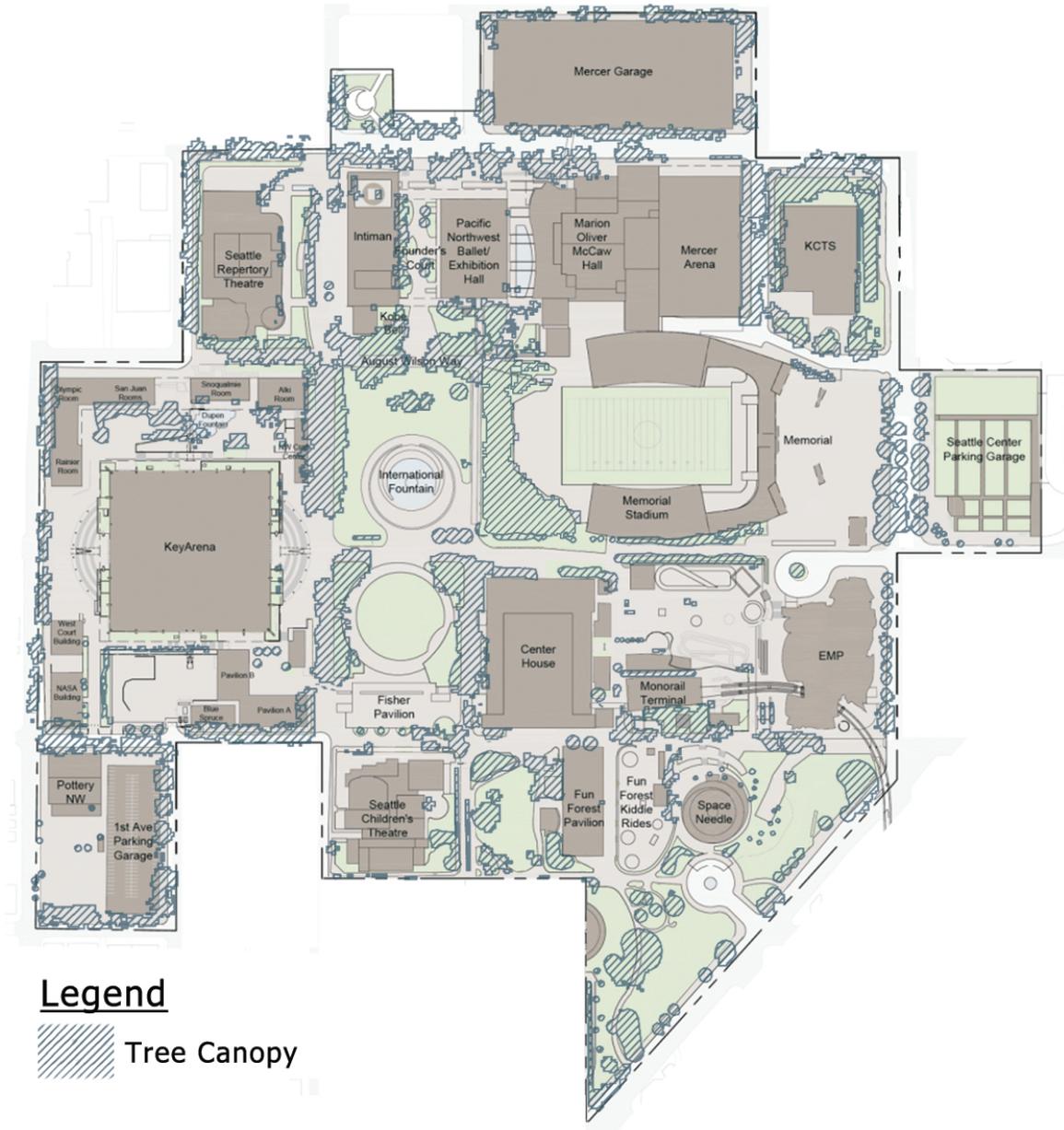


Diagram of canopy tree characteristics

Seattle Center's canopy trees exist in varied settings and numerous species are represented. Generally, they can be divided into two classifications: urban trees and non-urban trees. These categories are not absolute, nor do they imply any value distinction between the two since both enrich the Center's aesthetics and functionality.



CURRENT (2008) VEGETATION MAP - TREES

Urban & Non-Urban Trees

The difference between urban and non-urban trees lies in their location and function. Urban trees tend to be located in areas surrounded by an expanse of hardscape. Most commonly, people identify urban trees as the “street trees” that surround the campus and run parallel to vehicular/ pedestrian thoroughfares. These trees tend to delineate pathways and clarify the limits of distinct spaces, becoming an integral part of pedestrian wayfinding and spatial cognition.

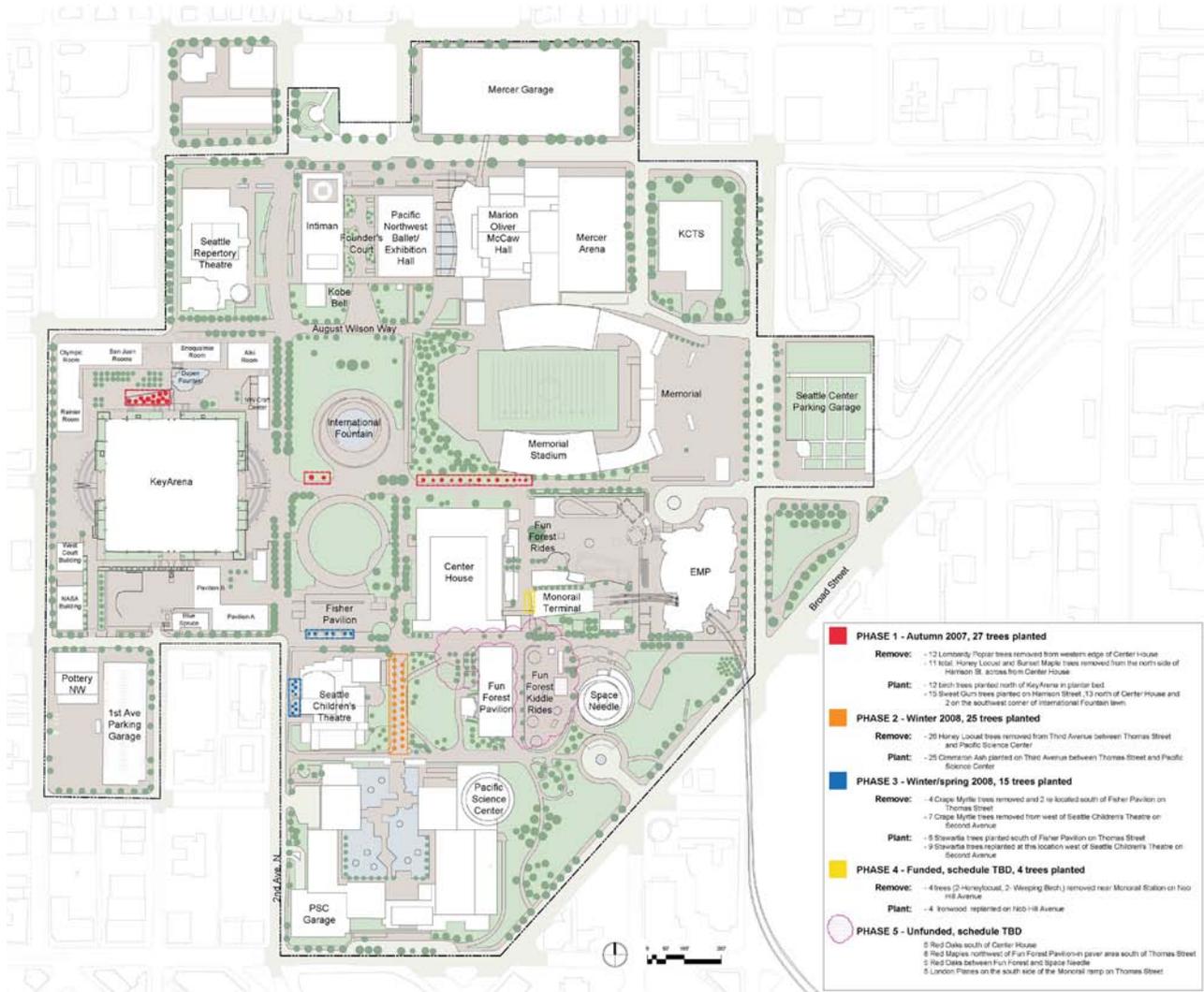
Non-urban trees, in contrast, are located in areas away from vehicular or pedestrian pathways. They help define distinct spaces and are often located along the periphery. In a formal planting, they can be utilized as a screening device, such as the line of poplars just east of the Bagley Wright Theatre Lawn. Informal groupings, such as the diverse grove of trees within the expanse of the Broad Street green, act as background trees for the major art installation *Iliad*, as well as providing shade and respite.



Left and middle images depict urban trees around Seattle Center; right image depicts non-urban trees in front of the *Iliad*

Canopy trees at Seattle Center are commonly expected to live a full life span, often multiple decades. While the palette of understory trees, shrubs, and perennials is in a relatively constant flux, great care and management consideration are given to canopy trees because of their long-term tenure at Seattle Center. Canopy trees are given the highest level of investment, over 40 years on average, as well as the highest level of public scrutiny. For many visitors to Seattle Center, the street tree canopy is the signature landscape element. London Plane trees line the major pathways through the campus, creating a distinct border around the perimeter and on many blocks actually extending into the surrounding neighborhood. As an important legacy of the World’s Fair, the Plane Trees are highly scrutinized and unlikely to be removed because they are so valued for their contributions to the campus and the surrounding community.

Seattle Center’s tree canopy is protected by public policies, although these policies are sometimes contradictory. The Urban Forest Management Plan (UFMP) sets 30-year canopy goals for Seattle Center. The Mayor’s “2 for 1” Tree Replacement Executive Order stipulates that two trees shall be planted for each one tree removed, which also creates incentives to maintain healthy tree canopy. In 2008, Seattle Center removed over 60 canopy trees that were diseased, damaged, or not thriving, and replaced them one for one with new young canopy trees that have the potential to create a mature canopy over time (See Tree Replacement Plan, next page). This will help Seattle Center meet, or exceed, its UFMP canopy goal, but falls short of the “2 for 1” plan as there is little space available on campus for this volume of new canopy trees. As a result, Seattle Center is now working with other City Departments, including Parks and Transportation, to explore options for meeting its tree planting obligations on other City owned lands nearby, such as parklands, greenbelts or street right-of-ways.



SEATTLE CENTER TREE REPLACEMENT PLAN
2007-2008

UNDERSTORY TREES

Understory trees have a very specific role in the landscape that differs from canopy trees in form and function. While canopy trees provide overhead cover, understory trees essentially act as large-scale shrubs. They may provide a small amount of overhead canopy, but not enough to meet the parameters that would classify them as canopy trees. These trees are often massed in plazas to delineate spaces, screen distinct areas or use zones, or act as backdrops.



Sampling of understory trees around Seattle Center



Diagram of understory tree characteristics

URBAN FORESTRY MANAGEMENT PLAN

CANOPY TREES

The trees that currently exist at the Center contribute to the larger Seattle urban forest system. Using the guidelines set forth in the April 2007 City of Seattle Urban Forestry Management Plan for mixed-use properties, Seattle Center should attain or exceed canopy coverage of 15% of the total site area in 30 years. In the baseline study of Seattle Center conducted in 2000, tree canopies comprised 9.2% of the total area of the Center. The addition of canopy trees to meet city-wide coverage goals will be an issue of great importance in future landscape planning and management discussions at Seattle Center.

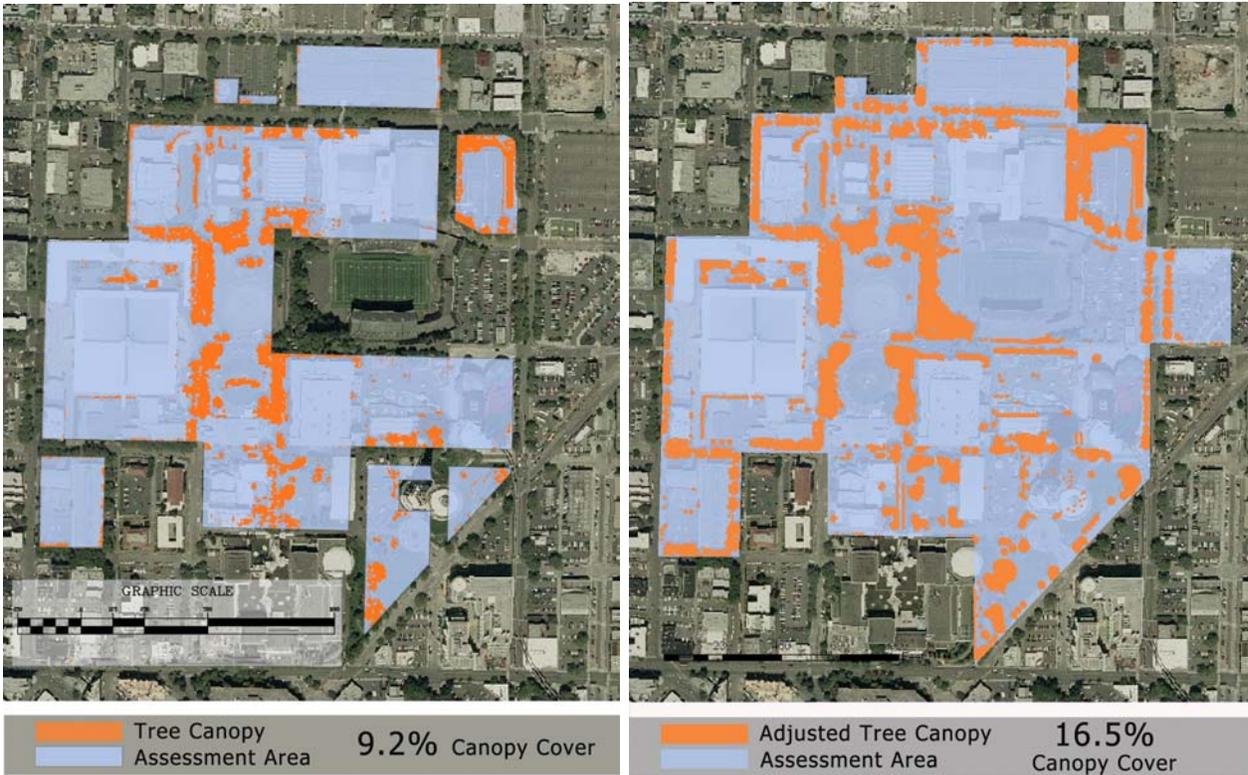
The analysis done for the LMP included a new assessment of the current Seattle Center canopy, beginning with the Light Detection and Ranging (LIDAR) technology collected in the year 2000 and published in 2002 by Seattle Department of Parks and Recreation (DPR) in collaboration with Seattle Department of Transportation. The 2000 LIDAR was shot over the whole of Seattle on a one-meter grid in leaf-off conditions, counting any vegetative cover 10' off the ground as canopy.

Setting the Boundaries

The 2000 LIDAR survey incorporated the individual parcels that make up Seattle Center, but some areas were excluded. The survey did not include some Seattle Center property such as the 5th Ave N. parking lot and a number of vacated street right-of-ways. It excluded parcels owned by others such as the small parcel on which the Space Needle is located, the Memorial Stadium site, and the Pacific Science Center. Also excluded was the street tree canopy on Seattle Center Property and the London Plane street tree canopy that borders Seattle Center property in SDOT right-of-way. Therefore new boundaries needed to be established to create the 2008 “snapshot” of existing canopy cover. The following areas were added:

- 1) The vacated rights-of-way throughout the campus
- 2) The portion of the 5th Ave Parking lot still under Seattle Center operation (the new 5th Ave. N. Parking garage)
- 3) The Space Needle parcel, in order to represent the entire Broad Street Green
- 4) The London Plane street tree canopy as it borders Seattle Center property
- 5) The Memorial Stadium site because it is an integral component of the Century 21 Master Plan

The Pacific Science Center was excluded because it is owned and managed as a separate entity. The “aspirational” areas of the master plan such as the north side of Mercer between Warren Ave N and 2nd Ave N and the “triangle block” east of the EMP were also excluded. There are no immediate plans for Seattle Center ownership of these parcels.



2002 DPR TREE CANOPY ASSESSMENT

2008 TREE CANOPY ASSESSMENT

In addition to these boundary adjustments, the canopy coverage data requires some modification and extrapolation to achieve an accurate current representation of 2008 conditions. Field observations were conducted to document areas of tree canopy growth, tree additions, and tree removals. In light of these modifications, the total square footage of canopy cover has been increased along with the total boundary area of the project.

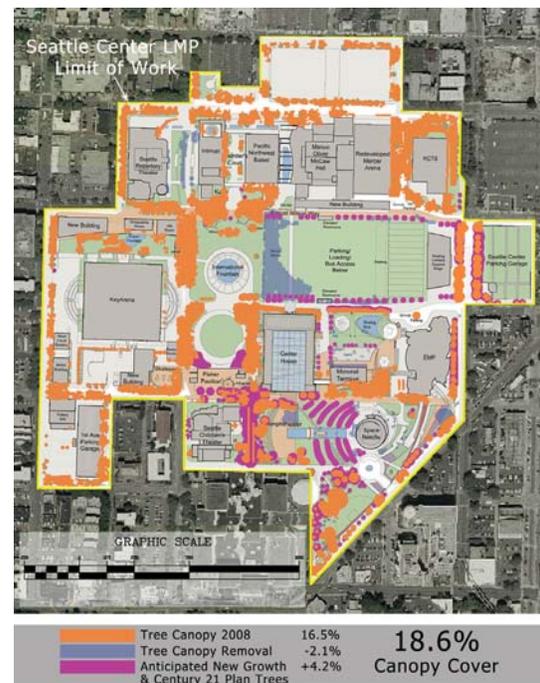
Depicted above is a comparison of the 2002 DPR Tree Canopy Assessment and the 2008 LMP Tree Canopy Assessment. While the 2002 study shows a 9.2% canopy cover that falls short of the UFMP 15% 30-year canopy goal, the 2008 Assessment shows that currently the Seattle Center campus, including Memorial Stadium, has a 16.5% canopy cover, already exceeding the UFMP 30-year goal.

Moving Forward

After completing the evaluation of current conditions (represented by the 2008 Tree Canopy Assessment Map, page 17), an assessment was completed of the tree canopy represented in the Century 21 Master Plan. The boundary for the master plan assessment remained the same as the 2008 study. The only variables were tree loss and gain from specific changes to areas such as Memorial Stadium, the Fun Forest, and Theatre Commons and maturation of existing canopy. This assessment revealed, when implemented, the Century 21 Master Plan would achieve a nominal canopy cover of 18.6%.



CENTURY 21 PLAN

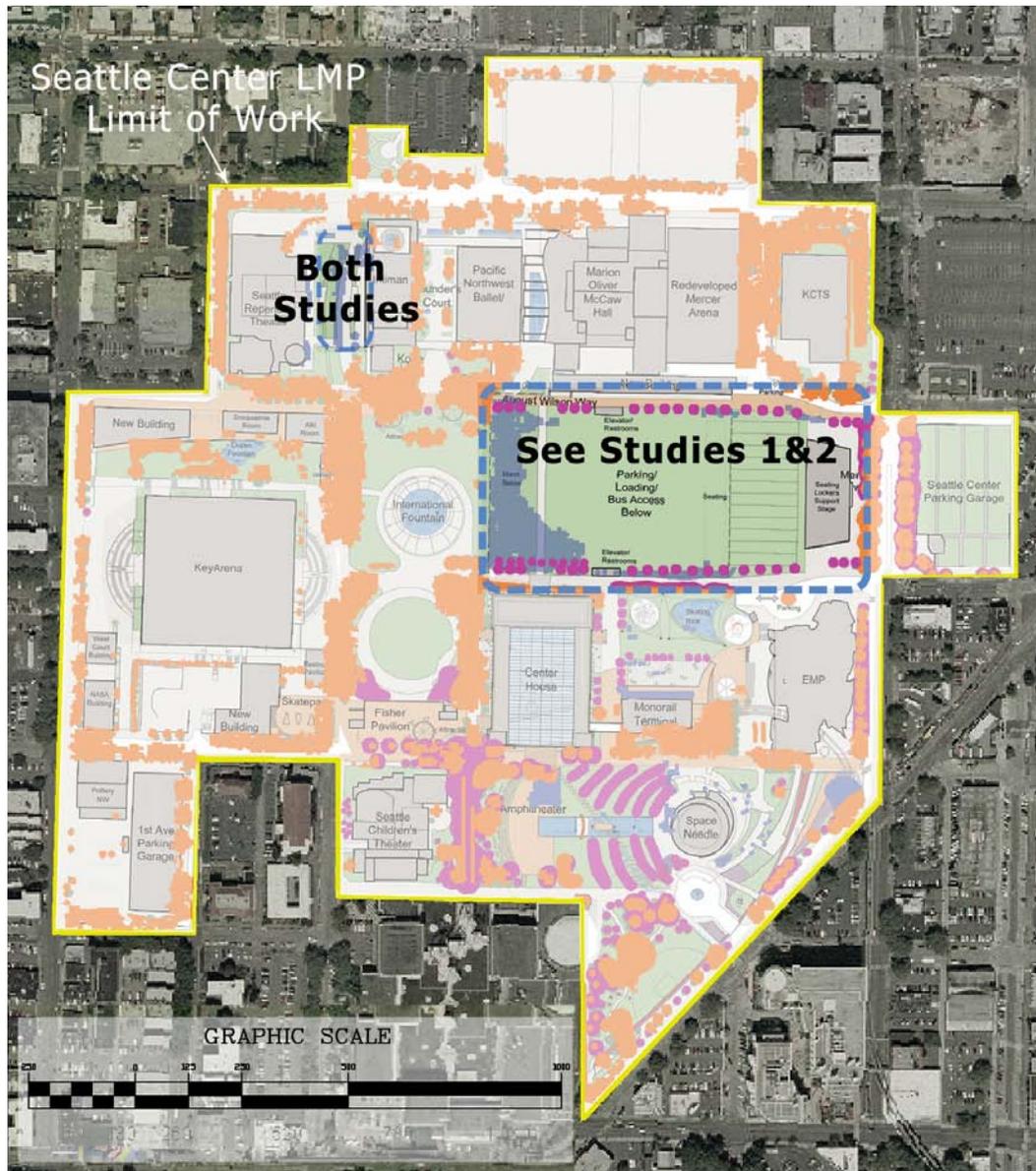


FUTURE ESTIMATED NET CANOPY

Future Canopy Cover Concepts

To evaluate options for possible canopy increases, in addition to the baseline in the Century 21 Master Plan, two study areas with projects in development were identified for additional analysis: the green lid with parking below that will replace Memorial Stadium and the Theater Commons, a new campus entry between the Seattle Repertory and Intiman Theaters. While 18.6% canopy cover, as shown in the baseline Future Estimated Net Canopy Map, already exceeds the UFMP 30-year goals, a higher percentage of tree canopy would help Seattle Center and the City of Seattle achieve additional environmental sustainability and civic goals. These studies illustrate how increased levels of canopy might be gained while still maintaining the active open space needed for festivals and other large events. Both studies merely suggest where possible increases to tree density and placement of new trees might occur. These studies are just a start as we explore more refined designs for both project sites. The potential tree canopy that might be possible with a more designed landscape solution for the Memorial Stadium Lid is particularly intriguing given the relatively spare diagram and expanse of open space envisioned in the Century 21 Plan.

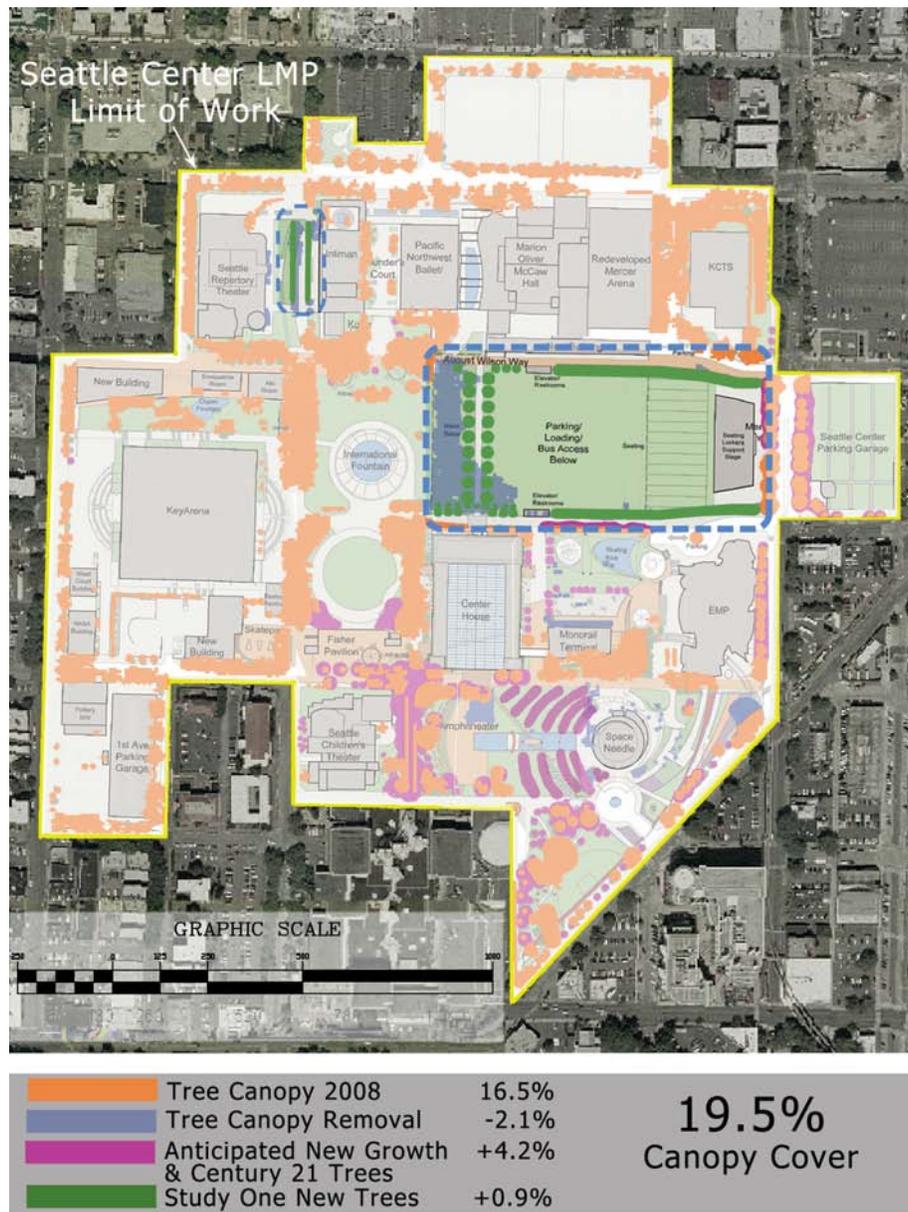
FUTURE CANOPY ASSESSMENT - STUDY AREAS



	Tree Canopy 2008	16.5%	18.6% Canopy Cover
	Tree Canopy Removal	-2.1%	
	Anticipated New Growth & Century 21 Plan Trees	+4.2%	

For the purpose of these studies, the first priority was selecting true canopy trees, defined as trees with a 15'-50' mature canopy spread that begins 10'-20' from the groundplane. Coniferous species that exhibit canopies lower than 10' were still considered canopy trees. Examples of canopy trees are sycamores (already a prevalent species within Seattle Center campus), red maples, London planes, zelkovas, Douglas firs, elms, western red cedars, and sweetgums. Also included to a lesser degree were smaller understory trees that could also potentially add to the canopy coverage calculations, such as vine maples and Callery pears.

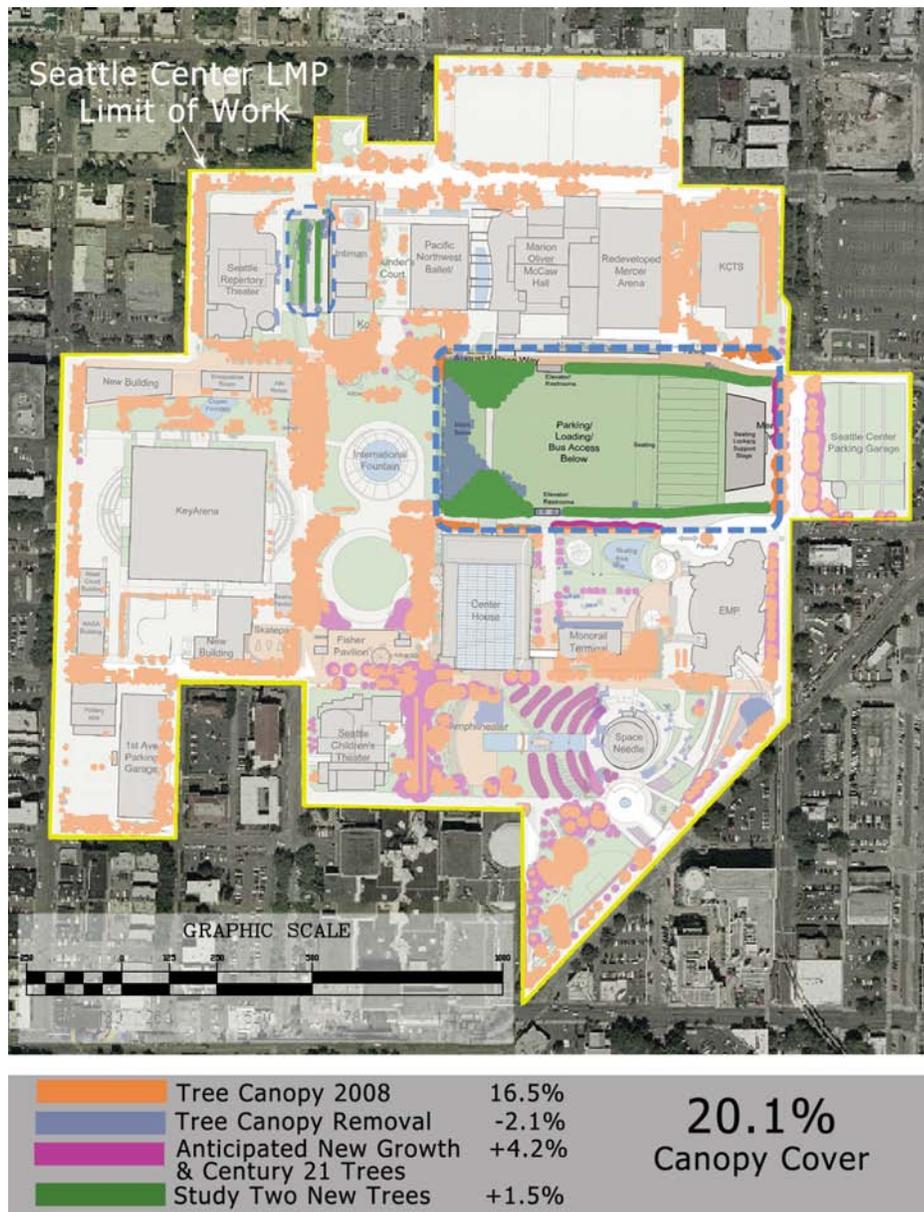
FUTURE CANOPY ASSESSMENT - STUDY ONE



Study One increases the density of trees and other vegetation running along the northern and southern edges of the Memorial Stadium Lid and recreation/ entertainment green. Additionally, an allée of trees flanks the north-south path that connects the Center House to the Theater District. The resulting effect is the division and definition of the International Fountain from the recreation/ entertainment green spaces. The impact on the structural components of the green lid needs further study to determine if this is feasible.

Study One adds 0.9% coverage to the foundation canopy estimation, achieving a projected 19.5% total canopy coverage.

FUTURE CANOPY ASSESSMENT - STUDY TWO



Like Study One, Study Two employs a denser edge to the north and south sides of the Memorial Stadium Lid and recreation/ entertainment green, but uses a more clustered application of trees to define the North-South walkway. This study also defines the lawn space while maintaining expansive view corridors from the International Fountain space and the recreation/ entertainment green.

Study Two provides the most opportunity for canopy coverage gain yielding a total canopy coverage of 20.1%.

LEGACY & DEDICATED TREES

SEATTLE CENTER

Legacy Trees are a new designation given to a select list of trees on the Seattle Center campus and are defined for the purposes of this document as an individual or group of trees that are considered important community resources because of unique or noteworthy characteristics or values. Some of these trees pre-date the 1962 World's Fair, while others were planted specifically for the Fair or more recently. All Legacy Trees have become a visible and beloved part of Seattle Center's landscape.

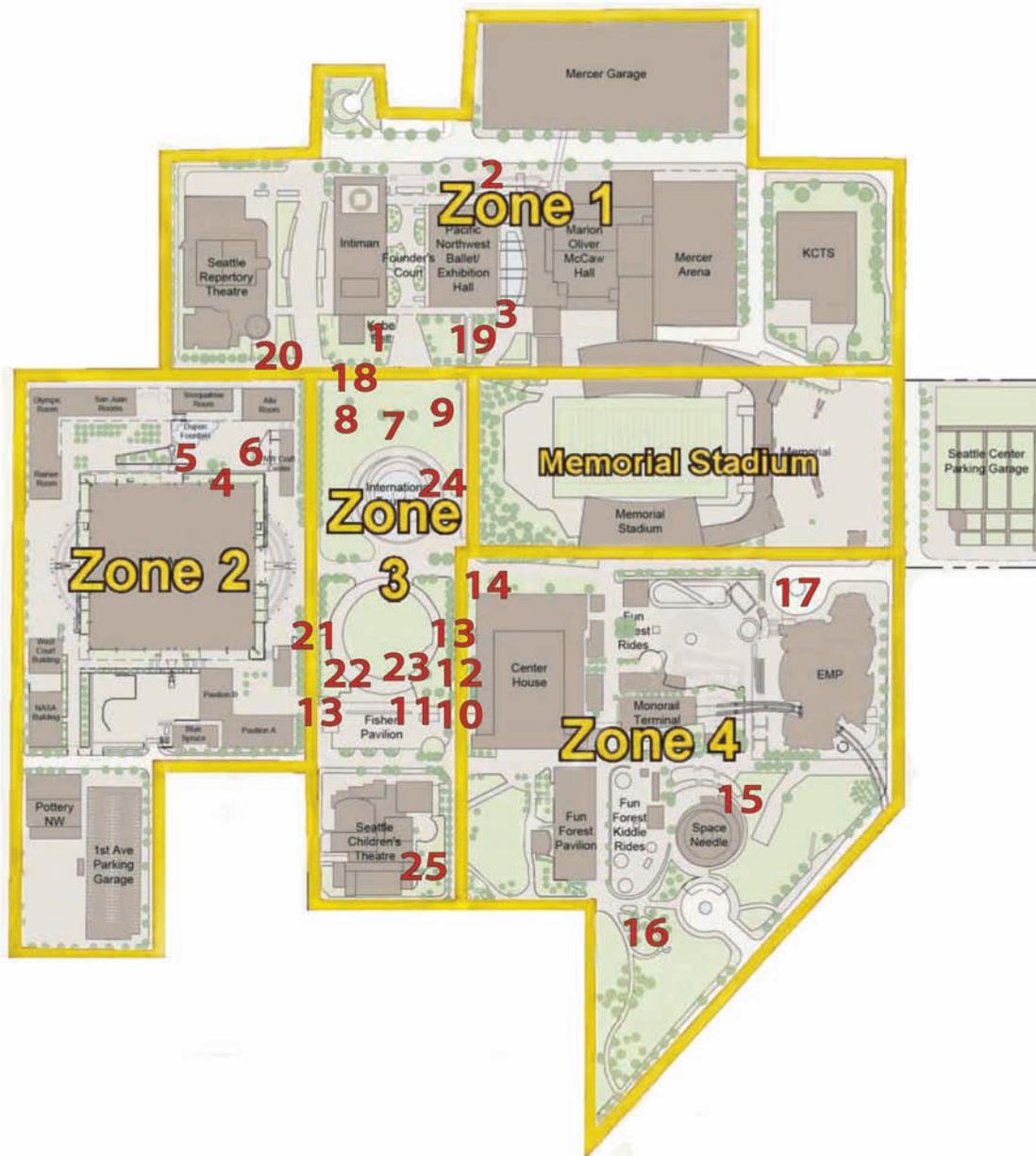
The definition of Legacy Tree is based on guidelines for determining heritage, historic, legacy, and landmark trees, as provided by the International Society of Arboriculture. One or more of the following characteristics are used to define a tree with special Legacy Tree status:

- Size: Some component of tree size, most frequently trunk diameter, is used, but other components of tree size, such as height or canopy spread, may also be used.
- Species: Certain species may be special locally, rare, or important to the community.
- Age: Older trees are especially valued (age of living trees is difficult to determine).
- Historic significance: A tree that is associated with an historical event, person, structure or landscape.
- Ecological value: Examples of trees that have special status are ones that provide a roosting or nesting site for certain wildlife species, play a critical role in slope stabilization, or provide critical cover for another plant or animal species.
- Aesthetics: Special form, site, and/or function in the landscape is identified.
- Location: There is an important contribution to the site such as near a street or building.
- Required plantings and retained trees: If trees have been preserved or planted as a requirement of development, the community has a vested interest in ensuring that the trees are protected.
- Other unique characteristics: This is a catchall term that may be used when a special tree does not fall neatly into another category.

A Dedicated Tree has a plaque, marker or documentation on file to commemorate its significance. Dedicated Trees by nature memorialize an event, group of people or individual and are presumed to be a long-term addition to the campus.

Legacy and Dedicated Trees are sometimes difficult to retain with planned construction and landscape improvements on campus. Seattle Center strives to retain these signature elements whenever possible and has reworked the design of such facilities as McCaw Hall and Fisher Pavilion in order to maintain Legacy Trees. Occasionally it is necessary to relocate or remove Legacy and Dedicated Trees; however, this is done only when all other options have been exhausted.

PROPOSED LEGACY & DEDICATED TREES



LEGACY & DEDICATED TREE LOCATION & ZONE MAP

Legacy and Dedicated Tree Inventory

Num.	Zone	Common Name	Tree species	Location	Special Attributes	Comment
Tier 1 - Most significant candidates for legacy status						
	All	London Plane	Platanus X acerifolia	Campus wide	Location, historical significance, size, collective contribution	157 trees
1	1	Daimyo Oak	Quercus dentata	east of Kobe Bell	Size, species, historical significance, aesthetics	Planted in 1932 by D.A.R. Also has a dedication plaque.
2	1	Austrian Black Pine	Pinus nigra	Mercer St./ Ex. Hall	Size, location, collective contribution	2 groups - 7 total
3	1	Atlas Cedar	Cedrus atlantica	south end of K-Prom	Size, aesthetics, location	Group of 3
4	2	Dawn Redwood	Metasequoia glyptostroboides	northeast Key Arena	Species, size, location	
5	2	Coast Redwood	Sequoia sempervirens	northeast Key Arena	Species, size, location	
6	2	Atlas Cedar	Cedrus atlantica	northeast Key Arena	Size, location	
7	3	Norway Maple	Acer platanoides	IF lawn	Size, location	Center tree only in grouping of 3
8	3	Black locust	Robinia pseudoacacia	IF lawn	Aesthetics, unique form, location	
9	3	Purple Tricolor Beech	Fagus sylvatica 'Purpurea Tricolor'	NE corner of IF lawn	Species, aesthetics	
10	3	English Laurel	Prunus laurocerasus	Fisher east	Size	On National Register of Big Trees, 1985
11	3	Cedar of Lebanon	Cedrus libani	Fisher east	Form, historical significance, location	Donated by the American Institute of Urban planners in 1963
12	3	Zelcova	Zelcova serrata	Fisher east	Size, location, aesthetics	
13	3	Medlar	Mespilus germanica	Fisher east & west	Species	2 trees saved from Flag Pavilion
14	4	Atlas Cedar	Cedrus atlantica	North side of CH	Aesthetics, location	
15	4	Sierra Redwood	Sequoiadendron giganteum	Space Needle	Location, aesthetics	
16	4	Weeping Willow	Salix babylonica	Peace Garden	Aesthetics, location	
17	4	Japanese maple	Acer japonica	EMP turn around	Aesthetics, location	

Num.	Zone	Common Name	Tree species	Location	Special Attributes	Comment
<i>Officially dedicated with plaque or documentation</i>						
18	1	Mt. Fuji Cherry	Prunus serrulata 'Shirotae' or 'Mt. Fuji'	south of Kobe Bell	Dedicated in 1975, donated by Japanese consulate in honor of Japanese Crown Prince Akihito	
19	1	Yoshino Cherry	Prunus yedoensis	south end of K-Prom	Dedicated in 2007, a gift from Kobe, Japan (Seattle sister city),	
20	1	Western Red Cedar	Thuja plicata	south end of BWT lawn	Dedicated in 1999 to Eddie Bauer and his wife Christine as part of Millenium Celebration and American Forests initiative	This includes a time capsule in the center of grouping of 3 trees
21	3	Kwansan Cherry	Prunus serrulata 'Kwansan'	Fisher west	Dedicated in 1995 to commemorate 50th anniversary of the end of World War II	7 trees
22	3	Mt. Fuji Cherry	Prunus serrulata 'Shirotae' or 'Mt. Fuji'	Fisher west	Dedicated in 1995 by Cherry Blossom Festival in honor of Prime Minister Takei Miki	3 trees
23	3	Sargent Cherry	Prunus sargentii 'Columnaris'	Fisher east	Dedicated in 2007 to commemorate the 30 year anniversary of Cherry Blossom Festival	3 trees
24	3	Grand Fir	Abies grandis	east side of IF	Dedicated in 1995 to honor SC staff	
25	3	Dove Tree	Davidia involucrata	east side of SCT	Dedicated in 1995 to children w/ AIDS	

Note: Detailed information on each tree numbered on this map is provided in the accompanying table on the following pages.

MANAGEMENT CONSIDERATIONS & RECOMMENDATIONS

TREES

Tree Protection

Seattle Center is constantly evolving; and construction projects will occur with implementation of the Century 21 Master Plan. Seattle Center hosts many large festivals, drawing crowds in great numbers. Whenever large groups of people are introduced into the landscape, managing the site to protect existing vegetation is a challenge. The current practice for protecting Seattle Center's trees within high-use zones is to box them or enclose them within a protective container. Boxing is necessary to ensure that trees are safe from the damage caused by certain on-site activities like construction and large events. For example, during festivals the trees on campus require protection from such potentially damaging elements as the heat from cooking equipment, dumping of food and grease into tree pits, physical striking by vehicles or equipment, and pedestrian compaction of root systems. For daily use, aesthetically pleasing tree guards are the preferred means for protecting trees.



Examples of vegetation protection measures taken around Seattle Center

Other forms of tree protection are also part of Seattle Center's current management regime. One such strategy is enclosing entire planting beds within a fenced-off area using picket or chain-link fencing or other materials. Lighting, banners, and all items that may be hung from trees require permission and careful measures to ensure the tree's protection. As outlined in the Seattle Center Site Standards, contractors are required to follow rigorous requirements for tree protection during construction activities.

Tree Removal

Seattle Center makes every effort to ensure that trees remain permanent features on the campus. Trees are only removed for health/hazard circumstances or new project construction.

Currently, the process for removing both canopy and understory trees within Seattle Center is made by the Seattle Center Director based on recommendations by the Landscape Supervisor. The Landscape Supervisor assesses the situation in the field, and, if a serious and obvious public hazard exists, recommends immediate removal of the tree. The Director then authorizes the Landscape Supervisor to remove the tree. The removal may be done by Seattle Center gardeners (three of whom, including the Landscape Supervisor, are ISA Certified Arborists) or by a contracted arborist firm. If the situation is serious but not an obvious hazard, the Landscape Supervisor may hire an ISA certified consulting arborist or plant pathologist to provide documentation of disease or problems that would justify the tree removal.

Tree Addition

New trees may be added to the campus as part of new landscaped areas associated with construction projects or as replacements for trees that have been removed for various reasons. Opportunities for planting new trees are very limited due to the established nature of the campus and annual use of the open spaces for events.

Considerations for choosing new tree locations and species are:

- Use of the site by various festivals and events;
- Ultimate size potential of the tree species and suitability to site;
- Durability and needs of the tree species in a specific location;
- Other species growing in proximity – it may be an addition to an existing planting (for example, a maple would not be planted in a row of London Plane trees);
- Opportunity to increase species diversity on campus;
- Opportunity to increase long-term canopy cover;
- Meeting the wishes of a Seattle Center community group (for example, Seattle Center has planted flowering cherry trees near the Fisher Pavilion to honor the Cherry Blossom Festival constituency); and
- Memorial trees are discouraged and must be approved by the Seattle Center Director.

POLICY RECOMMENDATIONS

General

- The Urban Forest Management Plan 30-year tree canopy goal is the standard by which tree management at Seattle Center should be measured. This policy outlines a clear path for Seattle Center to make critical decisions when it comes to tree removal and replacement. Going forward, Seattle Center will meet with Mayor's 2:1 policy to the extent possible on campus and partner with other departments to meet that commitment on nearby locations off-site when necessary.
- Seattle Center's landscape crew should have at least one ISA Certified Arborist on staff at all times in order to provide credible expertise to Seattle Center Executive and Project Management staff, contractors, and the public on construction issues, pruning, disease, insect, and hazard tree issues.
- Any and all tree related work must be performed by an ISA Certified Arborist approved by Seattle Center's Landscape Supervisor.
- Tree pruning maintenance should be done on an as-needed basis. Tree canopies must be kept 14' above campus roadways to allow clearance for trucks and event support vehicles. All tree pruning work should meet ANSI plant maintenance standards.
- The Landscape Supervisor may require any tree on campus to be boxed with four sheets of 4'x8' plywood if the tree is deemed to be in danger from any event or activity on campus. Festivals, community events, and construction projects are examples of activities that usually require certain trees to be boxed. Trees deemed necessary to be boxed may be of any size, age, or species.
- New, young, or relocated trees are staked and secured with plastic interlock cable for one year after planting.
- All tree parts touched by any kind of cable, rope or wire must be wrapped in burlap or other material approved by Seattle Center's Landscape Supervisor as protection.
- Tree wells should be mulched with bark or gravel to minimize weed problems. Insect and disease problems will be addressed using Integrated Pest Management (IPM) practices. See Appendix for more information on the City of Seattle IPM guidelines.
- No permanent light fixtures of any kind may be mounted in or on any tree. Uplighting must be at least 6' away from the trunk of the tree.
- Temporary lighting may be installed in a tree with permission from the Landscape Supervisor if adequate care and protection are exercised. No wires, clips, nails, screws, or invasive attachments may be used. Temporary lighting may remain in a tree for a maximum of six months.
- When applicable, Seattle Center should continue to work with other city departments to meet the "2 for 1" tree replacement requirements off-site.
- Existing Legacy Trees and Dedicated Trees shall be managed as unique civic resources, incorporated into new design whenever possible, and should not be removed without approval of the Seattle Center Director. The list of Legacy and Dedicated Trees shall be reviewed periodically and updated, as necessary.

- Due to the site's ever-changing character, and Seattle Center's commitment to realizing the Century 21 Master Plan, addition of new Dedicated Trees is strongly discouraged. The Director of Seattle Center is the only individual authorized to approve a Dedicated Tree. Coordination between the Landscape Supervisor and Redevelopment Department staff to site any new Dedicated Trees will help ensure a long life for the trees and avoid conflicts with construction projects.
- Seattle Center will manage the campus tree canopy to meet or exceed the 15% net canopy coverage per UFMP parameters. Since a portion of the London Plane tree canopy on the perimeter falls within SDOT right-of-way, Seattle Center will work collaboratively with SDOT to maintain this legacy.
- Generally, canopy trees will ultimately have a 15'-50' canopy spread that begins 10'-20' from the groundplane, including both deciduous and coniferous trees (although the canopy may start below 10' for certain coniferous species). There may be instances where canopy trees do not fit this narrow definition or comply with the Recommended Planting List (see Appendix). In those instances, the Landscape Supervisor and the Seattle Center Director may approve unique selections.
- Canopy trees should be spaced widely enough for full and reasonable canopy development. Minimum tree spacing for tree canopy growth should be 15'-20', depending on species requirements.
- When placing canopy trees within an urban setting receiving heavy foot traffic, some measure of protection against compaction should be employed. No tree grates or any tree pit treatment should be used that has the potential to be a trip hazard for pedestrians.
- When placing urban trees within tree pits, adequately scaled planters should be utilized. Minimum total square footage for canopy trees should be 50 ft per tree of protected surface area (for example: a 10 ft x 5 ft tree pit). This would not apply to trees in a less formal landscape setting.
- Street trees are not typically irrigated, with a few exceptions. If an irrigation system is used, it should only be during the establishment period.
- Seattle Center staff and consultants will refer to the canopy concept diagrams in this report as a guide for potential locations of future canopy areas. Canopy tree locations for new construction can differ from these proposed areas at the approval of the Landscape Supervisor and the Seattle Center Director.
- The Landscape Supervisor will continue to bring canopy tree removal recommendations to the attention of the Seattle Center Director. The Seattle Center Director should continue to be the final authority on any canopy tree removal as this is a highly controversial community-related action.
- If a tree is deemed to be a hazard to the public, it must be removed as quickly as possible through the course of action described above.

- Canopy trees may be moved or removed when they are in conflict with construction projects. The size, condition, species of the tree and availability of a suitable transplanting location are taken into consideration when deciding whether or not a tree will be moved rather than removed. The Landscape Supervisor works with Redevelopment staff to determine the cost/benefit of moving a tree for any given project. The final decision rests with the Seattle Center Director.

New Development

- Due to the number of construction projects occurring at Seattle Center, protecting trees during construction is an ongoing issue. If there are trees to be saved in construction zones, contractors should take all protection measures set forth in Seattle Center's Site Standards. Temporary irrigation systems should be constructed if permanent irrigation systems will be disrupted during construction.
- Due to Seattle Center's goal to exceed the UFMP's recommendation of 15% canopy cover, consideration of the impact on the overall tree canopy percentage should be a consideration in project planning design.
- All new construction area landscape plans should be reviewed by the Landscape Supervisor at the schematic design phase and through all phases of design and construction.
- New trees species shall adhere to the recommendations set forth by the Recommended Plant List for specific zones within Seattle Center, unless the Landscape Supervisor gives direct permission to specify species not found therein. See Appendix for Recommended Plant List.
- Every effort should be made during construction projects to preserve and protect the mature trees on the site, especially canopy generating trees.
- Construction projects may require other types of tree protection depending on the extent of construction and proximity to a particular tree. See Seattle Center Site Standards for details.
- The health and well being of Legacy Trees in the vicinity of a construction project should be assessed before and during the construction process by certified arborists.

Action Items

- An updated LIDAR survey is needed to fully assess existing canopy coverage and strategies to meet the UFMP's recommendation of 15% canopy coverage.
- A tree inventory to include location, type, species, and condition is needed for all understory trees.

SHRUBS

At Seattle Center, shrubs are defined as woody plants whose heights range anywhere from 3' to 15'. Anything under 3' in height is considered a "groundcover" whether or not the plant adheres to the definition in the truest sense of the word (see Groundcovers and Perennials section for further clarification).

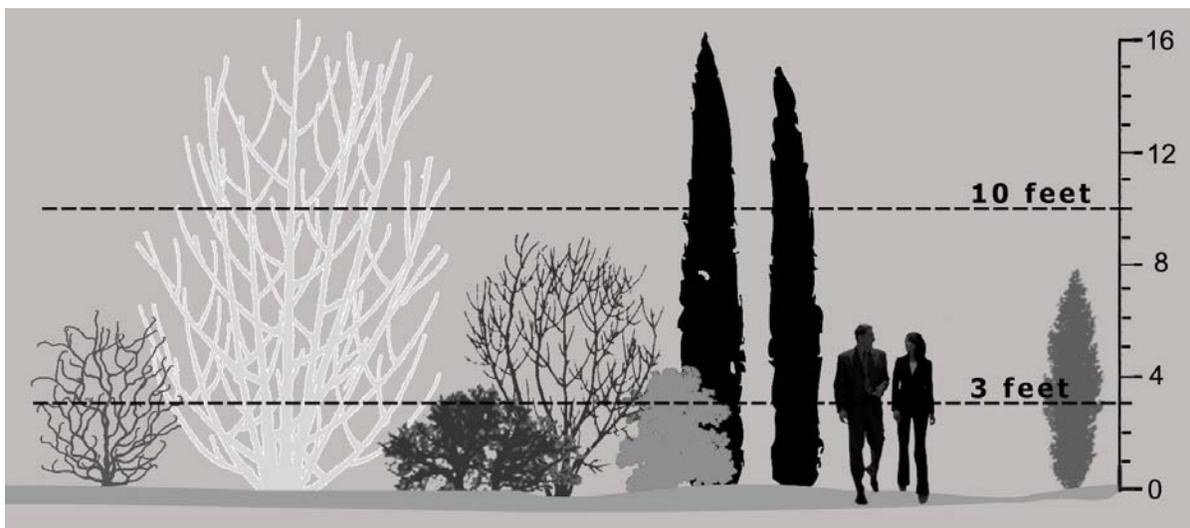


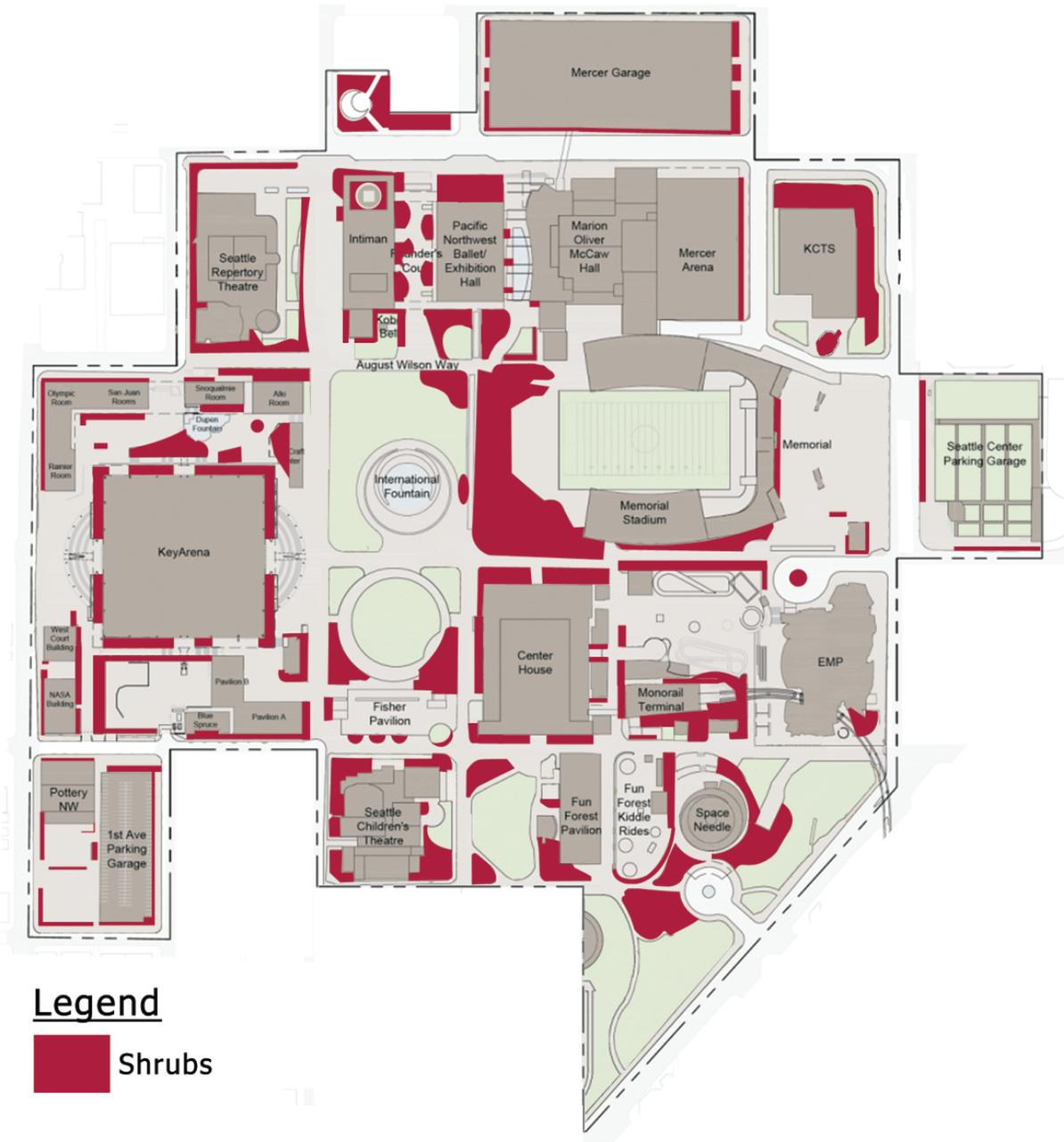
Diagram of shrub characteristics

Then & Now: Shrub Planting

In the World's Fair era, the shrub and ground cover planting palette was very limited. It consisted largely of often-used plants like mahonia, hamamelis, and rhododendrons in addition to hardy species such as photinia, climbing hydrangea, and the invasive English ivy.

Currently, Seattle Center's shrub-planting palette is very diverse. The shrub layer at Seattle Center is a dynamic aspect of the landscape. It is an evolving mix of new plant species and varieties and key plants that have been used widely around the campus because they have proven themselves to be successful within their respective landscape applications.

New construction and infrastructure repairs and upgrades have major impacts on the landscape. Every effort is made to recycle plants displaced by construction into other areas of the campus. Plants that cannot be absorbed into Seattle Center landscapes are offered to other City agencies, such as the Seattle Parks Department or the Woodland Park Zoo.



CURRENT (2008) VEGETATION MAP - SHRUBS/ PLANTING BEDS

Planting Beds

Because of the high volume of foot traffic that Seattle Center receives on a regular basis, it is important to prevent and mitigate for plant damage. Children, animals, and the homeless population contribute to planting bed wear and tear. The volume of visitors that funnel through the campus, especially during large events and concerts, results in the most damage to the landscape. As a result, beds are planted with the intention of discouraging people from entering and walking through planted areas. This is accomplished through careful attention to species selection, configuration, and density.



Sampling of shrub beds found around
Seattle Center

MANAGEMENT CONSIDERATIONS & RECOMMENDATIONS

SHRUBS

Most shrub beds become overgrown and tired every five to seven years. They must be renovated periodically by removing older plants and adding new fresh plants to maintain the aesthetic value of the landscape and ensure public safety. Seattle Center's gardening staff makes every effort to choose plants that provide a mix of attributes for year-round interest and aesthetic appeal. A mix of evergreen and deciduous plants is found in all areas of the landscape. Shrub species chosen for Seattle Center landscapes must have more than one of the following characteristics:

- Resilient and able to withstand crowds of people on a regular basis
- Do not require annual pruning
- Disease and insect resistant
- Transplant reliably
- Adaptable to various environmental conditions
- Provide flower and/ or fragrance

Seattle Center gardeners are continually experimenting with different plants to determine which species perform to the highest degree in each particular application. These experiments are helpful in attaining firsthand knowledge about the benefits and drawbacks of certain plants and determining whether or not they are horticulturally sustainable options for Seattle Center's landscape. This is especially important as new varieties are constantly being introduced into the market. This ensures the campus can keep up with horticultural trends while maintaining a reliable shrub palette.

POLICY RECOMMENDATIONS

General

- As new shrubs are added, every effort should be made to select shrubs that are disease and insect resistant, multi-seasonal, and high impact. All proposed selections by designers and subconsultants should be approved by the Landscape Supervisor. See Shrub Species in the Recommended Plant List in the Appendix.
- No known invasive plants should be added to the landscape; reference the King County Noxious Plant List. Any plants known to be invasive should be removed from Seattle Center grounds.
- Health and condition of shrub plantings are monitored by Seattle Center gardeners. Any additions and removals will be left to the gardeners' professional assessment. Reasons for removal may include construction, old age, pest and disease problems, plants impinging on public space, overcrowding, and replacement for improved species or varieties.
- Depending on need, shrubs may be fertilized once per year with slow release or organic based fertilizers.
- Weed, insect, and disease problems will be addressed using Integrated Pest Management (IPM) practices. See Appendix for more information on City of Seattle IPM guidelines.
- New shrub species are generally added due to new construction, crowd control, or to replace plants that have been removed for the above potential reasons.
- For new construction, existing shrubs will not be protected. They may be removed and/or replanted elsewhere on campus at the Landscape Supervisor's discretion.

CHAPTER THREE

GROUNDCOVERS & PERENNIALS

Groundcovers

In general, traditional, low growing groundcovers are not planted at Seattle Center. Low growing groundcovers are defined as plants that grow to a maximum height of between 6 to 12 inches and are usually aggressive spreaders, for instance hypericum, cotoneaster, English ivy and fragaria. Wherever these kinds of groundcovers have been planted, Seattle Center gardening staff has usually removed them. One of the problems with these groundcovers is they do not grow densely enough to suppress weeds and thus necessitate labor-intensive hand weeding. Groundcovers may also create potential habitat opportunities for rats and mice. The removal of leaves and litter is also especially difficult in certain types of groundcovers.



Sampling of perennials found around Seattle Center

Perennials

Perennials are seasonally emerging herbaceous plants whose impermanence aids in demarcating and celebrating the changing seasons at Seattle Center. Perennials play an important role in Seattle Center's landscape. Given all the problems inherent with using groundcover, it has been Seattle Center's strategy to instead utilize low shrubs and perennial plants, installing them as densely as possible to create continuous cover on the groundplane. They have a longer lifespan in Seattle Center's landscape than annuals, and are not typically turned over for several years. Perennials tend to be resilient to high volume foot traffic since they renew their foliage every year. They are selected for durability, longevity, and ease of maintenance.

MANAGEMENT
CONSIDERATIONS & RECOMMENDATIONS

GROUNDCOVER & PERENNIALS

POLICY RECOMMENDATIONS

- As new perennials are added, every effort should be made to select plants that are disease and insect resistant, multi-seasonal, and high impact. All proposed selections by designers and subconsultant should be approved by the Landscape Supervisor. See Perennial Species in the Recommend Plant List in the Appendix.
- Perennials must be used judiciously, as they are relatively high maintenance, require yearly pruning and need to be divided or thinned every three to four years, depending on type. They are valuable for adding texture and color on a seasonal basis.
- No known invasive plants should be added to the landscape, taking reference from the King County Noxious Plant List. Any plants known to be invasive should be removed from Seattle Center grounds.
- Health and condition of perennial plantings are monitored by Seattle Center gardeners and additions and removal will be left to their professional assessment.
- Depending on need, perennials may be fertilized once per year with slow release or organic based fertilizers.
- Weed, insect, and disease problems will be addressed using Integrated Pest Management (IPM) practices. See Appendix for more information on City of Seattle IPM guidelines.
- For new construction, existing perennials will not be protected. They may be removed and/or replanted elsewhere on campus at the Landscape Supervisor's discretion.
- Perennials should be planted close enough so that plants grow together to suppress weeds.

CHAPTER FOUR

SEASONAL COLOR

The use of annuals around Seattle Center provides the campus with the most spectacular and vibrant displays of seasonal color. Constantly in flux, annuals are labor intensive. In spring and fall, new displays of annuals are planted. Spring flowering bulbs are planted in the fall.

At Seattle Center, annual displays are designed by the gardening staff and coordinated through the Landscape Supervisor. Plants may be purchased from a variety of local nurseries. Many of Seattle Center's summer and fall annuals are custom grown for Seattle Center by the Seattle Parks Department's Jefferson Greenhouse staff. Orders are placed in early fall of the preceding year for the following spring delivery, while orders are placed in spring of the same year for fall delivery. Bulbs are ordered in the early summer for October delivery. Many are grown for one spring season and then removed, while others are naturalized for long-term spring color spots.



Sampling of annuals/ seasonal color found around Seattle Center

MANAGEMENT CONSIDERATIONS & RECOMMENDATIONS

SEASONAL COLOR

Careful planning and coordinating is required to ensure efficient use of all of the plants purchased. Each season, an annual color theme is chosen. Because the public sees most Seattle Center annual plantings from some distance, emphasis is on colors and scheme that can provide impact in large spaces. Furthermore, annual plantings usually include large structural plants to add immediate impact and hold up to foot traffic and crowds, for instance tibouchina and canna lilies. The gardening staff tries to incorporate at least one new variety or species into the planting mix each year.

POLICY RECOMMENDATIONS

- Annual/color plantings should be emphasized in areas with the most pedestrian traffic and potential impact. Examples include the area around the Space Needle, Fisher Pavilion, and some building entrances.
- Summer annuals should not generally be planted until after Folklife to prevent impacts from this event.
- Fall plantings should be a mix of evergreen shrubs or sub-shrubs, bulbs, and annuals.
- It is essential that areas planted with annuals and containers be balanced against labor availability so as not to overburden the staff.
- It should be taken into consideration that Seattle Center does not generally have labor resources to replant annual plantings mid-season if they are destroyed by an event.
- Weed, insect, and disease problems will be addressed using Integrated Pest Management (IPM) practices. See Appendix for more information on City of Seattle IPM guidelines.
- Careful consideration should be given to the location of any freestanding planters with annual plantings as they must be physically moved to safe locations during festivals and large events, adding more labor needs.

CHAPTER FIVE

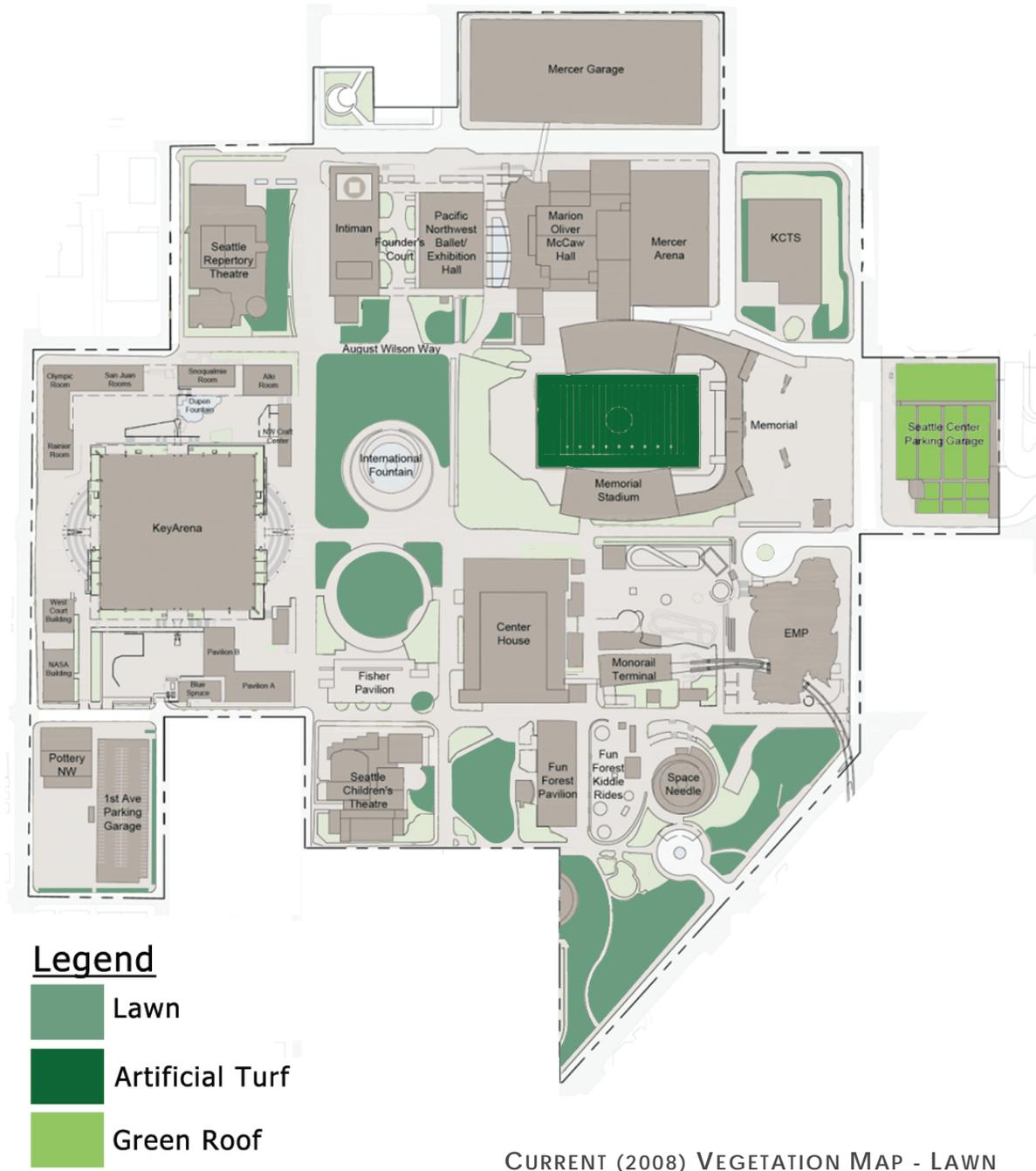
LAWN

Areas of lawn play a vital role in Seattle Center's landscape. When envisioning some of the country's most successful urban public spaces, the images that come to mind often include large, rolling expanses of lawn with Central Park in New York City as a prime example. Lawn acts as a natural and versatile material for public gatherings and is a welcome relief from urban hardscape. Given the inherent social value of lawn and how essential it is to Seattle Center's events, it is crucial that lawns be maintained to their highest quality, even though it is resource and labor intensive.



Sampling of lawn areas found around Seattle Center

The total lawn area on Seattle Center's campus is 266,268 feet, or 6.1 acres. The location and size of the lawn determines its use. One of the largest areas of lawn at Seattle Center is the Fountain Lawn surrounding the International Fountain. Given its size, this area provides visitors with opportunities for both active and passive activities. Lawn is especially important to Seattle Center as it absorbs a heavy amount of foot traffic during festivals and large events. The lawn amphitheatre that surrounds the Mural Stage, for example, can be used as informal seating for a concert as well as flexible space for a number of diverse events. Seattle Center's lawns, which are sand-based, are managed like sports fields due to their heavy use.



Current Lawn Mixture

The seed mixture used for the lawns at Seattle Center is a perennial rye grass mix of three different varieties. The seed mix varies from year to year depending on availability of the latest strains of rye grass on the market, as Seattle Center stays current with the most durable grass varieties as they become available. Rye grass is used for a number of reasons: the seed germination time is relatively short, seed germinates at cooler temperatures than some other turf grasses, seedlings can handle foot traffic almost immediately, established grass withstands heavy wear and tear from foot traffic better than most other grass types, and it retains moderately good color during the winter.

Sod may be used on some new construction projects and renovation work. Commercially available sod that is used at Seattle Center is a mix of Kentucky Blue grass and perennial Rye grass. Kentucky Blue grass is necessary to bind the turf together, although it will eventually die out leaving a pure stand of perennial rye grass.

MANAGEMENT CONSIDERATIONS & RECOMMENDATIONS

LAWN

Current Lawn Care Requirements

The current lawn care regimen at Seattle Center involves a significant portion of the overall allotted landscape maintenance time and material resources. No insecticides or herbicides are currently used on Seattle Center lawns. Broadleaf weeds are largely kept under control through a regimen of fertilizing, amending, aerating, watering, and over-seeding.

Tree Conflicts with Lawn

Growing turf under tree canopies is a maintenance challenge at Seattle Center. Grass that grows under the canopy of any tree tends to be weaker and less durable than lawn in full sun- an issue for a high use public space with constant wear and tear on turf. Soils tend to become hydrophobic underneath large trees. It is difficult to regulate irrigation systems to compensate for the extra water taken up by the tree. All materials dropped from trees such as leaves, fruit, seeds, flowers, twigs, and branches must be gathered from the lawn in order to optimize turf vigor and ease of mowing.

Growing lawn beneath trees is an issue for the health of the tree as well as for the lawn. The pedestrian-friendly nature of lawn invites a heavy amount of foot traffic, which serves to compact the tree roots. This compaction can significantly reduce a tree's lifespan.

Lawn Protection

Although lawn is a durable and resilient groundcover, it is not immune to the destructive nature of heavy foot traffic. Many portions of lawns are destroyed or badly damaged during major events. Mitigation is performed both before and after large events to minimize and repair excessive amounts of wear and tear on lawns, which is time consuming for the gardening staff. Due to their location, some lawns are more susceptible to this type of damage. Heavily used areas may require the use of protective coverings. Examples of approved coverings are plastic terraplas, gridmat, wood decking, or elevated stages. Other policies, such as the prohibition of vehicles on lawns other than turf maintenance equipment, ensure the lawns suffer minimal damage.

Some lawns are closed to public use after major festivals or events in order to allow heavily damaged lawn areas to be restored and recover. Areas impacted are roped off and signs posted for public information. Turf recovery typically takes four to six weeks. Depending on weather and lawn condition, some areas may be roped off for the entire duration between the major festivals, essentially making those areas unavailable to the public for informal enjoyment between Memorial Day and Labor Day.

POLICY RECOMMENDATIONS

Aerating/ Over-seeding

- Aerating and over-seeding should be done four times per year: once in early spring and after each of the three major festivals.
- All lawns should be top dressed with a thin layer of sand immediately after over-seeding in the fall. Ideally, Seattle Center would top dress every time the lawns are over-seeded, but may be completed as labor and material resources allow (minimum once a year).
- Mowing height should be lowered to 1 ½" before topdressing.
- Sand used for topdressing must be washed building sand, free of stones or any other contamination.

Fertilization & Addition of Other Amendments

- Soil tests should be performed annually for each distinct lawn area, to determine PH, macro/micro nutrients, and nutrient deficiencies.
- Seattle Center will limit the use of herbicides, insecticides, and fungicides on lawn areas, except when necessary. When the situation requires chemical intervention, Integrated Pest Management (IPM) practices and the City of Seattle's Pesticide Use Reduction Strategy will be followed. See Chemical Use Policy section in Chapter Seven for a summary of Seattle Center's IPM approach and the Appendix for more information about the Pesticide Use Reduction Strategy.
- Generally, five lbs of nitrogen/1000 SF should be applied to the turf every year. This should be done in four applications using seasonally appropriate formulations.
- Organic fertilizers may be used for the spring or fall fertilizer application. Organic fertilizers are beneficial for healthy soils. Unfortunately, they are far more expensive to apply than conventional, petroleum-based fertilizers, so they should be applied as monetary resources are available.
- Lime should be applied to all lawns at various intervals depending on soil tests.
- Other amendments such as micronutrients may be applied as indicated by soil tests.
- Other products such as wetting agents, mycorrhizal inoculants, or growth regulators may be used when necessary to maintain the turf's health and vigor.

Mowing

- Lawns are mowed two times per week at three to four day intervals during the months of March through October. Mowing should be done on an as-needed basis the remainder of the year.
- Edging around tree pits, valve boxes, and hard surfaces should be completed as time permits.
- The usual mowing height should be 2 ½". This height may be lowered to 1 ½" before a large event to accommodate decking and other grass protection materials.
- Clippings should be grass-cycled during the mowing season.

Watering

- All lawns should receive adequate water to maintain vigorous growth during the growing season. Base watering time and day are set by landscape staff and adjusted daily by the Maxicom centrally controlled irrigation system. See more on Irrigation Equipment in Chapter Seven.

CHAPTER SIX

OTHER LANDSCAPE FEATURES

ARTIFICIAL TURF

In the future, Seattle Center hopes to utilize materials that are less resource intensive to promote low impact development (LID) and sustainability. One material that has been proposed for these purposes is artificial turf. Artificial turf is an effective material for reducing demand on resources as water, chemicals, and labor. It is currently not used at Seattle Center (the exception being the Memorial Stadium field, which is not presently managed by Seattle Center). As the product evolves, it may become an option in the future.



Images depicting Memorial Stadium (left) and closeup of typical artificial turf (right)

MANAGEMENT
CONSIDERATIONS & RECOMMENDATIONS

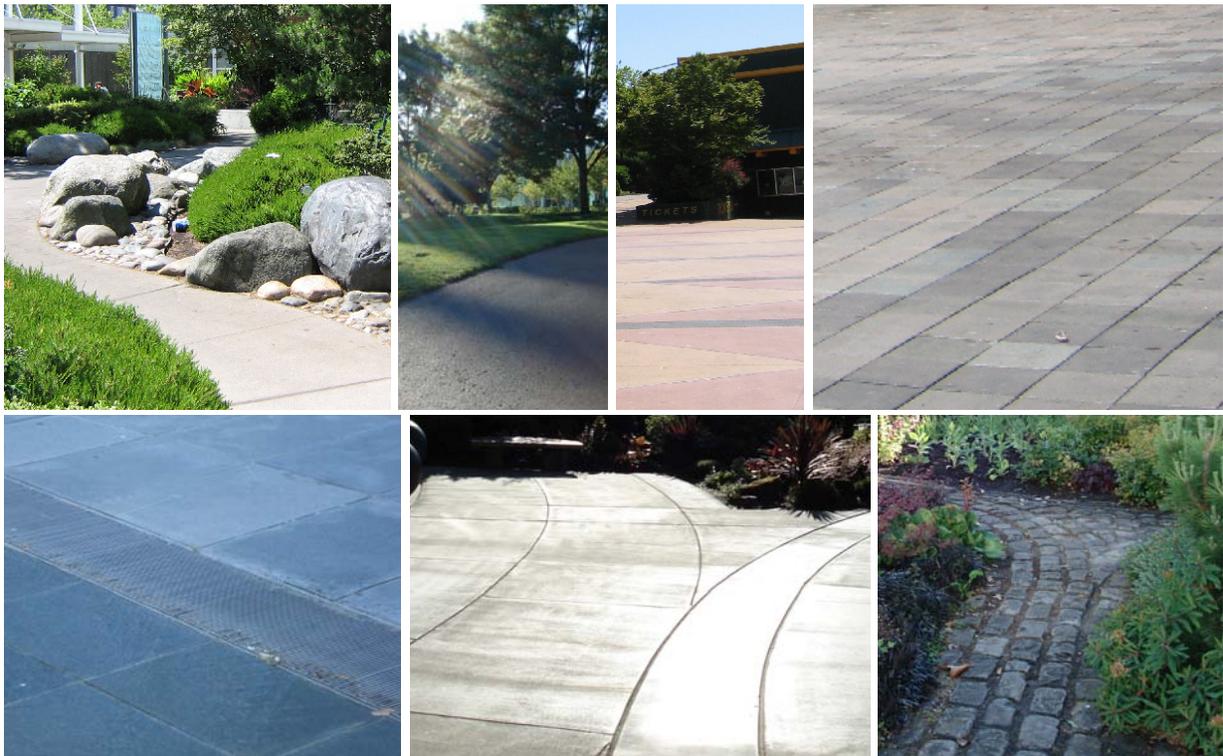
ARTIFICIAL TURF

POLICY RECOMMENDATIONS

- Artificial turf may be considered on a project-by-project basis for effective and appropriate use.
- A thorough cost/benefit analysis is needed for each project that proposes artificial turf to ensure that the reduced resource demand outweighs the initial financial investment.
- The latest EPA report on artificial turf brings up health concerns. It is important to review current research and findings about the material before investing in new artificial turf.

HARDSCAPE

Hardscape is a vital component in many public spaces. When used successfully, it helps make a place legible, accessible and dynamic. Seattle Center contains multiple examples. Fisher Pavilion, with pavers on the groundplane forecourt and roof, creates a comfortable and flexible space that can be used for many purposes. McCaw Hall's Kreielsheimer Promenade introduces unorthodox elements to the groundplane, such as a thin sheet of water to create a compelling and highly interactive experience. In the future, permeable hardscape might add an important new layer of sustainability to Seattle Center's landscape, making it possible to achieve not only a beautiful and highly legible campus, but also one that is environmentally sensitive.



Sampling of hardscape found around
Seattle Center

Current Hardscape Types

Asphalt

Asphalt is currently used in places like the Fun Forest for large expanses of hardscape with significantly scaled site features. Asphalt with a narrow concrete border is the current standard for the vacated street rights-of-way throughout the campus. Asphalt is a cost-effective and durable option. Drawbacks, however, are that it is an impervious surface that exacerbates runoff, and the dark surface color retains heat in the summer months, producing undesirable heat island effects. In the future, options beyond traditional asphalt will need to be considered to move towards sustainable design. New technology, such as pervious asphalt and/or concrete, is currently available and could be explored as a low impact paving option in future projects at Seattle Center.

Concrete

Concrete is used in many plazas and walkways within Seattle Center. It is a durable, versatile surface that is comfortable underfoot during all seasons. Colors and textures can be added to concrete, making it possible to create an infinite number of hardscape patterns. New advances in sustainable concrete technology, such as pervious concrete and concrete with a high reflectivity index, are currently available and can aid in future low impact development design schemes.

Pavers

Pavers are defined as individual paving units set side-by-side to form an expanse of hardscape. They are found in several key locations throughout Seattle Center. Pavers are available in a number of shapes, colors, and textures, making it possible to create dynamic patterns on the groundplane. Pervious concrete or asphalt pavers can aid in reducing stormwater runoff events and increasing water infiltration.

Crushed Rock

Crushed rock has been occasionally used on Seattle Center's campus in the past, for example the Poetry Garden's crushed granite pathways. These past installations have required extra maintenance, as crushed rock is prone to migration and washouts. However, gravel and crushed rock paths can provide an effective pervious surface that aids in water infiltration and reduces stormwater runoff.

MANAGEMENT
CONSIDERATIONS & RECOMMENDATIONS

HARDSCAPE

POLICY RECOMMENDATIONS

- There should be a clear hierarchy of hardscape materials and patterns to reinforce circulation throughout the Center. The most dynamic paving selections should be focused on main pedestrian routes to help delineate pathways.
- Material selection -- Paving materials should be selected for durability, extended long-term life, ease of maintenance and high visual impact. With the Century 21 Master Plan, it is crucial that the design of paving throughout Seattle Center reflect the facility's world-class status.
- Seattle Center should include more pervious paving such as pervious concrete and asphalt, Ipe decking, metal grating. When possible, recycled or sustainable materials should be used in new landscape projects.
- Some materials, such as crushed granite on pathways, have not been successfully used at Seattle Center and should be implemented with caution in the future.
- Water management of all hard surface areas should be coordinated into the overall water management scheme for the projects, moving towards LID and sustainable water management technologies.
- The proliferation of underground utilities needs to be taken into consideration when selecting hardscape materials as the management of the integrated campus systems depends on flexibility and access to below-ground systems.

WATER FEATURES

Water features are a vital part of the well-loved campus and provide a wealth of civic and cultural benefits to Seattle Center as they enliven and activate the public spaces. They provide sound, texture, movement, and aesthetic beauty to the campus. They also encourage safe public interaction that connects the visitor to Seattle Center in a way that other site amenities cannot.

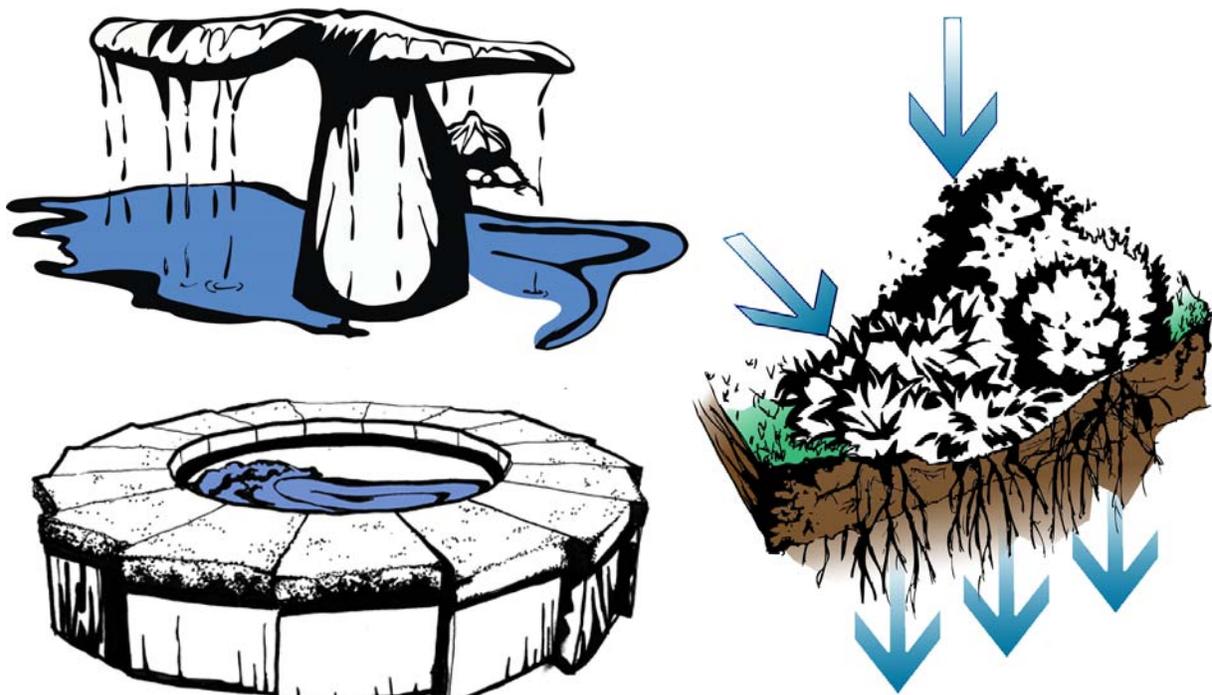


Sampling of water features found around Seattle Center

The water features located within Seattle Center vary widely in scale and form. Most notable is the International Fountain -- a welcoming spherical metal sculpture that sprays high arching jets of water within a sunken circular plaza. The International Fountain is well utilized in summertime months. The new Kreielsheimer Promenade outside McCaw Hall uses water differently in day and night. During the day, the shallow sheets of water serve as an interactive feature that pedestrians can choose to walk beside, around, or through. At night, for the more formal events in McCaw Hall, the sheets of water reflect the theatrical lighting on the overhead "scrim" and become another surface for the art installation. There are several other water features located throughout Seattle Center that are smaller in scale and activate some of the quieter areas of the campus. Examples include the Fountain of Creation in the Northwest Courtyard, the Fountain of the Northwest in Intiman Courtyard, the Fountain of Sesaragi south of the Intiman Theater, and the Vortex Fountain in Founders Court.

Water features take on a variety of aesthetic forms that help serve multiple purposes. In the Century 21 Master Plan, water features fall into two categories: architectural and natural. Architectural water features are iconic and recognizable sculptural elements placed within a plaza or area of hardscape. Even with recirculating water and energy efficient pumps, they are resource intensive and exist for the public's entertainment.

Natural water features are intentionally incorporated into the environment. These features, such as the rain garden currently under construction in the Broad Street Green, are aesthetic elements that also serve an ecological function. While not as interactive as architectural water features, the natural features provide an important public function by revealing natural processes and educating the public about water management and Seattle Center's role in promoting low impact development. Although the limited space and civic functions of Seattle Center preclude large-scale implementation of natural water features, smaller spaces could potentially be transformed into features like rain gardens or bioswales. While finding opportunities for sustainable water infiltration will be a challenge for Seattle Center, natural water features could play a vital role in meeting long-term sustainability goals and shaping the campus' character.



Images at left depict architectural water features currently at Seattle Center. Image at right depicts the functions of a bioswale, a future proposed natural water feature

MANAGEMENT
CONSIDERATIONS & RECOMMENDATIONS

WATER FEATURES

POLICY RECOMMENDATIONS

- Water will play an increasingly important role as Seattle Center continues to build upon its tradition as a dynamic public space.
- Water feature design should expand on multiple ways for water to be interactive in multiple seasons- from playful spray fountains in the summer to an ice rink in winter.
- Ensure that the design of water features and their related treatment systems safeguards that the water can be played in and enjoyed by visitors, particularly children.
- It is also important to utilize water features in conjunction with other effects, such as lighting, music, and performance to maximize their potential as dynamic site amenities.
- Whenever possible, sustainable technology should be applied to any proposed architectural water features. Potential energy and resource consumption should be weighed against the inherent civic benefits.
- All natural water features should be designed in such a way that they can be aesthetically pleasing while also providing ecological functions that promote sustainability or encourage water reuse on site. These functions should be clearly revealed to the public through interpretative signage or other visible means.

CHAPTER SEVEN

RESOURCES

FACILITIES

The landscape staff operates out of the Park Place maintenance building (232 1st Ave North). This building space is shared with the campus and grounds laborers. It has offices, a lunchroom, lockers and storage for supplies and equipment. Some landscape tools, vehicles and large equipment are stored here as well as irrigation parts and operating supplies. The computer that runs and schedules the campus Maxicom irrigation system is located here.

A storage and workspace dedicated exclusively to landscape operations is currently located on the campus on the north side of Center House. This area holds bulk materials such as soil, sand and mulch. Two tool sheds hold most of the gardeners' tools and small equipment. One electric vehicle is parked here after hours. This is the only place available for holding plants – containerized as well as bare-root and balled and burlapped. This space is essential to the gardener's ability to operate efficiently. Other storage spaces around campus are utilized for landscape equipment and supplies, including: Seattle Center warehouse, the NASA building, and a storage bay in the 1st Ave. North parking garage.

IRRIGATION EQUIPMENT

- Separately metered Seattle city water is used to avoid sewer charges.
- All lawns and shrub beds are fully irrigated with an automated system. Seattle Center has been utilizing Rainbird's computerized Maxicom 2 Control System for over 20 years. The Maxicom2 system uses ET (evapotranspiration) data collected by a weather station to adjust daily watering schedules. This system uses irrigation water in the most efficient manner possible. This efficiency conserves water, labor and power. Hardware components include:

Weather station: located at the south side of the Mural stage. Monitors 6 weather ET parameters: air temperature, solar radiation, relative humidity, wind speed and direction and rainfall. Communicates to Maxicom computer via phone line.

Cluster Control Unit: located in the communications room on the 1st floor of Center House. Receives and sends information from and to the computer and communicates that information to the satellites in the field.

ESP Satellite Controllers: 19 in various locations on campus. Hardwired together and to CCU in Center House.

Flow sensors: located at multiple sites to sense breaks in system and send information to CCU, which enables Maxicom to shut off water to affected area.

Dedicated computer: located in landscape office at Park Place. Communicates via phone line with CCU in Center House and with the weather station. Scheduling, monitoring, and remote operations are performed from the computer.

- Software: Maxicom 2-system software operates and integrates all of the components of the system. It can be upgraded as Rainbird modernizes and improves aspects of the software. Seattle Center's most recent upgrade to the system was made in August 2008.
- All Seattle Center gardeners monitor the Maxicom system. Irrigation schedules are adapted to accommodate public use of the site, construction activities, maintenance needs, and special events. They monitor breaks on system malfunctions, schedule needs, coverage issues, and ongoing changing plant needs.
- Drip irrigation is currently utilized where appropriate.

MANAGEMENT CONSIDERATIONS & RECOMMENDATIONS

IRRIGATION EQUIPMENT

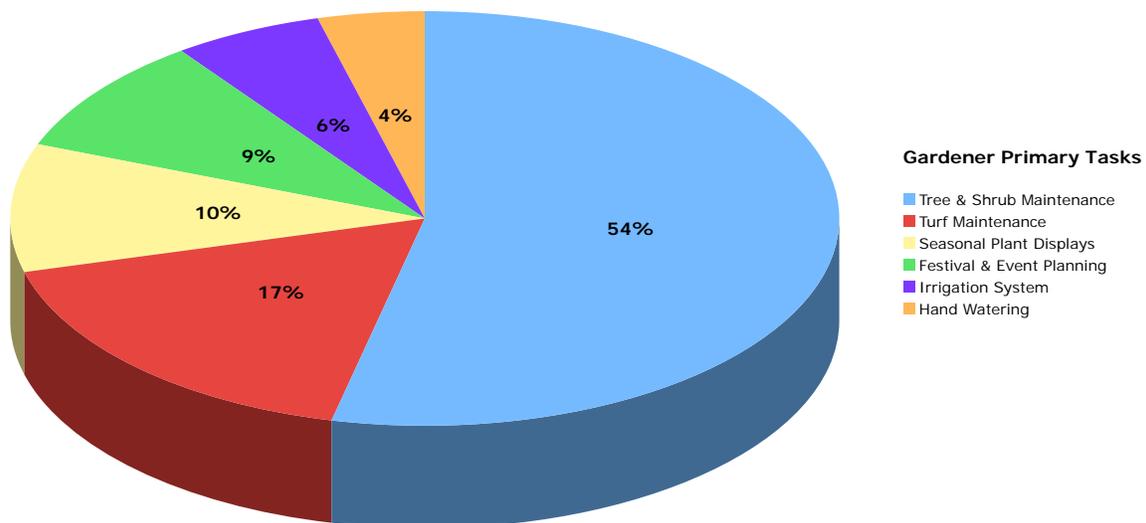
POLICY RECOMMENDATIONS

- Introduce such rainwater capturing systems as cisterns, water detention, or other sustainable strategies for reusing non-potable water for irrigation.
- Explore design of a large-scale, high volume runoff, stormwater retention tank as part of the Memorial Stadium site development, as envisioned in the Century 21 Master Plan.
- Utilize the most up-to-date irrigation management and monitoring systems technologies available.
- Drip irrigation should be used whenever possible because of its efficiency and direct water delivery to plants. It should be noted that drip irrigation systems require more maintenance due to the decreased size of the lines and possible physical damage.

CURRENT RESOURCE ALLOCATION

Staffing

Currently, there are five full-time gardeners and two part-time gardeners at Seattle Center, three of whom are ISA Certified Arborists. The amount of time allocated by the gardeners to each task does not vary greatly from year to year. The following is a general breakdown of the gardeners' primary tasks at Seattle Center. This list does not take into account the time spent on tasks such as administrative work, meetings, training, or CIP project work:



53% - Tree and Shrub Maintenance
Including all weed control, mulching, pruning, planting, leaf removal, bed maintenance.

17% - Turf Maintenance
Including all mowing, aerating, over-seeding, top-dressing, fertilizing, amending, edging, and trimming.

10% - Seasonal Plant Displays
Including planning, acquisition, preparation, installation, removal, etc.

9% - Festival and Event Planning
Including preparation, clean up and recovery activities.

6% - Irrigation System
Including monitoring, repairs, and trouble-shooting.

4% - Hand Watering

Equipment

The following is a list of landscape maintenance equipment currently owned and managed by Seattle Center:

- Large Equipment: Toro electric Workman scooter, Toro diesel Workman scooter, Kabota tractor 41HP w/ backhoe attachment, Toro Groundsmaster 72" mower, Smithco diesel turf sweeper, lift truck, and forklift.
- Medium Equipment: FMC 30-gallon sprayer, Aera-vator aerifier/seeder, Cushman top dresser, snowplow attachment for tractor, Champion air compressor, Vicon fertilizer spreader, and Toro ProCore aerator.
- Small Equipment: Neuton electric walk behind mower, Honda walk behind mower, Stihl chainsaw (3), hedge trimmers (4), Mantis cultivator, gas powered edger (2), Spotlyte sprayer, backpack sprayers (4), water well tank, back pack blowers (4), flame weeder, radiant heat weeder, walk behind blower (2), turf roller, and mulch spreader.

CHEMICAL USE

The use of chemical pesticides in landscape applications to manage weeds, insects, and diseases can have negative impacts on the environment. Pesticides do not remain stagnant at their application site. Studies have documented the infiltration of these chemicals into streams and larger water bodies and how they negatively affect aquatic species like salmon. Consequently, a high degree of caution and care should be used in administering any chemical pesticides on campus.

Integrated Pest Management

Seattle Center has been part of the City of Seattle's Pesticide Reduction Strategy from its inception. Seattle Center is committed to utilizing Integrated Pest Management (IPM) practices in all landscape maintenance operations. IPM involves close observation of plants in the landscape: monitoring for weeds, insects, and diseases. Solutions to problems call for the appropriate use of the least toxic, most effective treatment necessary to maintain the health and/or aesthetic value of the plant(s). See Appendix for more information about the City of Seattle's Pesticide Use Reduction Strategy.

MANAGEMENT
CONSIDERATIONS & RECOMMENDATIONS

CHEMICAL USE

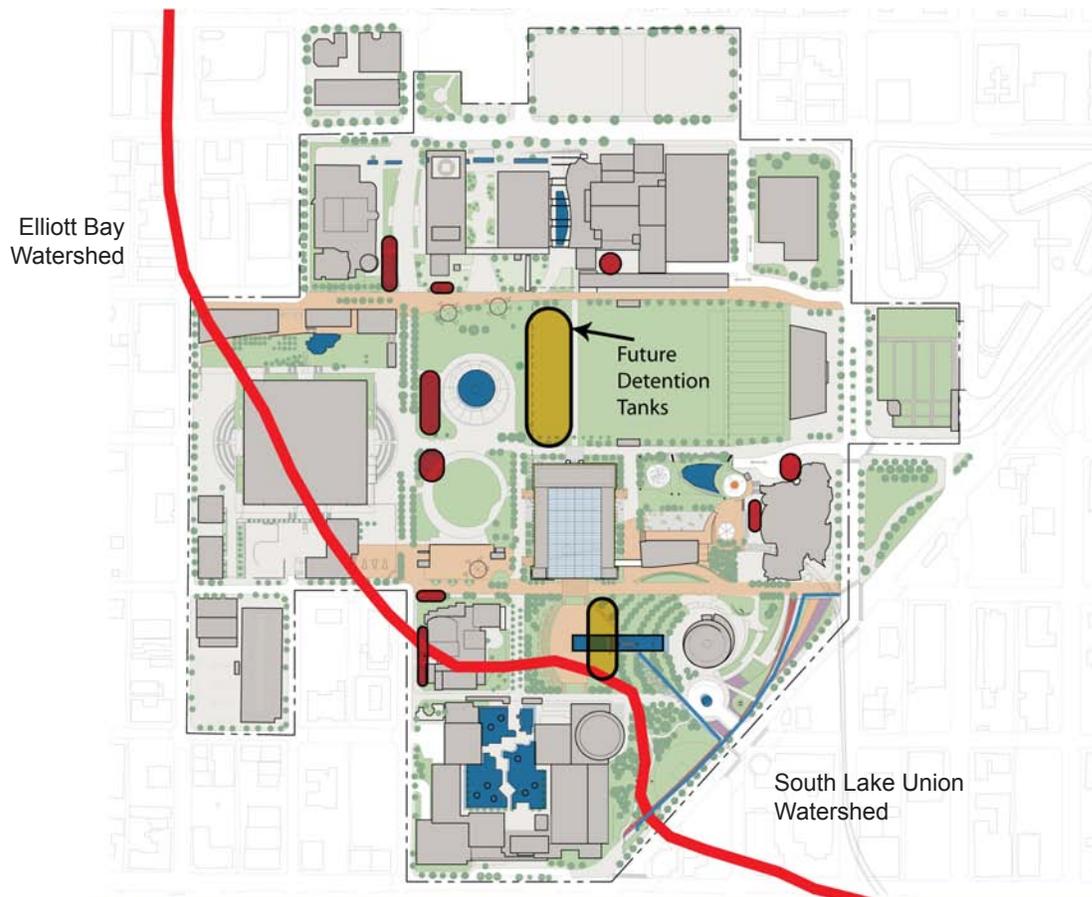
POLICY RECOMMENDATIONS

- Seattle Center should continue to implement a situational plant philosophy. This entails selecting plants appropriate to their setting that are insect and disease resistant, providing adequate irrigation, and not over watering.
- All staff applying pesticides must be licensed with the WSDA as Public Pesticide Operators and understand the current requirements for handling and applying pesticides.
- The pesticides that are used at Seattle Center should adhere to the provisions of the City of Seattle Pesticide Reduction Strategy.
- Seattle Center staff should remain continually updated on the latest research regarding pesticide use and applicable alternatives.

CHAPTER EIGHT

SUSTAINABLE DESIGN PRACTICES

Seattle Center maintains an ongoing commitment to environmental stewardship and sustainability. The Center can serve as a showcase for sustainability in Seattle, a city that has always been on the forefront of promoting “green” building and energy conservation policies. With the Century 21 Master Plan, Seattle Center should adopt a comprehensive landscape design and management program that is fundamentally rooted in sustainability while balancing the public’s expectation for multiple uses on campus and budget considerations. It will be important to highlight those projects and programs that contribute to sustainability, to educate the public and illuminate the way in which Seattle Center’s landscape is part of the larger ecological system.



Current and future detention tank locations around Seattle Center, red line signifies the watershed divide

Balance

Sustainable design practices present a challenge for active, well-loved civic spaces like Seattle Center. Many of the elements that enliven the space and create the attractions that draw people to the Center are the same elements that require a great deal of resources to maintain. Features like lawns, architectural water features, and high-impact planting beds are civic amenities for the people of Seattle and all visitors who come to explore the grounds.

Given these challenges, it is important that Seattle Center approaches future landscape design and management to seek balance between sustainability concerns and the public's expectations. Seattle Center must remain ecologically aware in its design and management decisions, but also consider the public's need for dynamic open space and the important civic functions that only Seattle Center provides.



Images depicting strategies for low impact landscape design

MANAGEMENT
CONSIDERATIONS & RECOMMENDATIONS

SUSTAINABILITY

POLICY RECOMMENDATIONS

General

- All landscape design and management decisions at Seattle Center should promote and advance environmental sustainability.
- Per the Century 21 Master Plan, the Center should be utilized as a compelling and highly visible model to showcase emerging green technology in its landscape and should demonstrate solutions to reduce the City's carbon footprint.
- Seattle Center should strive to attain LEED Silver status or better for all new building construction, a distinction that can be aided by utilizing sustainable design practices within the landscape.

Ecological Systems

- Landscape design and management will be critical elements as Seattle Center fits responsibly into the larger regional ecosystem. Low impact development features and practices should be pursued in all landscape projects, appropriate to Seattle Center's high event use and urban setting.
- Water Detention

Construction of new stormwater detention tanks can improve Seattle Center's ability to time runoff. Rainwater collection solutions, such as cisterns, tanks, and ponds are also needed to capture water for reuse on site for irrigation systems and other non-potable water needs. All new projects should take into consideration the unique hydrology of Seattle Center.

Areas that have been proposed as possible future stormwater retention locations include the Mural Amphitheater and the area west of Memorial Stadium (See Diagram on page 65).

Existing sites within Seattle Center, such as KeyArena, already have detention facilities, but substantial investment would need to be made to convert these into systems that could re-circulate storm water for other uses on-site.

- **Water Infiltration**

All new projects should look for opportunities to incorporate water infiltration solutions, such as bioswales, rain gardens, and pervious pavement, taking into account that because of the heavy event schedule, large areas of land will not be available for this use.

- New sustainable design strategies are important and should expose the ecological process of Seattle Center to the public-at-large. Strategies such as bringing water-conveyance to the surface, in channels or runnels, and the creation of aesthetically appealing infiltration ponds or swales could become compelling new site features on the campus. For example, the new rain garden concept for the Broad Street Green area in the Century 21 Plan provides an opportunity to illuminate Seattle Center's sustainable stormwater management strategies.

Climate Change

- Seattle Center has a green purchasing policy, which mandates purchasing and utilizing equipment and fleets that use alternative, environmentally responsible energy methods. Equipment for which no alternative fuel source is available shall meet California Air Resources Board requirements and specifications. Seattle Center also utilizes bio-based lubricants and other available bio-based fluids in all equipment and fleet vehicles. The landscape unit has one electric utility vehicle and all other major vehicles, including tractor, riding mower, turf sweeper and utility vehicle are powered by bio-diesel.
- It is important to take into account climate change that may occur in the long term, and how this may affect future landscape design and management practices at Seattle Center.
- If climate change patterns continue to exhibit the trends that are evident today, it is crucial to plan for the resulting larger precipitation events. The implementation of such stormwater management strategies as bioswales, rain gardens, pervious pavement, cisterns, and detention tanks can aid in capturing the larger influx of water and either filtering it back into the natural system or utilizing it for other non-potable uses around the Center. The most up-to-date rainwater management strategies are needed to prepare for future events.
- If the climate change trends continue, plants that are part of the Northwest native palette may not be appropriate or prove successful in the future. Gardeners at Seattle Center may have to look beyond these natives and other widely used plants if their survivability is compromised by changing temperatures.
- Seattle Center should use plants that are non-invasive, ecologically responsible, disease and pest tolerant, aesthetically pleasing, and adaptable to various conditions.
- Other strategies can be implemented that help reduce the impact of the changing climate such as maximizing tree canopies to help cool the groundplane.

GENERAL

Integrated Customer Connectivity

A central goal of Seattle Center now and into the future is strengthening the ways in which the public interacts with the campus. As elements of the Century 21 Plan are implemented, it will be important to help visitors interact with all aspects of the site and create a more fully integrated visitor experience. Some of the ways in which Seattle Center can achieve the integrated customer connectivity goals are:

- Produce brochures and maps locating significant plants and site features;
- Lead guided tours of the landscape to foster the public's appreciation of the campus;
- Produce interactive maps and use digital technology to foster increased engagement for visitors with the campus and its features; and
- Create interpretative boards to educate visitors on aspects of the site that may not be readily apparent such as sustainable site features, environmental processes, Seattle Center's history, etc.

Internships

Students at accredited collegiate programs in landscape architecture or horticulture could be utilized to establish an internship program at Seattle Center. Interns would gain valuable educational experience while aiding Seattle Center staff with a number of tasks, including data input into a plant collections database, labeling, mapping of plants and significant site features, interpretative brochures, and other like items.

SEATTLE CENTER LANDSCAPE MANAGEMENT PLAN

APPENDIX

RESOURCES

City of Seattle Urban Forest Management Plan

The full plan can be accessed at this location:

http://www.seattle.gov/environment/documents/Draft_Forest_Plan-Final.pdf

City of Seattle Tree Replacement Executive Order

The Executive Order can be accessed at this location:

http://www.seattle.gov/mayor/executive_orders/EO03_05_TreeReplacement.pdf

Seattle Center Century 21 Master Plan

The new Master Plan was adopted in August 2008 and can be found at:

<http://seattlecenter.com/media/century21b.asp>

Seattle Center Site Specifications

The current design and construction specifications can be accessed by contacting Seattle Center. The specifications were last updated in 2004 and will be upgraded again soon.

Seattle Center Website

<http://seattlecenter.com/>

History Link- Seattle Center

http://www.historylink.org/index.cfm?DisplayPage=output.cfm&File_Id=1321

RECOMMENDED PLANT LIST

NOTE: This list is not meant to be absolute, but rather a guideline to utilize when selecting plants. The recommended lists contain both existing species that have been proven successful on site as well as new species that fit the horticultural character of Seattle Center, but this does not preclude the use of other vegetation in future design schemes.

Canopy Trees

Abies sp.	Sophora japonica
Acer sp. (large growing sp. & clvs.)	Taxodium disticum
Carpinus betulus	Thuja plicata
Cercidiphyllum japonicum	Ulmus sp. (Dutch elm resistant var.)
Cladrastus lutea	Zelcova serrata clvs.
Cupressocyparis x leylandii	
Fagus sylvaticus clvs.	
Fraxinus sp. and clvs.	
Ginkgo biloba	
Gymnocladus dioicus	
Liquidambar styraciflua clvs.	
Liriodendron tulipifera	
Magnolia sp. and clvs.	
Metasequoia glyptostroboides	
Nyssa sylvatica	
Pinus sp.	
Platanus X acerifolia	
Pseudotsuga menzesii	
Pterostyrax hispida	
Quercus sp.	
Sequoia sempervirons	
Sequoiadendron giganteum	

Understory Trees

Abies sp.
Acer sp.
Betula jacquemontii
Calocedrus decurrens
Chamaecyparis sp.
Cornus sp.
Cotinus sp. and clvs.
Crataegus × lavalleyi
Cryptomeria japonica
Cupressus sp.
Davidia involucrata
Franklinia alatamaha
Halesia sp.
Ilex opaca clvs.
Koelreuteria paniculata
Lagerstromia indica clvs.
Laurus nobilis
Magnolia (small sp. and clvs.)
Oxydendrum arboreum
Parrotia persica
Picea sp.
Pinus sp. and clvs.
Prunus sp. and clvs.
Pyrus calleryana
Sciadopitys verticillata
Sorbus hupehensis clvs.
Stewartia sp.
Styrax sp. and clvs.
Trochodendron aralioides
Tsuga mertensiana

S h r u b s

Abelia sp. and clvs.	Juniperus sp. and clvs.
Acer sp. and clvs.	Lonicera sp and clvs.
Arbutus unedo compacta	Mahonia sp. and clvs.
Berberis sp. and clvs.	Nadina domestica clvs.
Buxus sp. and clvs.	Osmanthus sp. and clvs.
Camellia sp. and clvs.	Philadelphus sp. and clvs.
Ceanothus sp. and clvs.	Pieris sp. and clvs.
Cephalotaxus harringtonia	Pittosporum sp. and clvs.
Chamaecyparis sp. and clvs.	Rhaphiolepis sp. and clvs.
Choisya ternata	Rhododendron sp. and clvs.
Cistus sp. and clvs.	Ribes sp. and clvs.
Corylopsis sp. and clvs.	Rosa sp. and clvs.
Cornus sp. and clvs.	Sambucus sp. and clvs.
Daphne sp. and clvs.	Sarcococca sp. and clvs.
Duetzia sp. and clvs.	Spiraea sp. and clvs.
Enkianthus sp. and clvs.	Syringa sp. and clvs.
Erica clvs.	Taxus sp. and clvs.
Euonymus sp. and clvs.	Ternstromia gymnanthera
Fothergilla sp. and clvs.	Vaccinium sp. and clvs.
Fuchsia magellanica clvs.	Viburnum sp. and clvs.
Garrya sp. and clvs.	Wiegela sp. and clvs.
Gaultheria sp. and clvs.	Yucca sp. and clvs.
Hamamelis sp. and clvs.	
Hebe sp. and clvs.	
Hibiscus syriacus clvs.	
Hydrangea sp. and clvs.	
Ilex sp. and clvs.	

Perennials

Agapanthus africanus clvs.	Liriope spicata and muscari clvs.
Agastache sp. and clvs.	Nepeta clvs.
Allium spand clvs.	Ophiopogon sp. and clvs.
Anemone sp. and hybrids	Paeonia sp. and clvs.
Artemesia sp. and clvs.	Penstemon sp. and clvs.
Arum sp. and clvs.	Perovskia atriplicifolia clvs.
Aruncus sp. and clvs.	Persicaria sp.
Aster sp. and clvs.	Phlox sp. and clvs.
Baptisia sp. and clvs.	Phormium clvs.
Bergenia sp. and clvs.	Phygelius sp. and clvs.
Brunnera sp. and clvs.	Polygonatum sp. and clvs.
Camassia cusickii and quamash	Salvia sp. and clvs.
Canna sp. and clvs.	Sedum sp. and clvs.
Coreopsis sp. and clvs.	Solidego sp.
Crocsmia sp. and clvs.	Stachys sp.
Dierama pulcherrimum	Stokesia laevis
Echinacea sp. and clvs.	Tiarella sp. and clvs.
Epimedium sp.	Vancouveria sp.
Euphorbia sp. and clvs.	
Gaura lindheimeri clvs.	
Geranium sp. and clvs.	
Helleborus sp. and clvs.	
Hemerocallis clvs.	
Heuchera sp. and clvs.	
Hosta sp. and clvs.	
Iris sp. and clvs.	
Kirengeshoma palmata	
Knifophia clvs.	
Lilium sp. and clvs.	

Ferns

Adiantum sp.
Athyrium sp.
Dryopteris sp.
Gymnocarpium sp.
Osmunda sp.
Polysticum sp.

Grasses

Acorus sp.
Calamagrostis clvs.
Carex clvs.
Festuca sp.
Hakonechloa macra clvs.
Helictotrichon sempervirons
Imperatus cylindrica var. rubra
Molinia caerulea clvs.
Pennisetum sp. and clvs.
Stipa sp.

KING COUNTY NOXIOUS WEED LIST - 2008

Class A Noxious Weeds

Eradication required in Washington, including King County.

Common Name

bighead knapweed
 buffalobur
 clary sage
 common cordgrass
 common crupina
 dense flower cordgrass
 dyers woad
 eggleaf spurge
 European hawkweed
 floating primrose-willow
 garlic mustard
 giant hogweed
 goatsrue
 hydrilla
 Italian thistle
 johnsongrass
 kudzu
 meadow clary
 Mediterranean sage
 milk thistle
 purple starthistle
 reed sweetgrass
 ricefield bulrush
 salt meadow cordgrass
 silverleaf nightshade
 slenderflower thistle
 Spanish broom
 spurge flax
 Syrian bean-caper
 Texas blueweed
 variable-leaf milfoil
 velvetleaf
 Vochin knapweed
 yellow devil hawkweed

Scientific Name

Centaurea macrocephala
Solanum rostratum
Salvia sclarea
Spartina anglica
Crupina vulgaris
Spartina densiflora
Isatis tinctoria
Euphorbia oblongata
Hieracium sabaudum
Ludwigia peploides
Alliaria petiolata
Heracleum mantegazzianum
Galega officinalis
Hydrilla verticillata
Carduus pycnocephalus
Sorghum halepense
Pueraria montana var. *lobata*
Salvia pratensis
Salvia aethiopsis
Silybum marianum
Centaurea calcitrapa
Glyceria maxima
Schoenoplectus mucronatus
Spartina patens
Solanum elaeagnifolium
Carduus tenuiflorus
Spartium junceum
Thymelaea passerina
Zygophyllum fabago
Helianthus ciliaris
Myriophyllum heterophyllum
Abutilon theophrasti
Centaurea nigrescens
Hieracium floribundum

Class B Noxious Weeds

Control required in King County.

Common Name

annual bugloss
Austrian fieldcress
black knapweed
blackgrass
blueweed, viper's bugloss
Brazilian elodea
brown knapweed
camelthorn
common bugloss
common reed (non-native genotypes)
Dalmatian toadflax
diffuse knapweed
fanwort
garden loosestrife
gorse
grass-leaved arrowhead
hoary alyssum
kochia
leafy spurge
lepyrodiclis
longspine sandbur
meadow knapweed
mouseear hawkweed
musk thistle
orange hawkweed
oxtongue hawkweed
parrotfeather
perennial pepperweed
perennial sowthistle
plumeless thistle
polar hawkweed
policeman's helmet
purple loosestrife
queen-devil hawkweed
rush skeletonweed
Russian knapweed
saltcedar
Scotch thistle
smooth cordgrass
smooth hawkweed
spotted knapweed

Scientific Name

Anchusa arvensis
Rorippa austriaca
Centaurea nigra
Alopecurus myosuroides
Echium vulgare
Egeria densa
Centaurea jacea
Alhagi maurorum
Anchusa officinalis
Phragmites australis
Linaria dalmatica ssp. dalmatica
Centaurea diffusa
Cabomba caroliniana
Lysimachia vulgaris
Ulex europaeus
Sagittaria graminea
Berteroa incana
Kochia scoparia
Euphorbia esula
Lepyrodiclis holosteoides
Cenchrus longispinus
Centaurea jacea x nigra
Hieracium pilosella
Carduus nutans
Hieracium aurantiacum
Picris hieracioides
Myriophyllum aquaticum
Lepidium latifolium
Sonchus arvensis
Carduus acanthoides
Hieracium atratum
Impatiens glandulifera
Lythrum salicaria
Hieracium glomeratum
Chondrilla juncea
Acroptilon repens
Tamarix ramosissima Tamarix ramosissima
Onopordum acanthium
Spartina alterniflora
Hieracium laevigatum
Centaurea biebersteinii

sulfur cinquefoil
swainsonpea
tansy ragwort
water primrose
white bryony
wild chervil
yellow floating heart
yellow hawkweed
yellow nutsedge
yellow starthistle

Potentilla recta
Sphaerophysa salsula
Senecio jacobaea
Ludwigia hexapetala
Bryonia alba
Anthriscus sylvestris
Nymphoides peltata
Hieracium caespitosum
Cyperus esculentus
Centaurea solstitialis

Class C Noxious Weeds

Control required in King County.

Common Name

common hawkweed
hairy willowherb
non-native and invasive hawkweeds

Scientific Name

Hieracium lachenalii
Epilobium hirsutum
Hieracium spp.

Non-designated Noxious Weeds

Control recommended, but not required in King County.

Common Name

absinth wormwood
Atlantic ivy
Bohemian knotweed
bull thistle
butterfly bush
Canada thistle
common fennel (except bulbing variety azoricum)
common groundsel
common St. Johnswort
common tansy
curly-leaf pondweed
English ivy
English ivy
English ivy
Eurasian watermilfoil
field bindweed
fragrant water lily
giant knotweed
herb Robert

Scientific Name

Artemisia absinthium
Hedera hibernica
Polygonum bohemicum
Cirsium vulgare Cirsium vulgare
Buddleia davidii
Cirsium arvense
Foeniculum vulgare
Senecio vulgaris
Hypericum perforatum
Tanacetum vulgare
Potamogeton crispus
Hedera helix Baltica
Hedera helix Pittsburgh
Hedera helix Star
Myriophyllum spicatum
Convolvulus arvensis
Nymphaea odorata
Polygonum sachalinense
Geranium robertianum

Himalayan knotweed
Japanese knotweed
lawnweed
myrtle spurge
old man's beard
oxeye daisy
poison-hemlock
reed canarygrass
Scotch broom (required SR-2, I-90 E. of MP 34)
spurge laurel
wild carrot
yellow archangel
yellow flag iris
yellow toadflax

Polygonum polystachyum
Polygonum cuspidatum
Soliva sessilis
Euphorbia myrsinites
Clematis vitalba
Leucanthemum vulgare
Conium maculatum
Phalaris arundinacea
Cytisus scoparius
Daphne laureola
Daucus carota
Lamium galeobdolon
Iris pseudacorus
Linaria vulgaris

Noxious Weeds of Concern

Unregulated, but of concern.

Common Name

bittersweet nightshade
creeping buttercup
English holly
English laurel
evergreen blackberry
Hedge Bindweed
Himalayan blackberry
tall buttercup

Scientific Name

Solanum dulcamara
Ranunculus repens
Ilex aquifolium
Prunus laurocerasus
Rubus laciniatus
Calystegia sepium
Rubus armeniacus
Ranunculus acris

CITY OF SEATTLE PESTICIDE USE REDUCTION STRATEGY



Purpose

It is the policy of the City of Seattle to promote environmentally sensitive landscape pest and vegetation management by phasing out the use of the most hazardous pesticides and reducing overall pesticide use while preserving landscape assets and protecting the health and safety of the public and our employees. The following strategy describes how the City will achieve these goals and establishes pesticide reduction targets and timelines.

Background

The City of Seattle's Environmental Management Program was developed in 1999 to promote environmental stewardship in City operations. The pesticide use reduction strategy is an outgrowth of two policies developed under that program. The Landscape and Grounds Management policy promotes the design, construction and maintenance of City landscapes in a way that protects and enhances the region's natural resources and public health. The Landscape and Grounds Management Guidelines were developed to implement that policy, including promoting the use of Integrated Pest Management (IPM), which favors the use of pest prevention/tolerance over control.

It is the City's policy to reduce the toxicity and amount of hazardous materials used in City operations. The Chemical Use Policy sets forth a framework for evaluating hazardous materials used by the City and prioritizing products for phase-out and replacement with less hazardous alternatives.

Regional Integrated Pest Management Initiative

The listing of Puget Sound Chinook salmon under the Endangered Species Act has heightened awareness of the impact common practices have on the environment. Recent studies documenting the presence of pesticides in area streams and effects of pesticides on salmon point to the need for public agencies to serve as models of environmental stewardship in landscape management.

Representatives from local jurisdictions in King, Pierce, and Snohomish counties developed a model Tri-County IPM Policy and Guidelines in support of the goal of reducing the potential impact of pesticide use on threatened and endangered species. This pesticide use reduction strategy is consistent with the Tri-County Policy and Guidelines.

Strategy Approach

The two main components of this strategy are (1) to eliminate the use of the most hazardous pesticides (as defined below) and (2) to achieve a 30% reduction in overall pesticide use. The following paragraphs discuss the approach to achieving these goals.

Eliminating use of the most hazardous pesticides

Based on the general criteria in the Chemical Use Policy, pesticide-specific review criteria were developed. A hazard assessment was then conducted on the pesticides used by the City to prioritize products for phase-out. Products were categorized into three tiers ranging from greatest potential hazard -Tier 1 to least -Tier 3. New products considered for use will undergo the same analysis and product tier designations will be re-evaluated, as additional information becomes available.

Products meeting any of the following criteria were placed in Tier 1.

Tier 1 Criteria

- Products assigned by the U.S. Environmental Protection Agency (EPA) to Hazard Category I: Signal word DANGER appears on label
- * Restricted use pesticides – use of the product is restricted to certified pesticide applicators (except aquatic herbicides¹)
- * Products that cannot be disposed of because of dioxin contamination
- * Products with active ingredient on the state list of acutely dangerous wastes (P list- Washington State Dangerous Waste Regulations)
- * Products with known, likely, or probable carcinogens as active ingredients (as identified by U.S. EPA, State of California, National Toxicology Program, or International Agency for Research on Cancer)
- * Products with reproductive toxicants as active ingredients (California Proposition 65 list)
- * Products with known or probable endocrine disruptors as active ingredients (State of Illinois EPA)
- * Products labeled as highly toxic or extremely toxic to birds, aquatic species, bees, or wildlife. (Exceptions for products used only indoors; exception to bee toxicity will be needed for products intended to control bees, wasps, or hornets)
- * Products that are persistent in the environment - defined as those with active ingredients with soil half-lives greater than 100 days. (Possible exception for products used only indoors.)
- * Products that move readily in the environment and may impact ground or surface water - defined as those with active ingredients with mobility ratings high or very high or with specific label warnings about groundwater hazard. (Possible exception for products used only indoors.)

¹Note: aquatic herbicides are not included in this criterion because all aquatic applications in the state are restricted because of the need for a permit rather than because of particular properties of the chemicals involved.

Target: Tier 1 herbicides and insecticides have been targeted as first priority for phase-out. Exceptions to the restriction will be considered as described below. Affected departments will designate IPM Coordinators to evaluate exception requests.

Exceptions

Exceptions to the restrictions will be considered based on:

- a description of the pest problem,
- rationale for chemical control with the proposed product,
- a description of how the product will be used,
- legal requirements,
- public health and safety considerations,
- preservation of landscape assets, and
- an evaluation of all feasible alternatives including non-chemical and no action alternatives; the safety, health, and environmental impacts of the alternatives also will be evaluated.

Exceptions may be granted on a one-time-only basis or as a programmatic exception that applies across all departments.

One-Time-Only Exceptions - The Departmental IPM Coordinator and the Office of Environmental Management will be responsible for evaluating and approving one-time-only exceptions within each Department.

Programmatic Exceptions - Departmental IPM Coordinators and the Office of Environmental Management will meet, as necessary, to evaluate and approve or deny programmatic exceptions. All programmatic exceptions will be re-evaluated annually by the IPM Coordinators and the Office of Environmental Management based on a review of alternatives and a re-evaluation of the need for the control.

For all exceptions granted, a Best Management Practice will be required to minimize human health and environmental risk.

Overall Pesticide Use Reduction

City staff have already significantly reduced the amount and toxicity of pesticides used through IPM. In order to identify ways to reduce pesticide use further, a survey of specific pest management strategies was conducted and general alternative controls were suggested. Many of the suggestions came from City gardeners based on their knowledge and experience. Specific pest management strategies were evaluated for ornamentals, turf, trees/woody brush, electrical substations, rights-of-way, and golf courses. Alternative pest management strategies identified include:

- Pest prevention techniques like mulching, irrigating, fertilizing, and using pest-resistant species;
- Mechanical pest control techniques like flame weeding, hand pulling, string trimming, and hot water weeding; and
- Alternative chemical controls like neem oil products, active bacillus products, and potassium bicarbonate products.

Increasing pest tolerance thresholds was also suggested. Pesticide use reduction decisions will consider preservation of the landscape asset, safety, and legal requirements.

Target: Reduce overall pesticide use by 30% by the end of 2002.

Implementation Strategy

In order to plan for these long-term investments, over the next year we will conduct further research into alternative pest control methods and initiate pilot studies to evaluate alternative effectiveness and potential for use on a citywide scale. The lessons learned from this work will help us effectively target our resources. Over the next year, we will develop a pesticide reduction program including the following elements:

- Research alternative pest control equipment, products, and techniques;
- Conduct pilot studies to evaluate alternative effectiveness and potential for use on citywide scale;
- Develop maintenance standard trial sites to monitor increased pest tolerance thresholds and any resulting damage;
- Conduct public outreach to both increase awareness of and gauge reactions to changing maintenance standards and alternative approaches;
- Partner with private entities to leverage community support for reduced pesticide use through volunteer programs; and
- Pursue alternative funding sources.

For more information about the City's pesticide use reduction strategy and program plan, please contact Tracy Dieckhoner in the Office of Environmental Management at 206/386-4595.

