MAGNOLIA BOULEVARD
VEGETATION MANAGEMENT PLAN

Adopted
May, 1998

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Summary

This Vegetation Management Plan is intended to guide public stewardship of the landscape along Magnolia Boulevard. The Plan was developed by the Seattle Department of Parks and Recreation through the involvement of community residents representing various opinions of how the Boulevard's landscape should be managed. It considers the elements of the landscape that are fundamental to the character of the west side of the Boulevard, including views, madrona trees, lawn and forest habitat. Three of the key aspects of this Plan are as follows:

The Plan determines how the vegetation along the Boulevard will be managed to create or maintain expansive views of Puget Sound. The Plan outlines two strategies for achieving this goal. In many areas, brush and trees would be trimmed in rotation to keep the vegetation within specified height limits for different zones on the hillside. Secondly, the long-range goal is to convert vegetation in certain areas to lower-growing species of plants that would essentially eliminate the long-term need for routine brush clearing.

The plan determines the number of existing and proposed madrona trees that represent a population that will maintain historical levels of madronas on the Boulevard over the long term. The Plan locates these trees along the Boulevard to segment and frame views of Puget Sound. The nature of these trees requires some specialized approaches to their management. One critical strategy is the flexibility over the long-term to move madrona locations as old trees die and new ones are started or volunteer. This relocation would be carefully evaluated to insure that there is no overall loss of view on the Boulevard.

The Plan also examines the role that vegetation plays in slope stability and erosion control. Maintaining a diversity of healthy native tree and shrub vegetation on the hillside is expected to help control erosion and inhibit some surficial soil movement. However, it is not expected to remedy the underlying geological instability of the hillside.

This plan is a first step by the Department of Parks and Recreation to seek the community's participation in the stewardship of the Boulevard. Since the scope of the Plan significantly exceeds the capacity of existing operations of the Department of Parks and Recreation, the success of the Plan depends partially on voluntary community participation. A Phase I Implementation Plan identifies project areas that are expected to achieve the greatest public benefit. The Plan recommends that a vegetation management advisory committee composed of community representatives and DPR staff develop a workplan for the Boulevard each year.

1. Introduction

Dramatic marine views have historically attracted people to Magnolia Boulevard. Magnolia Bluff offers views stretching over Puget Sound from Seattle to Mount Rainier, to the Olympic Mountains. The view is framed and distinguished by large native madrona. Every day of the week, Magnolia Boulevard is an active public park. It is frequented by joggers and walkers as well as those seeking a contemplative experience. The site is a regular stop for tour buses carrying citizens from all over the world. The steep slope below the crest is geologically active; subject to both deep slumps and surficial slides. The dense vegetation cloaking the slope helps to limit the surficial movement and provides vital wildlife habitat.

The numerous madrona along the boulevard are intrinsic to the quality of the experience on the boulevard. The trees not only frame the view: the red-trunked trees with peeling bark, dark evergreen leaves and gracefully twisting branches are a considered by many to be one of the most beautiful native plants in the Pacific Northwest. The foliage and berries of the madrona are an important wildlife food source. Also, the tree is ideally suited for steep, erosive slopes such Magnolia Boulevard. Its thickly matting roots have tremendous erosion control capabilities and it is highly drought-tolerant.

For over sixty years, the Seattle Department of Parks and Recreation (DPR) has maintained public views on the boulevard by trimming brush and trees. The extent of view clearing has varied, depending on budget and public comment. Members of the community have frequently quarreled over the view clearing. Some felt it went too far, destroying beautiful madronas and valuable wildlife habitat. Others felt it did not go far enough, allowing an unique, world-class view to be obscured by commonplace vegetation[1].

The purpose of this plan is to find a balance between the various attitudes about how the boulevard should be managed by: (1) establishing the fundamental landscape elements that characterize the boulevard, then (2) preserving the long-term integrity of the fundamental landscape elements through a management plan that guides the administration, maintenance and modification of the landscape and vegetation. This plan is not a master plan for the boulevard. This project is not intended to substantially alter use patterns or the composition of the boulevard landscape.

Public Involvement

Public involvement has been a central element in development of this plan. The public process included formation of a Citizen's Advisory Committee (CAC) to work with DPR and the consultant. The purpose of the CAC was to include a representative base of citizen perspectives in the development of this vegetation management plan. The CAC met as needed starting in

[1] Board of Commissioners, Letter to Magnolia Boulevard residents, April 1, 1948; Brown, Letter to Mr. and Mrs. A.L. Blessing et al, March 24, 1959; Carleton Park Improvement Club. Resolutions regarding cutting of madrona trees. July 8, 1930; Erickson, Letter to Mr. W.B. Kirtley, July 5, 1935; Hoffman, Letter to Carleton Park Improvement Club. February 24, 1931; Hoffman, Letter to Mrs. Charlotte Weller, Secy., Carleton Park Improvement Club. December 7, 1931; Koepf, Memorandum to E. J. Johnson. February 13, 1962; Towne, Letter to Dick Moody, September 15, 1970.

Figure 1 Project Location

Figure 2: Aerial View of Magnolia Bluff (1965)

March 1996 to review research and discuss proposed actions. All CAC meetings were open to the general public.

In addition, DPR hosted two public meetings. The purpose of the first meeting, on April 22, 1996, was to initiate the project and gather information. The second meeting, on March 23, 1998, was to present the proposed management plan. Comment from the public meetings is included in Appendix A.

Process

As DPR and the CAC embarked upon the planning effort, the people involved realized that the process must encompass more than the single issue of trees versus views. Magnolia Boulevard is located on a steep, active slope. Vegetation is a factor in slope stability. First conceived as a bike path in 1900, the boulevard is a historic feature of Seattle. The vegetation growing on the hillside slope provides important urban wildlife habitat. The lawn along the boulevard is the site of recreation activities. These and other issues were considered during development of the vegetation management plan. Tasks included:

- Review existing documentation including GIS maps, current madrona research, historic research, soil logs and other materials.

- Field reconnaissance to evaluate existing and proposed landscape conditions.

- Meeting with:
  - Seattle Public Utilities Soils Engineer to discuss geotechnical considerations.
  - horticulturists to affirm best management practices for successful reintroduction and maintenance of existing specimens.
  - Seattle Central West District to review maintenance equipment and procedures.

- Achieve consensus on the fundamental landscape elements that characterize the park boulevard through a design visioning exercise.

- Preparation of a vegetation management plan, to be communicated in text and graphic plan.

A General Note About Slope Stability

The project site is an excessively steep bluff subject to slope instability, surficial soil creep and erosion. This plan recognizes that control of geotechnical conditions cannot be achieved through vegetation management. The intent of this plan will be to manage the vegetation in a way that does not contribute to slope instability or exacerbate an existing condition.

Madrone or Madrona?

A citizen at the first public meeting inquired about the correct common name for *Arbutus menziesii*: "Is it madrone or madrona?" As with most plant species, *A. menziesii* has several

common names, all of which may be used correctly. Father Juan Crespi first applied the Spanish common name madroño to the trees when he found it in Monterey Bay. Most of the historic documents uncovered in the process of developing this plan refer to the tree as madrona. This plan uses madrona as the common name.

2. Background of Magnolia Boulevard

The process of determining the fundamental landscape elements that characterize the boulevard gave consideration to its historical use and appearance. To gain an understanding about the boulevard, researchers reviewed documents from the Seattle Department of Parks and Recreation (DPR), Seattle Public Utilities (formerly Seattle Engineering Department) and the Seattle Library. Additionally, residents from Magnolia offered their recollections and family photographs.

Early on, there were questions about the "Olmsted Vision." The Olmsted Brothers, landscape architects from Brookline, Massachusetts, were highly influential in Seattle at the beginning of this century. The Olmsted Brothers Plan describes a proposed "Magnolia Bluffs Parkway" in their 1903 and 1908 Comprehensive System of Parks and Parkways for Seattle. Their description, recorded in the Annual Report of the Park Board[2], is as follows:

Smith's Cove and Magnolia Bluffs

> Northwest of Smith's Cove, the lower part of the hill becomes exceedingly steep. The parkway would be here about 125 to 130 feet above low water. It may then descend gradually, perhaps 20 or 30 feet to an outlook concourse on the bold headland forming the east end of Magnolia Bluff. The parkway would then continue nearly level, as near the bluff as practicable for about a quarter of a mile. It would then widen out into a park which would include the large ravine west of the hill [Wolf Creek]. It would probably not be necessary, however, for the parkway to make so long a detour around the head of the deep portion of the ravine or to keep so far west of it as the bicycle path does. Yet the woods here are so beautiful, and the land of such little value for residential purposes, that it would be desirable to include in this woodland park almost as much as is enclosed between the bicycle path and the shore. West of this ravine, the drive should again come to the top of the bluff, and bending in and out to accommodate the smaller ravines, should follow the bluff to a commanding point a short distance west of Four Mile Rock. The drive will then have to turn inland to secure a practicable crossing of the ravine in the cleared land, but may pass near the farm house and then rise again gradually to the top of the next bluff. The drive should then continue along the top of the to the Fort Lawton Reservation, winding in and out to fit ravines.

The route proposed by the Olmsteds generally followed an existing bike path that had been designed by George F. Cotterill, an assistant City Engineer in 1900. (See Figure 3.) Apparently, the Olmsted Brothers did not prepare a specific design for Magnolia Boulevard or indicate design principles to be used in construction of the boulevard. The vehicular road was first laid out by Samuel C. Lancaster, a consulting engineer, in 1910 and it was about that time that the City began acquiring property for the boulevard through donation and condemnation.

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2 Seattle Dept. of Parks and Recreation. Data on history of Seattle park system. Compiled by Don Sherwood.

Figure 3: Seattle Bicycle Paths in 1900

The level of "view clearing" has varied tremendously in the nearly 100-year history of the boulevard. DPR has letters dating from 1930s both criticizing and calling for tree removal. Since 1990, the issue of view clearing has gained greater sensitivity due to reductions in the frequency of underbrush trimming and the general decline of madrona throughout the Seattle area.

The following provides a general time line for events affecting Magnolia Boulevard:

Prior to 1857: Conifers logged from Magnolia Boulevard.

1857: Navy botanist and geographer Lt. George Davidson, not recognizing madrona trees, names Magnolia Bluff.

1860: Farming begins to spread over Magnolia.

1890s: A gentleman named Emerson bought the valley on top of Magnolia offering it as a route for the railroad (the railroad went elsewhere).

1897: A fort was built to provide protection to Bremerton Navy Yard. It was named Fort Lawton in 1900.

1900: George F. Cotterill, assistant City Engineer, designed a 25-mile system of bike paths. He included a bike path that is essentially the route of Magnolia Boulevard today, connecting to Interbay via Thorndyke Avenue. (Mr. Cotterill went on to serve as state senator and mayor and finally as Chief Engineer of the Washington State Department of Highways.)

1903: Olmsted Brothers Comprehensive System of Parks and Parkways for Seattle describes route of the proposed "Magnolia Bluffs Parkway" (No record of influence on the final route selection; no drawings or designs found. A photograph of the bluff attributed to the Olmsted Brothers shows an exposed cliff face with dense coniferous forest on top. The photograph is too grainy to determine the numbers of madrona that may have been present.

1904: Park Board Annual Report describes boulevard and Magnolia Park, but the Board did not take implement the proposed action.

1908: Olmsted Brothers Comprehensive System of Parks and Parkways for Seattle again describes route of the proposed "Magnolia Bluffs Parkway" (No record of influence on the final route selection; no drawings or designs found.)

1909: Park Board Annual Report again describes boulevard and Magnolia Park.

1909: Real estate developers increase efforts to sell lots on Magnolia, but steep slopes and distance from development limits interest by potential buyers.

1910: The route for Magnolia Boulevard is laid out by Samuel C. Lancaster, consulting engineer. (During this period he was also working on the Columbia River Gorge Highway.) The City began acquiring the property through donation and condemnation.

1912: The City issues a work agreement for construction of Magnolia Boulevard. Grading and macadamizing begins.

1916: Magnolia Boulevard is completed to Fort Lawton.

1924: By now, ten homes are located on the boulevard (including a large English Tudor owned by H.W. Parrish).

1927: Perkins Lane is built.

1928: A plan to pave boulevard is not carried out, but subsequently WPA labor was used to grade portions of the boulevard and perform other labor.

1928: Garfield Bridge is constructed from Galer to the then existing trestle across the mouth of Smith Cove at the current location of the Magnolia Bridge.

1929: The Park Board develops West Raye Street down to Perkins Lane.

1930: The Carleton Park Improvement Club protests cutting and destruction of madrona trees along the boulevard. According to the Club's resolution, the Park Board had authorized cutting of some trees at the request of "certain" property owners. A letter from the Park Board to the Improvement Club in the following year notes that the Park Board did cut some trees, but states that most of the cut trees were removed by vandals.

1931: In February, the Park Board writes to the Carleton Improvement Club requesting help in tracking down vandals who ringed the bark of forty-one madronas tree in the vicinity of West Howe Street.

In December, the Park Board writes to Carleton Park Improvement Club outlining proposed maintenance. (There is no record of whether proposed actions were carried out.) Proposed maintenance: cutting of willow and alder; removal of some madrona standing directly on edge of bluff ("The trees contribute to the sloughing off of the edge of the bank, for the reason that the wind sways them and loosens the soil."); thinning of madrona groves in an effort to promote full crowns; cutting back flowering shrubs (spiraea and syringa) to encourage new growth; removal of "dangerous limbs and dead tops"; removal of "alders and similar soft woods that are short-lived".

1935: The Park Board requests that the police to arrest or fine a property owner who illegally cut a tree on the boulevard.

1940s: Major slide occurs on south side of boulevard between Galer and Eaton.

1945: The wooden Howe Street bridge is replaced by a concrete structure.

1950: "The Battle of the Boulevard." City planners decide that boulevard should be an arterial parkway: widened, paved and with sidewalks and drainage. Residents at the time fought the action for three years, being particularly concerned that the sidewalk on the north side would take out rockeries. During this time arguments continue about which madronas to leave or take out.

1953: The City and residents reach an agreement and formed and Local Improvement District (L.I.D.) to fund proposed improvements. The existing road is constructed: forty feet wide, with curbs, gutters and a sidewalk on the water side. Total cost: $379,408 paid for with proportioned assessments from the City Street Fund, Park Fund and abutting property owners.

1969: Magnolia Chamber of Commerce dedicates Memorial Viewpoint on the 2200 block in recognition of W. Robert England.

1970s: People begin to notice the decline of madronas in the Puget Sound region.

1980s: The City gradually reduces the frequency of clearing vegetation to maintain views.

1991: In response to complaints about lack of view clearing, Terry Brady, DPR Director of Grounds Maintenance, meets with various groups of interested citizens and agrees upon a three-year minimal maintenance plan. DPR conducts view pruning and deadwooding along Magnolia Boulevard.

1994: (April) Members of the Friends of Discovery Park present *Pacific Madrone Preservation in Seattle* a madrona training session that initiates a madrona database project.

1994: (June) Five madrona trees removed from boulevard by DPR because they were defoliated and two contained heartwood rot. Public outcry ensues.

1994: (June) In response to concerns resulting from removal of the trees, DPR staff meets with a group known as Save Magnolia's Madronas. In subsequent months, DPR also receives complaints from the public about the lack of view clearing.

1994: (September) The Draft Interim Landscape Plan is issued for review.

1995: (April) A symposium entitled "The Decline of Pacific Madrone" is held at the Center for Urban Horticulture at the University of Washington.

1996: In response to divergent public opinion, DPR begins the process of developing a vegetation management plan for the boulevard.

1996: American Forests Famous and Historic Trees, working with the Save Magnolia's Madrones Committee, designates a large madrona on the boulevard as a historic tree (see graphic management plan for location of tree.)

1996/
1997: Winter storms bring an unusually high level of slide activity throughout the Puget Sound region. Magnolia Bluff is severely affected.

3. Slope Stability Issues

Magnolia Bluff is an unstable slope. Like all steep slopes, it is vulnerable to erosion resulting from rain and stormwater runoff. A specific characteristic of the bluff is that it is composed of layers of sand overlaying layers of clay/silt. The exposed bluff face accumulates a thin mantle of looser colluvial material over time form normal soil development processes. Trees and shrubs root into this colluvial layer, but they are generally unable to penetrate into the dense sand and silt layers beneath.[3]

Groundwater percolates downward through the bluff strata on Magnolia hill. At the interface of a sand and silt layer, water moves along the interface and exits through the colluvium on the bluff face. When the colluvium becomes saturated with water, the friction that holds the colluvium on the bluff face decreases dramatically and predisposes it to movement. This is a natural process that has been evolving since the end of glaciation in the Puget Sound lowland about 13,000 years ago[4].

Research by the U. S. Forest Service has shown that there is a positive relationship between

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3 See Appendix C, Figure 3.

4 Menashe, *Vegetation Management: A Guide for Puget Sound Bluff Property Owners.*. 1993; Myers, Lorilla and Myers. *Surface Water and Groundwater on Coastal Bluffs: A Guide for Puget Sound Property Owners.* 1993; Myers, *Slope Stabilization and Erosion Control Using Vegetation: A Manual of Practice for Coastal Property Owners.* 1993. Parker, Kathy. "Vegetative Contribution to Slope Stability at Magnolia Park." 1996. (Appendix B); Witter and Kirkland, "Review of Magnolia Boulevard Vegetation Management Plan". 1997. (Appendix C)

slope stability and vegetation cover[5]. However, a geotechnical review of this plan emphasizes that: "Excess water, however, remains the primary triggering mechanism for most of the Magnolia Bluff slides"[6]. On an unstable slope like Magnolia Bluff, removal of vegetative cover may result in increased erosion and incidents of slope failure. Since several factors affect slope stability, there is no guarantee that vegetation cover will prevent or lessen the impact of slope failure. However, vegetative cover is more likely to help if the following conditions are met:

1. Dense vegetation at the top of the slope appears to be at least as important in protecting slopes as the vegetation at the bottom of the slope. Apparently, vegetation at the top of the slope is important for intercepting stormwater runoff which could accelerate erosion and soil saturation. The slope is apparently best protected if there is dense vegetation at and below the crest, as well as a buffer of dense vegetation between the crest and development of the top of the bluff. Based on this, the first two tenets for vegetation management on Magnolia Boulevard are:

   Slope Stability Principle #1:
   Encourage dense vegetation with a high fibrous, interlocking root structure at and below the top of the bluff.

   Slope Stability Principle #2:
   Provide a buffer of dense vegetation between the developed landscape and the top of the bluff.

   How wide should the buffer be? Generally a wider buffer can be assumed to provide greater protection, but it is likely that there is a point of diminishing returns. In the absence of clear scientific rule, the vegetation management plan adopts conservative approach: (1) a fifty foot wide buffer of dense vegetation shall be maintained above exceedingly steep slopes (1.5:1 or greater, measured on an overall average of the ratio of rise to run) or slopes with a history of failure. As stated above, there is no scientific formula to determine the most effective buffer width. The recommendation for a fifty foot wide buffer is based on the existing research[7] . It is not an absolute and future research may result in revising the recommendation. (2) The buffer may be reduced to ten feet in areas of existing lawn above flatter slopes (2:1 or less), if the lower slope has no history of failure or has not been identified as a potential landslide hazard.

2. Dense plant communities with diversified structure tend to provide better slope protection than monotypic stands. In other words, forests with a mix of dense groundcovers, shrubs and trees tend to perform better than lawn or even a grove of trees with little or no shrubby understory. Apparently, a mix of plant structure and type more effectively breaks the force of falling water, improves water absorption, encourages root reinforcement, and increase transpiration rates. (Plants draw water from the soil to their leaves then release it to the air by the mechanism of transpiration). Holding (intercepting) water on leaves and stems is the most effective mechanism during winter months[8].

   Therefore, the dense vegetation described in the first two principles should be structurally mixed with dense groundcovers, shrubs and trees. But this brings up the question of windthrow: won't tall trees at the top of the slope whip around in the wind resulting in loosened roots, tipped over trees and increased erosion? There is debate on this subject. Some authorities contend that dense roots, low top-growth provides superior slope protection. Others argue that the advantages of diversified plant structure outweighs the potential risks of windthrow. We can say with confidence that windthrow is a hazard where trees are suddenly exposed to wind after growing in a forest, as can happen on clearcut slopes in timber

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5 Ibid.

6 See Appendix C, Page 1.

7 See Menashe, *Vegetation Management: A Guide for Puget Sound Bluff Property Owners.*. 1993; Myers, Lorilla and Myers. *Surface Water and Groundwater on Coastal Bluffs: A Guide for Puget Sound Property Owners.* 1993; Myers, *Slope Stabilization and Erosion Control Using Vegetation: A Manual of Practice for Coastal Property Owners.* 1993. Parker, Kathy. "Vegetative Contribution to Slope Stability at Magnolia Park." 1996. (Appendix B); Witter and Kirkland, "Review of Magnolia Boulevard Vegetation Management Plan". 1997. (Appendix C)

8 (See Appendix C, Figure 2)

production areas. Trees that have grown in the presence of wind are more likely to be wind resistant. Given the present lack of scientific research, the Magnolia Boulevard Vegetation Management Plan must make a distinction. The plan should encourage a plant community with diversified structure, but the tall trees included in the mix should have demonstrated ability to resist wind. Madrona, with its deep, wide and tenacious root system is an excellent candidate for the tall tree at the top of the slope. The fact that so many madrona growing naturally on Magnolia Boulevard have reached maturity is an argument for its ability to adapt to the sites microclimate, sandy soils, and wind conditions.

Slope Stability Principle #3:
Dense vegetation shall be a mix of groundcover, shrubs and trees offering diversified plant structure. At and near the top of the bluff, madrona shall be the preferred species for overstory trees. Erosion control fabrics may be used to supplement groundcover.

3. Even within a diversified plant community, some plants are better than others at slope protection. Good slope protectors tend to have matted, fibrous roots and thick ground covering foliage. The latter can be deceiving. Himalayan blackberry appears to protect the slope with its heavy leaves, but the roots of the blackberry do not add significant tensile strength to the soil and the aggressive vine prevents other, more effective plants from growing. Many native plants such as madrona, oceanspray and bigleaf maple have excellent slope protection capacity.

   The ability of a plant to protect the soil is dependent upon its ability to become established and thrive. Magnolia Bluff has specific environmental conditions affecting its plant community. The southwest facing slope is directly exposed to sun and wind. Parts of the slope are well-drained and sandy. Vegetation must be able to withstand summer drought conditions. Elsewhere, groundwater seeps create year-round wet soil conditions. Naturally growing native species are those likely to be adapted to environmental conditions existing at the site.

   Slope Stability Principle #4:
   Plant selection (in management practices or in new plant installation) shall give preference to native species naturally adapted to site's environmental conditions, including steep erosive slopes. Non-invasive, non-native plant species may be used when the species is uniquely adapted to the site and has other important characteristics such as providing diversity of wildlife habitat.

4. Fundamental Landscape Elements

The methodology used to develop the Magnolia Boulevard Vegetation Management Plan included determining a consensus of opinion on the fundamental landscape elements that characterize the boulevard. Once the fundamental landscape elements were determined, the vegetation management plan could then be structured to support or enhance the elements. The public and the Citizen's Advisory Committee were asked to participate in a design visioning exercise to first identify, then to debate and agree upon the elements. During the course of this exercise, people identified several items that did not apply directly to vegetation management. These are listed in Section 8: **Topics for Further Attention**. The vegetation management plan is limited to vegetation and is not intended as a park master plan.

Views:

The role of the Department of Parks and Recreation (DPR) is to manage designated public views. In case of the boulevard there are both public and private views. The southwest side of the boulevard will be managed in a manner that encourages healthy stands of madrona and

associated vegetation while safeguarding a diversity of views from the public sidewalk along the boulevard.

The public view from Magnolia Boulevard will be segmented and framed by vegetation primarily madronas. Madrona trees are integral to the view. The trees unto themselves are beautiful, and they frame the view of Puget Sound, Mount Rainier, downtown Seattle and the Olympic Mountains beyond them.

The overall goal will be to establish an acceptable proportion of view and vegetation massing approximating the examples shown in Figure 4 and defined in Section 5B: **View Management**. The location of vegetation and viewing locations may alter over time in response to changes in the health of the plant community, i.e., particular panoramic views may not be preserved if a healthy stand of madrona is developing in that area. Conversely, new views may be opened in other areas if the vegetation in that area is not in good health or presents an excessive barrier to viewing. Temporary exceptions to this goal will be permitted in areas where new madrona is becoming established because young madrona are shorter and bushier than mature madrona.

Bench Locations:

Benches will be located near the sidewalk at regular intervals to accommodate people with special needs. In other words, the benches will be located to serve the physical needs of pedestrians for intermittent rest stops (recommended minimum spacing: every 400 lineal feet along the boulevard; recommended maximum spacing: 900 feet lineal feet along the boulevard). The viewing opportunity at the benches will be taken into consideration in the vegetation management plan. However, bench locations will not be sufficient reason for removal of vegetation: if a stand of healthy madrona is becoming established in that area, it will not be removed in order to preserve a view from a bench. Benches may be relocated or added to take advantage of extant viewing opportunities.

Historic Landscape Character:

The landscape on the southwest side of the boulevard will be managed with turf at the road edge backed by native, natural vegetation (including groundcover, shrubs and trees). The edge between the grass and natural vegetation will be informally curvilinear. This definition precludes formal, highly organized planting beds. Ornamental plant species may be used in the natural plant masses provided the plants: (1) have minimal maintenance requirements (2) have an informal, natural appearance, and (3) are placed informally with natural appearing spacing. *Rosa rugosa* and *Philadephus cornarius* (mock orange) are examples of appropriate ornamental plant species. Hybrid tea roses are examples of inappropriate ornamental species.

Figure 4: Conceptual Proportion of Trees and Views

Specimen Madronas[9]:

Specimen madronas are historically, architecturally and aesthetically important to Magnolia Boulevard. The primary goal of madrona management will be to save and protect healthy, living specimen madronas. Management procedures will be flexible to accommodate specific needs of specific trees[10]. Healthy trees, whether growing in turf or natural areas will be maintained with no disruption to existing growing conditions ("if it's not broke, don't fix it"). Where trees exhibit signs of declining health, consideration may be given to modifications to the existing growing conditions, such as planting compatible shrubs at the base of trees. In otherwise healthy trees, minor dead branches will not be removed unless hazardous conditions result. Heavily diseased trees will be removed and allowed to resprout from the stump. The resprouting trunk will be protected and maintained to encourage regrowth of the healthiest sprouts). Regenerating or replanted madronas will be part of the process of maintaining large specimen madronas, and therefore will be a visible feature of the boulevard landscape.

The majority of madrona will be growing in shrub areas which will tend to keep people away from the trunk where the majority of carving vandalism occurs. Existing park code makes destruction, mutilation or defacement of any park vegetation an offense punishable by fine and/or imprisonment (see Section 5: **Management Plan**).

Turf:

It is desirable to maintain the quantity of turf area as existing in the current condition. If an area of turf is converted to shrubs or groundcovers, then roughly equal area of natural vegetation suitable for growing turf should be converted to turf. The purpose of this goal is to assure that the vegetation management plan maintains adequate space for passive recreation. Unfortunately, this goal is unachievable because of conflicts with the slope stability principles of protecting slopes from stormwater runoff. Slopes steeper than 4:1 will not be maintained as turf. The area in front of the fence will be converted from turf to shrubs and groundcovers to soften the appearance of the fence. No areas, whether turf or natural, will be irrigated. Steep slopes within turf areas may be maintained as wildflower areas (these will be designated as areas suitable for maintenance by volunteer organizations.)

Forested Hillside:

The forested hillside will be managed to encourage wildlife habitat, densely rooting native plant species. In the transition zone at the top of the slope, madrona and associated native species will be encouraged. Slide areas or other exposed surfaces will be replanted with densely rooted, low top-growth species. Madrona will be considered as a candidate for replanting all areas of the forested hillside. Invasive exotic species, such as blackberry and ivy, will be controlled.

Wildlife Habitat:

Maintain wildlife habitat, encourage madronas and other natives that provide food and shelter. New plants will be used to supplement habitat diversity and food source. Exotic (non-native) plants will be controlled.

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9 A specimen madrona is defined as a large, mature individual tree (which may be multi-trunk form)

10 See Section 5.B for Madrona Best Management Practices.

5. Vegetation Management Plan

A. Management Zones

Under this vegetation management plan, the southwest side of Magnolia Boulevard is subdivided into three areas and six management zones as shown in Figure 5, Area and Management Zone Sections and on the graphic Vegetation Management Plan, Appendix E (*separate plan sheets*). The three areas are based on general use and landscape characteristics. Area 1, Developed Park Landscape, is the generally level area at the top of the bluff used for a variety of park functions. Table 1 shows the management zones in Area 1. Area 2, Transition, is at and immediately below the bluff. This area is generally steep. In the past, the vegetation has been highly modified by view clearing activities. Table 2 shows management zones for Area 2. In the transition zone at the top of the slope, madrona and associated native species shall be encouraged. Area 3, Forested Hillslope shall be managed to encourage wildlife habitat, densely rooting plant species. Table 3 shows the management zones for Area 3.

Additionally, all management zones are subject to special overlay zones and madrona management criteria. The overlay zones result from site-specific conditions which override management zones as described above. The overlay zones are described in Table 4. Madrona are encouraged in all six management zones. Table 5 outlines the management conditions for new and existing madrona; detailed guidelines follow in subsection 5C: **Madrona Best Management Practices**.

Figure 5: Typical Slope Cross-section

Table 1.
Management Zones in Area 1: Developed Park Landscape

Name of Zone	Description	Primary Management Practices*	Special Remarks
LAWN	Mown grass in upland portion of site.	Regular mowing to allow for passive recreation activities.	Where indicated, existing turf under existing madronas shall be maintain-ed as turf. Special consideration shall be given to protect-ing trunks during mowing operations.
SMALL SHRUB/ UNDERSTORY	Shrub areas in upland portion of site where plant mass, except trees to re-main, shall be main-tained at optimally three foot height or less.	New plantings: Shrubs with a mature height of three feet or less would be installed, periodic radical pruning unnecessary. (See the following subsection D: **General Guidelines** for methods of converting existing vegetation to new planting.) Existing planting: existing vegetation (excluding trees to remain) would be trimmed once a year to maintain a height of approximately three feet. Madrona saplings not indentified on the plan maps will be removed if they restrict view objectives as outined in Section 5B (below). Exotic weed species shall be controlled. Note: most small shrub areas would be new plantings.	Maintain dense vegetation cover to: a) intercept storm-water runoff to steep slopes, b) provide cover on difficult to mow slopes next to road.

**see Table 7 for plant species appropriate for new plantings in each zone.*

Table 2.
Management Zones in Area 2: Transition

Name of Zone	Description	Primary Management Practices*	Special Remarks
MEDIUM SHRUB/ UNDERSTORY	Plant mass, excepting trees to remain, shall be main-tained at an average height of five-foot or less.	New plantings: Shrubs with a mature height of five feet or less would be installed, periodic radical pruning unnecessary. (See the following subsection D: **General Guidelines** for methods of converting existing vegetation to new planting.) Existing planting: Every two years, species exceeding height parameters for this zone would be trimmed to about three feet height (excluding trees to remain). Species not exceeding height parameters would be saved and protected. If present, big leaf maple stumps would remain and allowed to sprout. Madrona saplings not indentified on the plan maps will be removed if they restrict view objectives as outined in Section 5B (below). Exotic weed species shall be controlled.	Maintain dense vegetation cover to: a) intercept storm-water runoff and human access to steep slopes; b) screen fencing.

Table 2. (con'd)
Management Zones in Area 2: Transition

Name of Zone	Description	Primary Management Practices*	Special Remarks
TALL SHRUB/ UNDERSTORY	Plant mass, excepting trees to remain, shall be main-tained at an average height of approximately ten feet or less.	New plantings: Shrubs with a mature height of ten feet or less would be installed, periodic radical pruning unnecessary. (See the following subsection D: **General Guidelines** for methods of converting existing vegetation to new planting.) Existing planting: Every four years, species exceeding height parameters for this zone would be trimmed to about three feet height (excluding trees to remain). Species not exceeding height parameters would be saved and protected. If present, big leaf maple stumps would remain and be allowed to sprout. Madrona saplings not indentified on the plan maps will be removed if they restrict view objectives as outined in Section 5B (below). Exotic weed species shall be controlled.	Maintain dense vegetation cover to intercept stormwater runoff to steep slopes and human access to steep slopes.

**see Table 7 for plant species appropriate for new plantings in each zone.*

Table 3.
Management Zones in Area 3: Forested Hillslope

Name of Zone	Description	Primary Management Practices*	Special Remarks
UPPER SLOPE FOREST	Forest below the crest of the bluff and above elevation 135-150.	Depending on whether or not a specific tree is accessible to maintenance crews, some big leaf maples (excluding those that have not been previously cut), may be coppiced[11] to enhance viewing objectives. Exotic weed species shall be controlled.	Maintain dense vegetation cover to provide slope protection.
LOWER SLOPE FOREST	Forest below elevation 135-150	Maintenance limited to monitoring for danger trees and control of invasive exotic plant species.	Maintain dense vegetation cover to provide slope protection.

**see Table7 for plant species appropriate for new plantings in each zone.*

Table 4.
Special Overlay Areas

Name of Zone	Description and Special Requirements
SLIDE SENSITIVE ZONE:	Zones that are impacted by slide activity or have been identified as potential slide areas. Vegetation management activities shall be undertaken with the direction of a geotechnical engineer. Revegetation of exposed soil will be a high priority following appropriate stabilization measures. If new slides occur , the area affected by the slide shall become a Slide Sensitive Zone.
MIXED FOREST:	Areas where natural mixed forest shall be maintained as described below for Lower Slope Forest. Generally, mixed forest is in areas where: (1) screening is desired (as next to private residences; (2) slope stability is at issue; or (3) the mixed forest does not impact the view objective.

11 "To coppice" means to trim at the base in a manner to allow resprouting , See Section 5.B.2.

Table 5.
Madrona

Type	Description and Special Requirements
EXISTING MADRONA TO REMAIN: Specimen Madrona and Existing Regeneration Madrona	This category includes trees of various ages and conditions (from three foot height to mature/nearly dead). If an existing madrona to remain dies or is considered for future removal for any reason, at a minimum, it shall be replaced with four madrona seedlings in approximately the same area. Whenever possible, this replacement will occur up to three years in advance of the anticipated removal, so as to allow the seedlings time to establish. As the seedlings grow, the trees will be thinned to leave the one healthiest, most vigorous growing specimen (see "New Madrona" below). If the replaced tree stump sprouts after cutting, the sprouting tree may be considered for retention in lieu of any planted seedlings. Sufficient time (approximately five years) will be allowed for seedlings and stump sprouts to establish so that the best possible candidate will be selected. Where appropriate, other methods of propagation such as planting larger (four to five foot) trees may be used. Madrona saplings not indentified on the plan maps will be removed if they restrict view objectives as outined in Section 5B (below).
NEW MADRONA:	New madrona planting. Each symbol on the graphic vegetation management plan represents one tree (can be multistem). These are located where viewing objectives will not be significantly impacted. Four madrona seedlings will be planted for each symbol shown on the plan. As the seedlings grow, the trees will be thinned to leave the one healthiest, most vigorously growing specimen. The first thinning will occur approximately five years after planting, leaving the two healthiest saplings. Final selection of the replacement candidate will occur seven years after planting(if trees are found to not impact views, more than one seedling may remain for each symbol, provided healthy growing conditions are maintained). Where appropriate, other methods of propagation such as planting larger (four to five foot) trees may be used. Where existing mature trees are identified as declining, new madronas will be planted in nearby locations in anticipation of the eventual loss of the tree. If more suitable locations for madrona establishment are present elsewhere along the boulevard, replacement trees may be planted at an unrelated site, provided that the overall proportion of viewing areas to trees is maintained along the length of the boulevard. If other locations for new madronas are sought, the preference will be to site them in association with existing groves. For all new plantings, the position of the trees will be marked and labeled at least one week prior to planting.

B. VIEW MANAGEMENT

Definitions

Window

A view window will be defined as a linear section of the sidewalk that has unobstructed perpendicular visibility to the horizon across Puget Sound. Sapling madronas that do not obscure the horizon will not be considered an obstruction, and other shrubs and trees that obscure "blue water" views are assumed to be managed under the specifications contained in Section 5A: **Management Zones**.

Obstruction

An obstruction will be defined as any natural or constructed feature that blocks perpendicular visibility from the sidewalk to the horizon across Puget Sound. This includes all trees and shrubs, except that unbranched, leafless ("bare") tree trunks will not be considered obstructions if they are at least ten feet from the sidewalk. Tree canopies that are above the horizon will not be considered obstructions, but will be managed according to **View Management Objectives** (below) and Section 5C: **Madrona Best Management Practices**. Shrubs and resprouting trees that will be routinely cleared according to Section 5A: **Management Zones** will not be measured as obstructions that will remain.

Measurements

Measurement of view windows and obstructions will be made from the sidewalk on the southwest side of the Boulevard. A measuring wheel will record cumulative feet of distance along the sidewalk. Readings will be taken at the beginning and end of each view window. The number of bare trunks in each window will be noted. It is recommended that a team of three people perform this task, so that one person calls out the beginning and end of each window, one person operates the measuring wheel and calls out the distance reading, and one person records these measurements.

Objectives

The objectives for managing the views along Magnolia Boulevard are intended to achieve the goal described under **"Views"** in Section 4: **Fundamental Landscape Elements**.

1. Manage vegetation to maintain the existing overall proportion of view windows and obstructions at a balance of 65% and 35%, respectively with a variance not greater than 5% (see the description of the View Element, p 17). The size and position of view windows may change over time to simultaneously implement other management objectives, such as madrona regeneration and erosion control. However, a decreasing view window in one location (e.g. from a growing madrona sapling) would require a proportional increase in a view window elsewhere.
2. Manage vegetation to distribute view windows along the entire Boulevard. This proportion of view windows and obstructions may vary somewhat along different sections of the Boulevard to simultaneously implement other management objectives, such as madrona regeneration and erosion control. However, extensive sections of view obstruction will be windowed, and require a proportional increase in vegetation in other sections of extensive window.
3. Manage vegetation to enhance panoramic view opportunities where possible. This includes

increasing the horizontal expanse of view windows that are fragmented by obstructions. When locations for new madronas are sought, the preference will be to site them in association with existing groves. This objective recognizes that mature madronas are part of the view, and regenerating madronas will be managed to insure a population of mature trees established from the 1969 baseline, as represented graphically in Appendix E: **Vegetation Management Plan** (separate plan sheets).

4. Manage vegetation to provide a variety of vertical heights in view windows, so as to capture "blue water", horizon and sky views, as well as to frame views. Some views will contain unobstructed expanses of sky, while others will be framed by madrona canopy.

These objectives are intended to be implemented within a midrange timeframe of seven to ten years. It is not the intention to micromanage the proportion and location of views, but rather take action based on reasonable expectation of plant growth. For example, The removal of a tree one year would not necessitate an immediate massive replanting to block the equivalent amount of view right away. Neither would the planting of new groves of trees necessitate the immediate removal of equivalent mature trees. This plan makes several provisions for transitional periods in the landscape where the proportion of views and trees may vary significantly (up to 10%) over seven to ten years before achieving the final balanced proportion.

C. MADRONA BEST MANAGEMENT PRACTICES

The following are the best management practices for madrona (*Arbutus menziesii*) as compiled from research and comments from horticultural and arboricultural professionals in the Pacific Northwest. These guidelines will be subject to revision as new research becomes available to improve our care and preservation of madronas in the landscape of Magnolia Boulevard.

1. CARE OF EXISTING MATURE TREES

A. Definition

A mature madrona will be defined as any tree over 20 foot in height or 12 inch in diameter at breast height. A mature tree may be multi-trunked, with trunk diameters measured cumulatively and individual trunk measurements discounted by an estimated percentage for its subordinate condition, according to "Guide for Plant Appraisal" International Society of Arboriculture publication, 1992.

B. Pruning

Since wounding of living tissue encourages infection by cankers (notably Nattrassia) pruning to improve crown form or provide view windows will be prohibited, unless approved by the DPR superintendent or designated representative to protect public safety or promote tree health. In such instances, a maximum of 10% of the leaf area will be removed in any one year, pruning will avoid increasing exposure to prevailing wind and sun (south and southwesterly directions), and remaining branches will be evenly spaced to protect bark surfaces from exposure, since increasing the exposure of bark surfaces encourages infection. Pruning will be timed in late winter or early spring to minimize exposure of the live tissue before new callous growth begins in the spring.

Trees with substantial amounts of dead wood over 2" in diameter may be pruned back to live tissue or an area of active callous formation. Pruning will comply with ANSI A300 standards for crown cleaning. Wherever possible, a lift bucket, pole pruner or other mean of non-contact elevation will be employed to minimize damage to bark surfaces. The arborist performing the pruning will carefully examine the extent of the trunk collar on each branch to determine the optimal site for the final cut. Wounds to live tissue will

be treated (e.g. fungicidal dressing, such as zinc chloride paste or Nectec®) to minimize infection at the wound site.

C. Soils and Fertilizing

Since changes in soil condition correlate with the decline of mature madronas, management practices will minimize changes in the soil of the root zones of mature trees. The exception to this will be practices to minimize compaction in the root zone of the trees, such as mulching or plantings that direct traffic away from roots. Mature trees will not be fertilized.

D. Watering

Mature trees will not be watered.

E. Mowing and Trimming

The intent of this activity is to protect the health of existing madronas while maintaining an attractive landscape. Mowing around the base of the tree shall not injure trunk or surface roots. For each tree, the adjacent ground will be inspected to determine vulnerability of surface and buttress roots. Areas with surface and buttress roots will not be mowed. The "No Mow" area would be to 6" beyond the edge of the natural root flare, or 3-1/2 feet from the point where the trunk contacts the ground, whichever is greater. The "No Mow" area will also encompass an area 6" beyond any surface and buttress roots. It's boundary will be contoured to fit the landscape and give a "natural" appearance. An alternative landscape treatment (bark mulch, shrub and/or groundcover) will be prescribed for each "No Mow" area. Weed growth in the "Mo Mow" area will be controlled manually, mechanically or chemically in a manner that protects the existing madronas.

F. Control of Adjacent Vegetation

Since there is no observed correlation between presence of adjacent vegetation and decline of madronas, no effort will be made to control adjacent vegetation unless such vegetation is considered undesirable for other management purposes. Any control of adjacent vegetation will seek to minimize disturbance to the roots of nearby madrona trees.

G. Shrub and Groundcover Plantings

For aesthetic and functional reasons, it may be desirable to establish shrubs around the bases of some madronas. The bed area will encompass the "No Mow" zone described in item E (above), and, in addition, it may extend up to six feet from the point where the trunk contacts the ground. The boundary of the bed area will be contoured to fit the landscape and give a "natural" appearance. Any such plantings will be installed with hand digging and minimal ground disturbance to avoid damaging tree roots. The smallest viable material will be used, e.g. 4" pots or direct seeding. Such plantings will be scheduled for fall so as to minimize the amount of follow up watering needed for establishment.

2. REMOVAL OF DEAD, DECLINING AND DISEASED TREES

A. Dead Trees

A tree will be considered dead if it fits both of the following criteria:

1. It is totally defoliated
2. It has not produced new leaf growth within the previous twelve months

Dead trees included in the turf landscape along the boulevard will be removed, unless identified for coppicing as described below. All material will be removed from site. When not in a view corridor, dead trees on the forested hillside will be retained standing for wildlife habitat value.

Stumps will be ground to below grade and backfilled with clean topsoil. Material from trees suspected of infection with phytophthora will be isolated from other material and disposed of off-site.

B. Declining Trees

A tree will be considered in decline if it fits both of the following criteria:

1. Terminal growth averages less than 2”
2. The live crown ratio (% of foliar mass as part of the total crown area) of the tree is 20% or less

Declining trees in the turf landscape along the boulevard will be removed at the discretion of the DPR Superintendent or designated representative. Declining trees may be retained if the tree is determined to add to the character of an existing grove or has other significant landscape value. Declining tree on the forested hillside will be retained standing as wildlife habitat.

Trees that have achieved this status of decline may be identified for coppicing (cutting at the base and allowing the stump to resprout) if the DPR Superintendent or designated representative determines that such a treatment may produce a viable tree. Trees suspected of infection from phytophthora will not be eligible for this treatment.

Stumps of trees not identified for coppicing shall be removed in turf areas. Stumps will be ground to below grade and backfilled with clean topsoil. Material from trees suspected of infection with phytophthora will be isolated from other material and disposed off-site.

When a tree is removed, it shall be replaced with a minimum of four madrona seedlings. As the seedlings grow, the trees will be thinned to leave the one healthiest, most vigorously growing specimen (if trees are found to not impact views, more than one seedling may remain for each symbol, provided healthy growing conditions are maintained.

3. PLANTING OF NEW TREES

A. Seed Source

Preference will be given to establishing a diversity of clones of disease resistant selections. Secondary preference will be given to seedlings from parents on the site.

B. Culture

Seedlings will be cultured in containers and transplanted as one to three year old seedlings. DPR will grow surplus containerized seedlings to larger sizes as replacement stock for outplanted seedlings. This specification is subject to amendment as new material becomes available.

C. Location

Locations for new madronas are indicated in Appendix E: **Vegetation Management Plan** (separate plan sheets). As other locations for new madronas are sought over time, the preference will be to site them in association with existing groves.

D. Planting

Planting will occur in February or March. For each location to be planted, an area 5 feet in diameter will be stripped of all existing vegetation. No amendment or fertilizer will be added to the existing native soil. The planting area will be tilled to a depth of 9 inches. A planting hole will be dug the same size and depth as the container of the seedling. The tree seedling will be transferred from its container to the hole with minimal disturbance to its root system. The planting area will be watered thoroughly and excessively immediately after installation. The exposed soil surface in the 5’ planting area will be covered with 3 inches of composted wood chips or bark mulch immediately after installation. No mulch will contact the base of the seedling. The seedling will be staked only if it requires support.

E. Establishment Care

For trees planted in turf areas, the 5’ planting area will be fenced with wood snow fencing for the first three years of establishment. The seedling will receive supplemental watering of 3 gallons once per week from

June 15 to September 15 during the first year of establishment. Watering may be suspended for any week when cumulative rainfall exceeds 1 inch. The 5' planting area will be weeded four times from May through August in the first three years of establishment. Stake will be removed when plant can support itself adequately. Mulch will be added as necessary. No additional fertilizer should be necessary in most instances.

F. Pruning

To insure best establishment potential, newly planted trees will remain unpruned for five years. Training of new trees to promote proper scaffold branching may begin after 5 years at the discretion of the DPR Superintendent or designated representative. Since wounding of living tissue encourages infection by cankers (notably Nattrassia) pruning to improve crown form or provide view windows will be restricted. Since increasing the exposure of bark surfaces encourages infection, a maximum of 10% of the leaf area will be removed in any one year, pruning will avoid increasing exposure to prevailing wind and sun (south and southwesterly directions), and remaining branches will be evenly spaced to protect bark surfaces from exposure. Pruning will be timed in late winter or early spring to minimize exposure of the live tissue before new callous growth begins in the spring.

Pruning will comply with ANSI A300 standards for young tree pruning. The arborist performing the pruning will carefully examine the extent of the trunk collar on each branch to determine the optimal site for the final cut. Wounds to live tissue will be treated (e.g. fungicidal dressing, such as zinc chloride paste or Nectec®) to minimize infection at the wound site.

4. RECRUITMENT OF EXISTING SAPLINGS

A. Definition

A sapling will be any tree under 20 foot in height and less than 12 inches in cumulative diameter.

B. Management

Existing saplings on-site may be identified as specimens to be managed for long-term retention. Since wounding of living tissue encourages infection by cankers (notably Nattrassia) pruning to improve crown form or provide view windows will be restricted. Since increasing the exposure of bark surfaces encourages infection, a maximum of 10% of the leaf area will be removed in any one year, pruning will avoid increasing exposure to prevailing wind and sun (south and southwesterly directions), and remaining branches will be evenly spaced to protect bark surfaces from exposure. Pruning will be timed in late winter or early spring to minimize exposure of the live tissue before new callous growth begins in the spring.

Pruning will comply with ANSI A300 standards. The DPR Superintendent or designated representative may specify crown cleaning, crown thinning, crown raising or vista pruning, depending upon the result desired. Wherever possible, a lift bucket, pole pruner or other mean of non-contact elevation will be employed to minimize damage to bark surfaces. The arborist performing the pruning will carefully examine the extent of the trunk collar on each branch to determine the optimal site for the final cut. Wounds to live tissue will be treated (e.g. fungicidal dressing, such as zinc chloride paste or Nectec®) to minimize infection at the wound site.

D. GENERAL GUIDELINES

1. LANDSCAPE MAINTENANCE

The Vegetation Management Advisory Committee (see below) will recommend to the Superintendent its maintenance priorities for the boulevard landscape. Allocation of maintenance resources will be made by the Superintendent or designated representative.

Maintenance workers shall utilize mechanical and hand methods as necessary to trim, prune and remove excess plant materials in a safe and efficient manner. Where maintenance activities can be viewed by the public, special care shall be taken to avoid a "butchered" appearance, i.e., branches shall be neatly trimmed and pruned following the best horticultural techniques as per applicable ANSI A300 standards.

2. NEW SHRUB CONVERSION

Conversion of existing vegetation to new shrubs shall be accomplished using methods and procedures that result in minimal disturbance to the site. Widespread vegetation removal and grubbing shall be avoided. New shrubs may be installed in grubbed "pockets" within existing vegetation. New shrub plantings shall be maintained as needed with watering and weeding. Mowing may be used to reduce competition from existing vegetation until new shrubs become established. Glyphosate herbicides such as Roundup® may be used to convert turf areas to shrub areas or to inhibit older vegetation once new plantings are established.

3. CONTROL OF EXOTIC WEED SPECIES

Control methods for exotic weed species shall emphasize the least toxic approaches available, emphasizing hand-pulling, mowing, girdling and mulching , as recommended by DPR staff. Use of chemical controls will be limited and subject to approval by DPR staff. Herbicides shall be applied by licensed pesticide applicators only, according to label instructions. Whenever possible, control projects shall be in conjunction with replanting projects according to techniques outlined in "New Shrub Conversion," above. Target exotic weed species are:

Table 6.
Exotic Weed Species Targeted for Control

Rubus discolor	Himalayan blackberry
Hedera helix	English Ivy
Polygonum cuspidatum	Japanese knotweed
Ilex aquifolium	English holly
Prunus laurocerasus	English laurel
Clematis vitalba	wild clematis
Cytisus scoparius	Scot's broom
Ulex europaeus	gorse

4. DEBRIS FROM VIEW TRIMMING

- In Area 1, Developed Park Landscape, all trimmings, branches and other debris resulting maintenance activities larger than 12 inches by 2 inches shall be removed from the site, or chipped for use as mulch on site.

- In Area 2, Transition, all trimmings, branches and other debris that are visually apparent from the Developed Park Landscape shall be managed as described for Area 1. All non-visually apparent debris shall be managed as described for Area 3.

- In Area 3, Forested Hillside, trimmings, branches and other debris may remain on site provided that: (1) debris is safely disposed of on the ground plane, i.e.., placed so that it will not slide downhill, fall out of trees, etc.; (2) branches, limbs and trunks are placed across the slope: parallel to the contours, perpendicular to the flow of stormwater.; (3) debris is distributed evenly over the site and not massed in piles.

5. VANDALISM

Subchapter II of the City of Seattle Park Code includes language designed to protect trees from vandalism. Section 18.12.070 states: "It is unlawful for any person...to remove, destroy, mutilate or deface any structure , lawn...shrub, tree...plant, flower.. in any park". Any person convicted of vandalizing vegetation in parks may be punished by a fine in any sum not to exceed Five Thousand Dollars ($5,000.00) or by imprisonment in the City Jail for a term not to exceed one (1) year, or by both fine and imprisonment.

6. VEGETATION MANAGEMENT ADVISORY COMMITTEE

The vegetation management plan will establish a review committee comprised of citizens, city staff, horticultural experts and other interested parties. The committee will be responsible for conducting annual field trips to review whether or not the condition of the vegetation meets the goals and intent of the vegetation management plan. The Superintendent of Parks or designated representative will be responsible for executing the management plan.

E. RECOMMENDED PLANTS

Table 7.
Recommended Plants

6. Phase I Implementation Plan

A. Priority Projects

The vegetation management plan described in Section 5 is a proposed long-term approach. . The success of this plan depends upon development of resources for implementation. Most of the work identified in this vegetation plan is not currently feasible using existing Department of Parks and Recreation operations alone. Voluntary contributions and activities from the community will supplement DPR Resources (see Section 8: **Topics for Further Attention**, below.) A focused effort on critical needs will provide most effective use of recources, and visible successes may create new opportunities for support.

In order to prioritize work needed on the Boulevard, the Department of Parks and Recreation identified eleven project areas that have high need for vegetation management. These projects were evaluated and revised with input from the members of the Citizen Advisory Committee Below are the proposed projects with tasks, which correspond to Appendix F: Phase I Implementation Plan (separate plan sheets).

Table 8
Implementation Projects List

Proj #	description
Project 1: Shrub Conversion with Madrona Plantings, north end of Blvd.	
1.1	cut down overgrown short shrubs
1.2	cut down overgrown tall shrubs
1.3	coppice two maple clumps
1.4	prepare planting areas
1.5	plant 24 new madronas
1.6	plant new shrubs
1.7	temporary fencing
1.8	establishment watering
1.9	establishment brush control
1.10	coppice management
Project 2: Shrub conversion w/Madrona Plantings, south of Glenmont Stairs	
2.1	cut down overgrown short shrubs
2.2	cut down overgrown tall shrubs
2.3	coppice large maple clump
2.4	prepare planting areas
2.5	plant 20 new madronas
2.6	plant new shrubs
2.7	temporary fencing
2.8	establishment watering
2.9	establishment brush control
2.10	coppice management

Project 3: Shrub Conversion with Madrona Plantings north of W. Parkmont Place

3.1 cut down overgrown medium shrubs
3.2 prepare planting areas
3.3 plant 8 new madronas
3.4 plant new shrubs
3.5 temporary fencing
3.6 establishment watering
3.7 establishment brush control

Project 4: Shrub Conversion with Madrona Replacement south of W. Parkmont Pl.

4.1 remove 3 declining & 1 dead madronas
4.2 cut down overgrown short shrubs
4.3 cut down overgrown medium shrubs
4.4 cut down overgrown tall shrubs
4.5 prepare planting sites
4.6 plant new shrubs
4.7 hydroseed lawn
4.8 plant 16 new madronas
4.9 temporary fencing
4.10 establishment watering
4.11 establishment brush control
4.12 coppice management

Project 5: Shrub Conversion with Madrona Replacement north of Montevista Pl.

5.1 remove one declining madrona
5.2 coppice 2 maple clumps
5.3 cut down overgrown medium shrubs
5.4 prepare planting sites
5.5 plant new shrubs
5.6 plant 4 new madronas
5.7 temporary fencing
5.8 establishment watering
5.9 establishment brush control
5.10 coppice management

Project 6: New Shrub and Shrub Conversion with Madrona Replacement at Parking Area

6.1 remove one declining madrona
6.2 cut down overgrown tall shrubs
6.3 prepare sod for shrub planting
6.4 prepare planting sites
6.5 plant new shrubs
6.6 plant new shrubs along fence
6.7 plant 4 new madronas
6.8 establishment watering
6.9 establishment brush control
6.10 coppice management

Project 7: New Shrub and Shrub conversion, With Madrona Replacement south of Parking Area

7.1 cut down overgrown short shrubs
7.2 prepare turf for shrub planting
7.3 prepare planting sites
7.4 plant new shrubs behind fence
7.5 plant new shrubs in front of fence around madronas
7.6 temporary fencing
7.7 establishment watering
7.8 establishment brush control

Project 8: Conversion planting and Madrona Replacement north of 36th Avenue W.

8.1 remove 2 dead madronas
8.2 cut down overgrown short shrubs
8.3 prepare planting sites
8.4 prepare turf for shrub planting
8.5 plant 8 new madronas
8.6 plant new shrubs
8.7 plant new shrubs along sidewalk
8.8 temporary fencing
8.9 establishment watering
8.10 establishment brush control

Project 9: New Shrub and Shrub conversion, With Madrona Replacement south of 36th Avenue W.

9.1 remove 2 dead & 4 declining madronas
9.2 cut down overgrown short shrubs
9.3 prepare turf for shrub planting
9.4 prepare planting sites
9.5 plant 40 new madronas
9.6 plant new shrubs behind fence
9.7 plant new shrubs along sidewalk
9.8 temporary fencing
9.9 establishment watering
9.10 establishment brush control
9.11 coppice management

Project 10: New Shrub Plantings on steep banks along sidewalk, north end to parking lot

10.1 remove existing vegetation
10.2 prepare planting locations
10.3 plant new shrubs
10.4 plant 20 new madronas
10.5 temporary fencing
10.6 establishment watering
10.7 establishment brush control

Project 11: View Trimming of Vegetation

1997 11.1 Trimming of overgrown short shrubs
1997 11.2 Trimming of overgrown medium shrubs
1998 11.3 Trimming of short shrubs
1999 11.4 Trimming of short shrubs
1999 11.5 Trimming of medium shrubs
1999 11.6 Trimming of tall shrubs
2000 11.7 Trimming of short shrubs
2001 11.8 Trimming of short shrubs
2001 11.9 Trimming of medium shrubs
2002 11.10 Trimming of short shrubs
2003 11.11 Trimming of short shrubs
2003 11.12 Trimming of medium shrubs
2003 11.13 Trimming of tall shrubs

Project 12: Slide Area Revegetation (site unspecified)

The scope of these projects is subject to reevaluation on an annual basis through the Vegetation Management Advisory Committee. Projects may be revised according to the changing conditions and needs on the Boulevard.

B. General Management Tasks

While the first phase of implementation will be focused on the above tasks, citizens at-large are encouraged to get involved with Adopt-a-Park activities in any part of the Boulevard. The Vegetation Management Plan provides prescriptive treatments for all areas of the Boulevard through the following specific tasks:

- **Trim vegetation** -- Maintenance Cycle -- ("ESS", "EMS", "ETS" on plan drawings). These projects include trimming of existing low shrub areas every year, trimming of medium shrub areas every two years and trimming of tall shrub areas every four years, according to the criteria described in Tables 1 and 2 (pp. 20-22).

- **Conversion planting** ("ESS", "EMS", "ETS" on plan drawings). These projects include phased, gradual replacement of shrubs with excessive height with new shrub plantings that maintain maximum specified heights, as denoted in the plant list (Table 7).

- **Plant new shrub areas** ("NSS", "NMS", "NTS" on plan drawings).

- **Install new lawn areas** ("New Lawn" on plan drawings).

- **Plant new madronas** (circled "A" on plan drawings).

- **Test treatments for ailing madronas** (circled "C" on plan drawings).

- **Remove dead and dying madronas** (evaluate with Vegetation Management Advisory Committee).

- **Evaluate hazard trees** .

- **Control exotic plants** .

- **Revegetate slide areas.**

- **Maintain shrub areas** by watering, mowing, weeding, etc.

7. Estimated Costs

A. MAINTENANCE

In the past, budget constraints have limited the frequency of view clearing along Magnolia Boulevard. Lengthy intervals between clearing activities exacerbated the impact: (1) vegetation allowed to grow fairly large between intervals is more costly to remove, and (2) the public experiences a significant short-term visual change when larger vegetation is removed. This Vegetation Management Plan proposes to improve the cost-effectiveness of view clearing and lessen the impacts resulting from visual change by increasing the frequency of maintenance in select areas. The Seattle Department of Parks and Recreation (DPR) estimated that, under current conditions, labor for one view clearing project on Magnolia Boulevard costs approximately $20,000.00 (this figure excludes maintenance of the developed park landscape). The budget currently allows for one view clearing project every four years. The proposed Vegetation Management plan increases the cost of maintenance over the four year period by approximately fifty percent as shown in Table 9.

Table 9.
Estimated View Clearing Labor Costs

Area	Size	Unit Cost	Cost	Frequency	Total Cost /4 years
Small Shrub *	18,000 SF	0.08/SF	$1,440.00	Once / year	$5,760.00
Medium Shrub *	84,000 SF	0.09/SF	$7,560.00	Once every two years	$15,120.00
Tall Shrub	124,000 SF	0.12/SF	$14,880.00	Once every four years	$14,880.00
TOTAL					$35,760.00

**Does not include new plantings which would not need extensive pruning or regular maintenance for developed park areas.*

B. NEW PLANTINGS

The proposed plan would convert about 97,000 SF of lawn to understory. Cost of new plantings would range from $150,000.00 to $200,000.00 if installed by contractor under public bid process. The maintenance of the new shrub areas, once established, would be less than the cost of view pruning in the areas of existing vegetation because the shrubs would be selected for height characteristics. However, for the first four years, the new shrub areas would require additional maintenance. This cost can be partially offset by reducing the amount of weekly mowing.

8. Topics for Further Attention

The scope of the Vegetation Management Plan is limited to addressing the issues of landscape and vegetation management for the southwest side of Magnolia Boulevard. Non-vegetation elements of the boulevard that were discussed by the Citizen's Advisory Committee (CAC) are listed below with a description of the CAC's opinion on each topic. These include:

- Control of groundwater and storm drainage where practical and would help slope stability.

- Landscape development on the northeast side of the boulevard.

- Traffic speed.

- Implementation strategies: The CAC expressed a desire to consider optional implementation strategies. The following lists potential resources to be considered.

  Department of Parks and Recreation
  DPR West Central District (turf and shrub area maintenance, small projects)
  DPR Forestry Unit (tree pruning and removal)
  DPR Nursery (propagation of madronas, shrubs)
  Capital Projects (CIP) - contracted or in-house
  Conservation Corps - job training program with DPR, paid with CIP money
  Department of Corrections crew

  Neighborhood
  Neighborhood Adopt-a-Park volunteers
  Adopt-a-Park agreements with neighborhood residents (for a maintenance fund)
  L.I.D.
  Funding from tour bus companies
  Neighborhood Matching Fund - neighborhood matches with time or money or in-kind donations
  Volunteer groups - schools, churches, scout groups, etc.

- Pedestrian Circulation: The sidewalk on Magnolia Boulevard should be considered the primary pedestrian circulation route.

- Pathways and Stairs: Existing stairs and paths should be maintained as community thoroughfares. Views from stairs and paths should not be a consideration in vegetation management.

- Signs: Permanent signs for park rules and interpretation should be limited to the vicinity of the off-street parking area. Signs should be located and designed to minimize visual intrusion. Temporary signs may be used to inform the public of on-going maintenance activities.

• Provisions for Maintenance and Improvements**:** Reasonable priorities shall be established for the work tasks outlined in Section 6: **Tasks**.

• Management of dog wastes: Waste receptacles should be provided, at a minimum, at each end of the boulevard and at the parking lot.

• Parking: Existing on-street and off-street parking should be maintained. No additional off-street parking should be provided.

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Appendix A: Meeting Notes

PROJECT: Magnolia Boulevard Vegetation Management Plan

DATE: Comments received April 22, 1996 public meeting

Stabilization through drainage management is needed

Vegetation management strategy - thinning vs. cutting down - especially big-leaf maple

Check historic records for land donation to the Parks Department in the 1700-1900 blocks

Any plans for the area west of W. Galer - is it a designated view point?

Plant lower growing trees

People from outside the neighborhood come to view the bluff

Remember we don't know everything about the relationship between wildlife and the madrona tree

Magnolia bluff madronas offer a unique opportunity for study and research

Madronas are very sensitive - don't like "golf courses"

Is it possible to restore the trees - they are integral to the scenic beauty and sense of well-being

What is rooting depth of trees and other vegetation on the bluff?

Are the trees being designated as historical monuments? - nothing is moving in that regard - the Parks Dept. would support landmark status for the forest but not for individual trees.

Are trees that look dead really dead? - best time to evaluate them is in August

Pruning creates pathways for pathogens, so current policy is to leave dead branches in the trees.

Replace dead trees

What are costs for maintenance? - one view trimming = $20,000

Underground wiring in 2500 block?

Remember dead trees - they are also good wildlife habitat

Is there any possibility that tour companies would contribute to financing the maintenance/renovation of the boulevard park?

Is it possible to trim and/or remove madronas.

Benches should serve as resting sites - spaced about 1 to 1-1/2 blocks apart and at top of stairs

Joggers have beaten a path

Common walking route is to park on boulevard and make circle down to bottom and back up

Residents use two-mile loop through "pits"

Vandalism includes a dump site between bridge and first house and picking flowers

Vegetation changes observed over past 30 years:
- there were more trees and larger trees
- there was less lawn
- the view was visible while driving through
- the trees framed the view
- vegetation composition has changed from deciduous to evergreen, which has impacted the view
- forest was mix of dogwood, madrona and big-leaf maple
- there was more land between the boulevard and the steep bank

Fence was extended in 1988 - it used to be obscured by vegetation

Magnolia Boulevard is an active park - keep opportunity for active use

Amenities should utilize natural materials and look non-institutional

Balance risk vs. aesthetics

Historic feel was low and brushy - less grass

Lawn is good for running and jogging

On east side, park property was lost when the boulevard was paved

Road is too wide - encourages fast autos

Logs are edge of old boulevard

Olympic views from 2300 block are obscured by big-leaf maples

Pruned trees are too dense

Want seasonal foliage change

Consider how tent caterpillars affect tree health

Recognize Olmsted heritage in management plan

Consider policy regarding private use adjacent to public land and future of east side of boulevard

Vegetation plan should be integrated to include both sides of boulevard to keep Olmsted look, including:
- open view corridor
- natural vegetation
- framed views

Madronas grow best where they are unmanaged

Don't want "wall" of trees

Tours also focus on viewing homes along boulevard and they appreciate the home landscaping

Replace Madronas with rhododendron

Remember ecological perspective

Wildlife vs. views - consider:
herbicide applications
pruning timing

Plan for entire boulevard

Slope stabilization should be done before vegetation management plan

Study area has three distinct segments - how to define S.A. boundary at ravine

Pruning debris left on slope - what is impact on slope stability

Need better maintenance than under current practice

Remember history of road widening and development along boulevard and previous commitments/agreements

Consider safety along Perkins Lane and large trees on slope

Print notice of Advisory Committee Meetings in local paper

Avoid stabilization measures similar to area above marina

Cut down sick and dying trees

Seattle Tours - clients like madronas

Maintenance funding
low ground cover at tree bases
gradually replace with low growing plants to minimize trimming

Dandelion control

Top growth vs. root mass - balance uptake and weight

END NOTES

Project: Magnolia Boulevard Vegetation Management Plan
Comments from the public meeting, March 23, 1998

1. What is the formal approval process?
   Explained that the plan would be presented to the Board of Park Commissioners for a recommendation to the Superintendent. Then the Superintendent will decide whether or not to accept the plan.

2. Are blackberries part of the plan?
   Explained that blackberries are one of the exotic invasive weeds listed to be controlled, but that there are no maintenance dollars to provide that.

3. Are maple trees at 1414 Magnolia Blvd going to be trimmed?
   Explained that this is outside the scope of the plan, referred citizen to Jon Martin, Senior Urban Forester.

4. Anything going to be done about young maples and hazelnuts?
   Explained that we would welcome Adopt-a-Park volunteers to maintain the shrub heights according to the plan. Presented sign up sheets for different levels of possible involvement.

5. Every uphill shrub that is cut should be replaced with other species, e.g. King County is a plant source.
   Clarified that the citizen was talking about routine trimming of the Boulevard. Explained that the old shrubs resprout prolifically, and would crowd out anything newly planted without intensive management.

6. Told DPR that if they cut more trees above her house, she would come out with a shotgun, if she had one.

7. Is there vegetation that will preserve slope stability?
   Explained that there are plant selections indicated in the plan for slope control. Noted that bigleaf maple and madrona are two of the best for soil reinforcement.

8. DPR should keep the ball rolling – request own maintenance staff
   Explained that Paul West will be project manager on implementation projects through the end of this year.

9. Why create expansive view, shouldn't we maintain openings created by slides and not create more? Visitors can enjoy view through existing trees.
   Explained that there is no intention of creating vast openings, and that there will be trees spaced along the entire Boulevard. Clarified that there is no intention of removing any trees for views, other than those that are sick or dying. Those removed trees will be replaced.

10. Would top and bottom of slope be addressed in the same project? Is it financial consideration?
    Explained that most of the implementation projects are intended for either the top of the slope or slide areas. Acknowledged that it is a financial consideration.

11. Want to cut shrubs at the top of the slope. When can I start?
    Explained the process of signing up for Adopt-a-Park, what services and support can be offered.

12. We've already signed up and want to start.
    Agreed to report the interest to the Parks Board and Superintendent to help expedite the Plan.

13. What provision has been given to the architectural character of the Boulevard? Fences are ugly, they don't have to be a wall, could enhance the landscape.
    Clarified that the plan has addressed aesthetics of the chain link fence by locating shrubs in front of them. Explained that the fencing at the slide area is probably going to be there for a while, because the Perkins Lane situation is still in litigation.

14. Are you going to continue fencing some trees?
    Explained that trees were fenced only to keep people away from slide areas.

15. If we do clean up, will DPR pick up the waste?
    Explained that the Adopt-a-Park program can arrange for waste pickup. If large amounts of waste are generated, it may impact the budget of the implementation projects.

16. Every day, Mrs. Bartells picks up litter.

17. Any research into dog waste damage to trees?
    Suggested that it might. Dog wastes do burn turf, dog foods have high salt content.

18. Talked about dog waste receptacles. Some people go back to pick up after their dogs.

19. After the plan is adopted, is there a continuing committee to advise?
    Explained that a Vegetation Management Advisory Committee will be convened each year to develop a work program for the Boulevard, that Paul West will be project manager through the end of this year.

END NOTES

Appendix B: Review of Magnolia Boulevard Vegetation Management Plan by Shannon and Wilson

Appendix C: Slope Stability and Arbutus Menziesii: A Summary of Research in Magnolia Park, Seattle, Washington by Kathy Parker and Clement W. Hamilton

Appendix D: Measurement of 1997 View Windows and Obstructions

Start (ft)	Stop (ft)	W/O	Window	Obstruct	APPROX START LOCATION CTR	NOTES	% VIEW
0	52	O	0	52		start at water meter	
52	82	W	30	0	1602		
82	94	O	0	12			
94	101	W	7	0			
101	107	O	0	6			
107	160	W	53	0			
160	166	O	0	6			
166	195	W	29	0			
195	200	O	0	5			
200	216	W	16	0			
216	231	O	0	15			
231	255	W	24	0			
255	258	O	0	3			
258	296	W	38	0			
296	309	O	0	13	1626		
309	319	W	10	0			
319	330	O	0	11			
330	357	W	27	0			
357	364	O	0	7	1636		
364	369	W	5	0			
369	376	O	0	7			
376	377	W	1	0			
377	421	O	0	44			
421	426	W	5	0			
426	504	O	0	78			
504	517	W	13	0			
517	554	O	0	37			
554	616	W	62	0			
616	643	O	0	27	1654		
643	658	W	15	0			
658	689	O	0	31			
689	707	W	18	0			
707	735	O	0	28			
735	764	W	29	0			
764	782	O	0	18			
782	789	W	7	0			
789	795	O	0	6			
795	802	W	7	0			

802	822	O	0	20	1670		
822	857	W	35	0			
857	871	O	0	14			
871	887	W	16	0			
887	925	O	0	38	36th Ave W.		
925	951	W	26	0			
951	991	O	0	40			
991	997	W	6	0			
997	1032	O	0	35			46%
1032	1092	W	60	0			
1092	1115	O	0	23			
1115	1145	W	30	0			
1145	1178	O	0	33	1714		
1178	1564	W	386	0			89%
1564	1590	O	0	26		topography blocks view	
1590	1605	W	15	0	1918	topography blocks view	
1605	1628	O	0	23		topography blocks view	
1628	1651	W	23	0		topography blocks view	
1651	1670	O	0	19	1928	topography blocks view	
1670	1682	W	12	0		topography blocks view	
1682	1710	O	0	28		heritage tree	
1710	1740	W	30	0			
1740	1764	O	0	24			
1764	1805	W	41	0			
1805	1824	O	0	19			
1824	1957	W	133	0			
1957	1988	O	0	31			
1988	2006	W	18	0			
2006	2043	O	0	37			
2043	2065	W	22	0			
2065	2083	O	0	18			57%
2083	2207	W	124	0			
2207	2221	O	0	14	1970		
2221	2257	W	36	0			
2257	2305	O	0	48			
2305	2377	W	72	0			
2377	2406	O	0	29	Montavista Pl. W		
2406	2523	W	117	0			
2523	2570	O	0	47			
2570	2653	W	83	0	2312		
2653	2740	O	0	87	2324		
2740	2746	W	6	0			
2746	2766	O	0	20			
2766	3028	W	262	0	2330		

3028	3033	W	5	0			
3033	3040	O	0	7			
3040	3047	W	7	0			
3047	3059	O	0	12			
3059	3077	W	18	0			
3077	3102	O	0	25			
3102	3140	W	38	0			
3140	3217	O	0	77	2368		
3217	3225	W	8	0			
3225	3237	O	0	12			
3237	3258	W	21	0			
3258	3281	O	0	23			
3281	3328	W	47	0			
3328	3354	O	0	26			
3354	3497	W	143	0	Parkmont Pl. W		
3497	3515	O	0	18			
3515	3576	W	61	0	2400		
3576	3601	O	0	25			
3601	3632	O	0	31	2412		
3632	3680	O	0	48			
3680	3696	W	16	0			
3696	3796	O	0	100		cedar, fir	
3796	3810	W	14	0			
3810	3839	O	0	29			
3839	3856	W	17	0			
3856	3869	O	0	13			
3869	3965	W	96	0			
3965	4000	O	0	35	2445	cedar	
4000	4180	W	180	0			
4180	4200	O	0	20	Glenmont Stairs		
4200	4325	W	125	0			
4325	4352	O	0	27			
4352	4568	W	216	0	2514		
4568	4596	O	0	28	2550		
4596	4605	W	9	0		ends at corner of driveway	68%
4605							
	TOTALS		2970	1635	64%		

APPENDIX E: VEGETATION MANAGEMENT PLAN (separate plan sheets)

APPENDIX F: PHASE I IMPLEMENTATION PLAN (separate plan sheets)