



GLACIER BAY LODGE COMPLEX HISTORIC DISTRICT VEGETATION TREATMENT AND PRESERVATION MAINTENANCE PLAN

Glacier Bay National Park and Preserve
Park Cultural Landscapes Program

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GLACIER BAY NATIONAL PARK AND PRESERVE

HISTORIC CHARACTER AND DESIGN INTENT
VEGETATION EXISTING CONDITIONS
TREATMENT

Prepared by
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June 2018



Glacier Bay National Park and Preserve

Glacier Bay National Park and Preserve concurs with the recommendations of the Glacier Bay Lodge Complex Historic District Vegetation Treatment and Preservation Maintenance Plan.

Philip Hooge
Superintendent
Glacier Bay National Park and Preserve

Date

INTRODUCTION

Project Description

This vegetation treatment and preservation maintenance plan for Glacier Bay Lodge Complex Historic District documents existing vegetation conditions, design intent, treatment objectives, and maintenance recommendations. The vegetation management plan can serve as a resource to design and implement landscape maintenance operations within the historic district. A site visit in the summer of 2017 to complete a Comprehensive Condition Assessment of the Glacier Bay Lodge Historic Grounds and Viewshed (FMSS Location- 231642) led to the creation of this abbreviated plan. Corey Dusin (Park FMSS Specialist), Dustin Hazen (Trails Lead), Fielding Link (ARO Cultural Landscapes Program Manager), Kelsey Mork (ARO Historical Landscape Architect), and Corinna Welzenbach (WASO Historical Landscape Architect and ISA Certified Arborist) completed a field inspection and identified deferred maintenance within the historic district landscape. The findings from the facility Comprehensive Condition Assessment served as a basis for this plan. In addition, the following park and regional staff reviewed the plan and provided guidance: Charles Carrig (Cultural Resources Manager), Sara Doyle (Outdoor Recreation Planner), Lisa Etherington (Chief of Resource Management), Ken Hutchison (Chief of Facility Management), Marty Nogues (Maintenance Staff Member), Whitney Rapp (GIS Specialist), Lewis Sharman (Ecologist), Zach Babb (ARO Outdoor Recreation Planner), Grant Crosby (ARO Historical Architect), Melanie Hess (ARO Cultural Landscapes Program Intern), and Kelsey Mork (ARO Historical Landscape Architect).

The National Park Service (NPS) has required that native plants be used in landscapes around developed areas in Natural Resource focused parks since the 1920s. A common misconception, both of park service staff and concessionaire staff, is that native vegetation in a designed historic landscape does not require maintenance. However, as is apparent at Glacier Bay Lodge Complex Historic District, native plants in developed areas often require treatment. The disturbed landscape of a developed area may not mimic natural conditions, and the plant response to growing in disturbed sites may result in maintenance needs both for plant health and aesthetic reasons. The vegetation within the historic district could, thus, be thought of as a naturalistic native plant garden rather than a wild forest and, using this plan, managed accordingly.

Cultural Landscape Description

Glacier Bay Lodge Complex Historic District is located in southeast Alaska, 6.5 miles to the northwest of Gustavus. The lodge and 16 associated multi-unit cabins sit on the south shore of Bartlett Cove near the entrance to Glacier Bay within the boundaries of Glacier Bay National Park and Preserve. The lodge complex was originally constructed to increase visitor accessibility and remains the only on-land visitor lodging available within the Park (cruise ships house the

majority of visitors, and some housing is available at lodges within the Preserve). Although the lodge was first proposed in 1945, the project was not realized until former National Park Service Director Conrad Wirth's Mission 66 park development program. The lodge construction began in 1965 and it was opened in June of 1966. The lodge complex was constructed in two main phases: the lodge and eight cabins containing a total of 20 bedroom units (1-8, 22-27, and 51-56) were constructed in 1965-66, and an additional eight cabins containing 36 units (9-21 and 28-50) and a utility building were constructed in 1972-73. The construction of the lodge complex provided a Mission 66 version of a culturally iconic park lodge for Glacier Bay National Park and Preserve and succeeded in increasing visitation to the relatively remote park.



Figure 1. Interior courtyard (GLBA Archives, c.1976).

Landscape Context

The Glacier Bay Lodge Complex sits on a glacial moraine. The lodge itself is located on the edge of a bench in the gentle slope rising from Bartlett Cove. The cabins are distributed to the northeast and southwest of the lodge. The site was glaciated as recently as the late 1700s and post-glacial (isostatic) rebound affects the landscape, a process where the land rises after the weight of the glacier has been removed. The inch of vertical uplift of the land occurring per year has caused the high tide line to recede away from the lodge complex. Since lodge construction, the vegetated area between the beach trail and the ocean has expanded as a result of uplift and will continue to expand in the future. Several glacial erratics, which were left during site grading, are located in the historic district. These large rocks provide visual interest and are a reminder of the glacial past.

Bartlet Cove is a successional landscape that is roughly 250 years old, and considered a young forest. It is a spruce dominated forest that is very dynamic and still-changing. A successional forest in southeast Alaska reaches full manifestation at 1,000 years old and is typified by a diverse old-growth forest of western hemlock, Sitka spruce, and a yellowcedar mosaic including poorly



drained muskegs, fens, and bogs.

The site is located in a temperate rainforest; Bartlett Cove receives about 70 inches of precipitation a year. Due to its location on the water the site is cool in the summer (highs only in the 50s and 60s) and relatively warm in the winter (lows of 25-40° F). The lodge is open from late May to early September when the weather is the warmest.

Site features were designed with consideration of the climate. The front deck of the lodge is covered by the roof overhang. Also, the roof of each cabin covers the boardwalk, keeping the entrance to each building dry. The raised boardwalks allow visitors to easily walk across wet ground. Rot-resistant cedar siding and shakes were used to construct the cabins.

Related Management Documents

The 2011 Cultural Landscape Inventory, which described the site history and defined contributing historic resources, serves as a foundation for this document. In addition, Regional Historian Kathleen Wackrow completed a Historic Structure Report (HSR) for the Glacier Bay Lodge Complex Historic District in 2018. The HSR recommendations focus on treatments for buildings and structures within the historic district, but also provides guidance relevant to landscape treatment. Particularly, the HSR includes further information about landscape development and recommends establishing guidance for view management in front of the lodge. This document addresses viewshed treatment and maintenance and serves as a complementary resource to the HSR for managing the historic district. Future documentation pertaining to the historic district will include a Frontcountry Management Plan. The Frontcountry Management Plan should recognize the vegetation within the district as a contributing cultural resource and develop recommendations aligned with the Cultural Landscape Inventory, Historic Structures Report, and Vegetation Treatment and Preservation Maintenance Plan, in consultation with the Regional Historical Landscape Architect.

HISTORIC CHARACTER AND DESIGN INTENT

The Seattle-based architecture firm John Morse and Associates designed the lodge complex. The firm received an Honor Award from the Seattle Chapter of the American Institute of Architecture (AIA) in 1967 for the project, followed by the Alaska Chapter of AIA Design Excellence Honor Award in 1974. Morse integrated the natural and built environments in his design, arranging the cabins upon the upper hillside to create vegetated courtyards surrounded by boardwalks. The lodge complex exemplifies Pacific Northwest regional modernism and the transition from Rustic to Park Service Modern architectural styles. While the design intent for the site's buildings and structures is more explicit, the landscape design reflects that of the native environment. NPS developments during the Rustic period and Mission 66 generally utilized native plantings to integrate the buildings with the natural environment. The Glacier Bay Lodge Complex Historic District development included a combination of installed native plantings with natural revegetation of the site after construction.

Planting Plan

In 1965, the construction site was cleared of vegetation and graded. After the first phase of construction in August of 1966, the NPS San Francisco Planning and Service Center created a planting plan to revegetate disturbed areas. The plan called for planting a combination of spruce, alder, blueberry, salmonberry, and currants around the lodge and original eight cabins. The planting plan included spruce in the center of the courtyards with mixed shrub groupings on the edges, adjacent to the boardwalks. The spruce on the planting plan were distributed 15 feet on center and the shrubs were to be planted from 3 to 6 feet on center, depending on the species.

Because landscape construction documents have not been archived, the extent of the implementation of the planting design is unknown. The park has installed landscape plantings at the site, likely partially implementing the planting plan. Currently the plants described in the planting plan are distributed throughout the historic district. However, all of the plants on the planting plan grow in the adjacent forest and could have naturally volunteered on the site. While the overall plant palette remains similar to the planting plan, if the plan was completed, only some of the plants have survived and certain species (especially alder) have gained dominance in areas.

The Secretary of Interior's Standards for the Treatment of Historic Properties state "Designs that were never executed historically will not be constructed." In this case, the plan, even if only partially implemented, provides a perspective on how the landscape was envisioned during the period of significance. The NPS San Francisco Planning and Service Center landscape architects, who created the planting plan, designed an open forested native plant landscape, echoing the adjacent habitat and following principles of Mission 66 and Rustic NPS design. The planting plan informs the character objectives and treatment recommendations in this document.

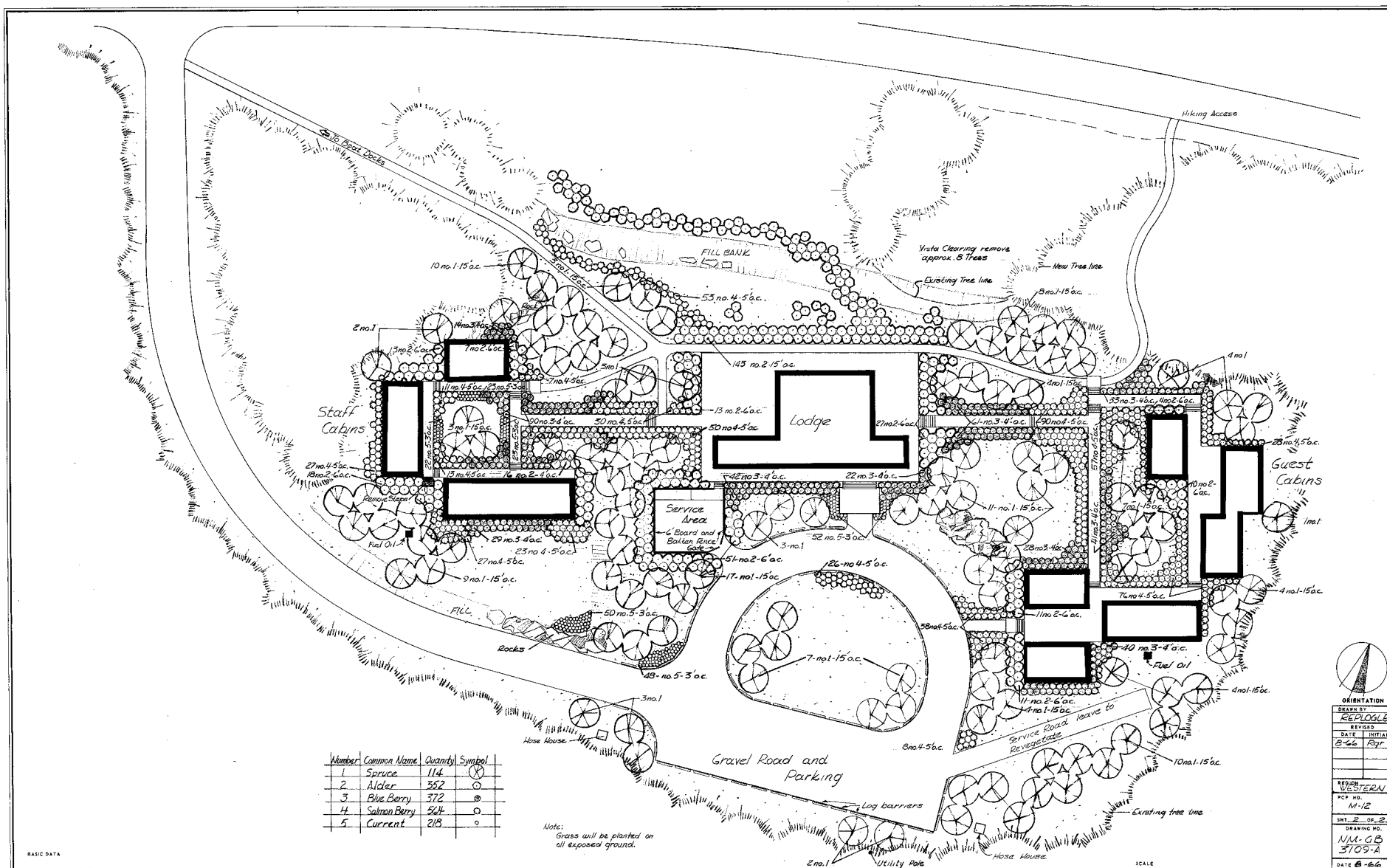


Figure 2. Glacier Bay Lodge Planting Plan, NPS San Francisco Planning and Service Center (NPS, 1966).

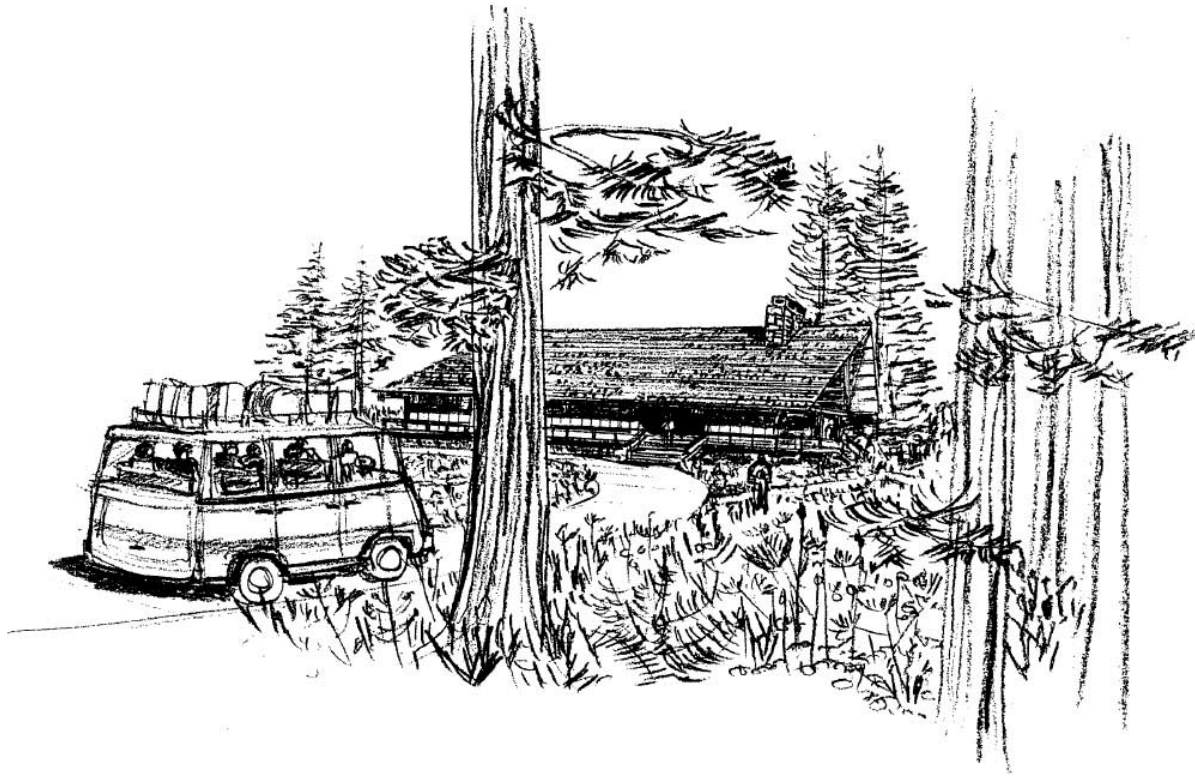


Figure 3. Schematic Drawing of Lodge with Vegetation (John Morse & Associates and Metcalf & Eddy Inc., 1973).

Views

Views and vistas from the lodge and cabins are a key element of the site design. The elevation changes on the site create many opportunities for views onto Bartlett Cove and the extended landscape. The 1960 request for proposal for the lodge indicated that the site “will provide a panoramic view of Bartlett Cove, Glacier Bay, the Beardslee Islands, and the Fairweather Range culminating in Mount Fairweather, with an elevation of 15,320 feet providing an impressive and awe-inspiring background”(NPS, 1960, 4). The primary designed view extended from the lodge and deck unobstructed to the water and more distant landscape. In addition, the cabins were staggered on the hillside in order to preserve both views and privacy (Morse, Metcalf, & Eddy, 1973, 29). The 1966 planting plan designated a vista clearing area to the north of the lodge. In a 1996 letter from John Morse to Superintendent Jim Brady, Morse emphasized the importance of views in site planning. He encouraged the park to develop a longterm plan for view management to restore the 1960s era views from the lodge. Based on this evidence and the design and siting of the buildings, Morse and the NPS designers intended to establish maintained views and vistas between the lodge and the water and between the ocean facing cabins and the water.

In addition, to the water-facing views, the designers planned for views from the non-water facing cabins into the forest. Schematic drawings from 1973 by John Morse & Associates and Metcalf & Eddy Inc. depict the vision for how the buildings would integrate into the landscape. In the

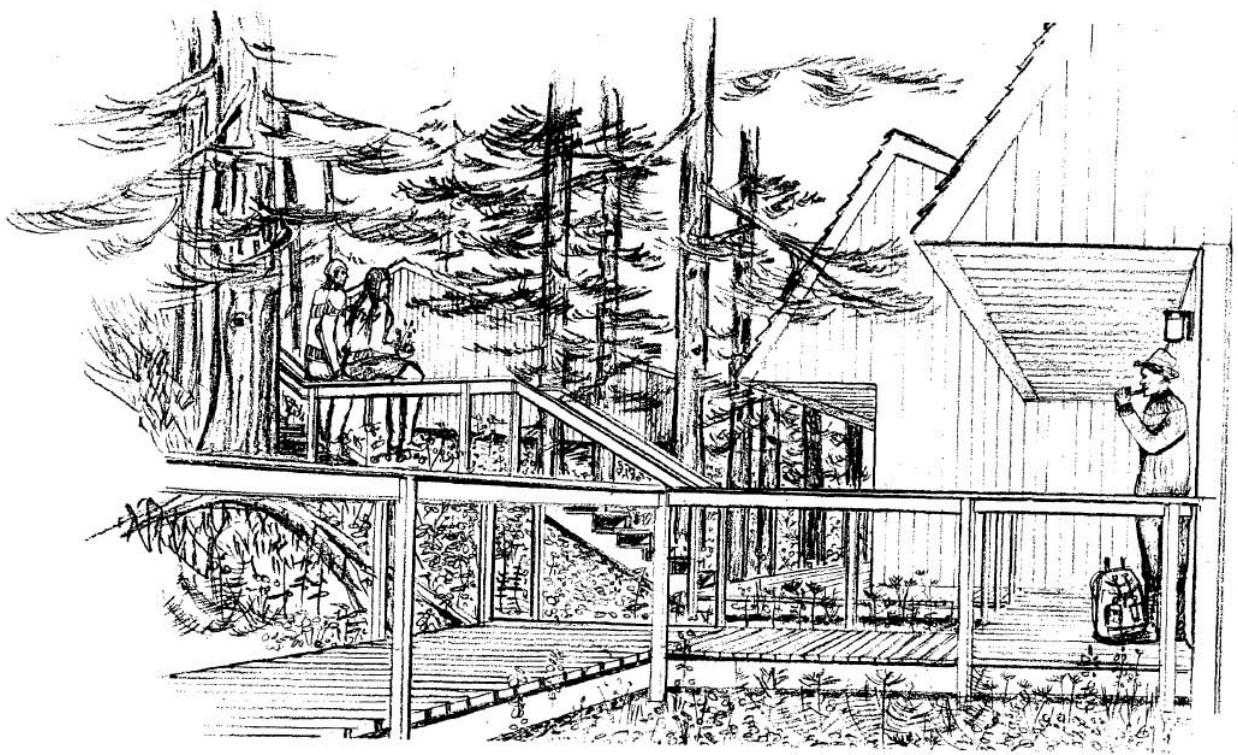


Figure 4. Schematic Drawing of Cabins with Vegetation (John Morse & Associates and Metcalf & Eddy Inc., 1973).

drawings, an open forest surrounds the buildings. The cabins and lodge are visible from one another through the open forest vegetation. These drawings indicate the intended open forest character of the site providing for internal views and views into the adjacent forest.

Character Objectives

The character objectives for a designed historic landscape are based on the historic character of the site after design implementation, as well as current management objectives. Vegetation is a dynamic biotic resource, and as such, the conditions at the end of the period of significance do not determine the desired character objective for the landscape. Plants should generally be allowed to reach their full-size, while managing change to preserve character defining features of the site (e.g., views) through pruning and thinning. Based on its historic character, the four following objectives can be established for the Glacier Bay Lodge landscape:

- Open views towards the water should be retained and maintained from the lodge.
- Filtered views from the ocean-facing cabins should be retained and maintained.
- The site should be planted with only native vegetation.
- Buildings should be integrated into the landscape through topography, the use of natural materials, limited roads and parking, and vegetative screening.

In addition, the following objectives can be established, based on the 1966 planting plan and

desired conditions for guests at the lodge and cabins:

- Courtyards should offer filtered views through the native forest, maintaining a sense of privacy without a sense of confinement.
- No shrub species should be allowed to dominate the landscape, and a diversity of plant species should grow within the site.
- Trees and shrubs should be maintained in a naturalistic form and those retained should be allowed to reach their full maturity.
- The transitions between vegetated areas should be naturalistic, avoiding linear transitions
- Maintain vegetative screening of non-historic structures both within and adjacent to the historic district. Do not install additional unscreened structures.

These main objectives for the desired vegetation character provide a clear outline for work planning. The historic site currently achieves some objectives (e.g., native vegetation), while in other cases, significant work is required to achieve the desired character (e.g., filtered views in courtyards).



Figure 5. Dense spruce along boardwalk, view to northeast (NPS, 2017).

VEGETATION EXISTING CONDITIONS

The Glacier Bay Lodge landscape setting is a Sitka spruce/western hemlock mixed forest. All forest vegetation has established since the glaciers last receded from Bartlett Cove in the late eighteenth century. Therefore, the forest is dominated by Sitka spruce, a sun-tolerant species that is typical of disturbed areas, with colonies of Sitka alder and black cottonwood in more recently disturbed and wetter areas, respectively. The native understory is comprised of a variety of small shrubs and perennials, including devil's club, early blueberry, salmonberry, and cow parsnip. As isostatic rebound occurs, the high tide line continues to recede relative to the lodge complex, creating additional shoreline habitat between the beach trail and Bartlett Cove.

With the exception of specimen trees preserved during site development, the vegetation that currently exists on the Glacier Bay Lodge landscape was either planted by the NPS using native plants following construction, by the lodge operator in the following years, or has volunteered from the surrounding forest. The establishment of vegetation since the major construction periods in 1965-66 and 1972-73 aligned the site with the design intent that was strongly based on the integration of the buildings with the natural environment.

The aesthetic qualities of the landscape plants within the historic district vary. In some courtyards, dense young spruce with dead lower branches create an enclosed feeling. While in the cleared viewshed in front of the lodge, the low shrub layer contrasts with the adjacent forest, creating an abrupt edge.

Many of the courtyards and vegetated areas share similar conditions. For example, the western courtyards and the largest eastern courtyard all contain a dense young spruce canopy. The majority of the main courtyards on the upper hillside show great evidence of over-densification due to a lack of thinning. More mature Sitka spruce and hemlock trees preserved during construction grow on the eastern hillside between cabins 28-39 and cabins 9-21, creating an open understory.

The primary site view is from the lodge to Bartlett Cove and the Fairweather Range. The water-facing cabins on the edge of the hillside and hillside slope offer filtered views. GLBA maintenance staff has periodically removed plants between the lodge and the beach trail, and cabins 9-21 and the beach trail to preserve views. Thus, these areas retain an open character.

The park has worked to preserve the views from the historic district. During planning for the Whale Skeleton Shelter and the Huna Tribal House views were carefully considered. Both buildings were sited to not impact historic views from the lodge and cabins.

REHABILITATION TREATMENT

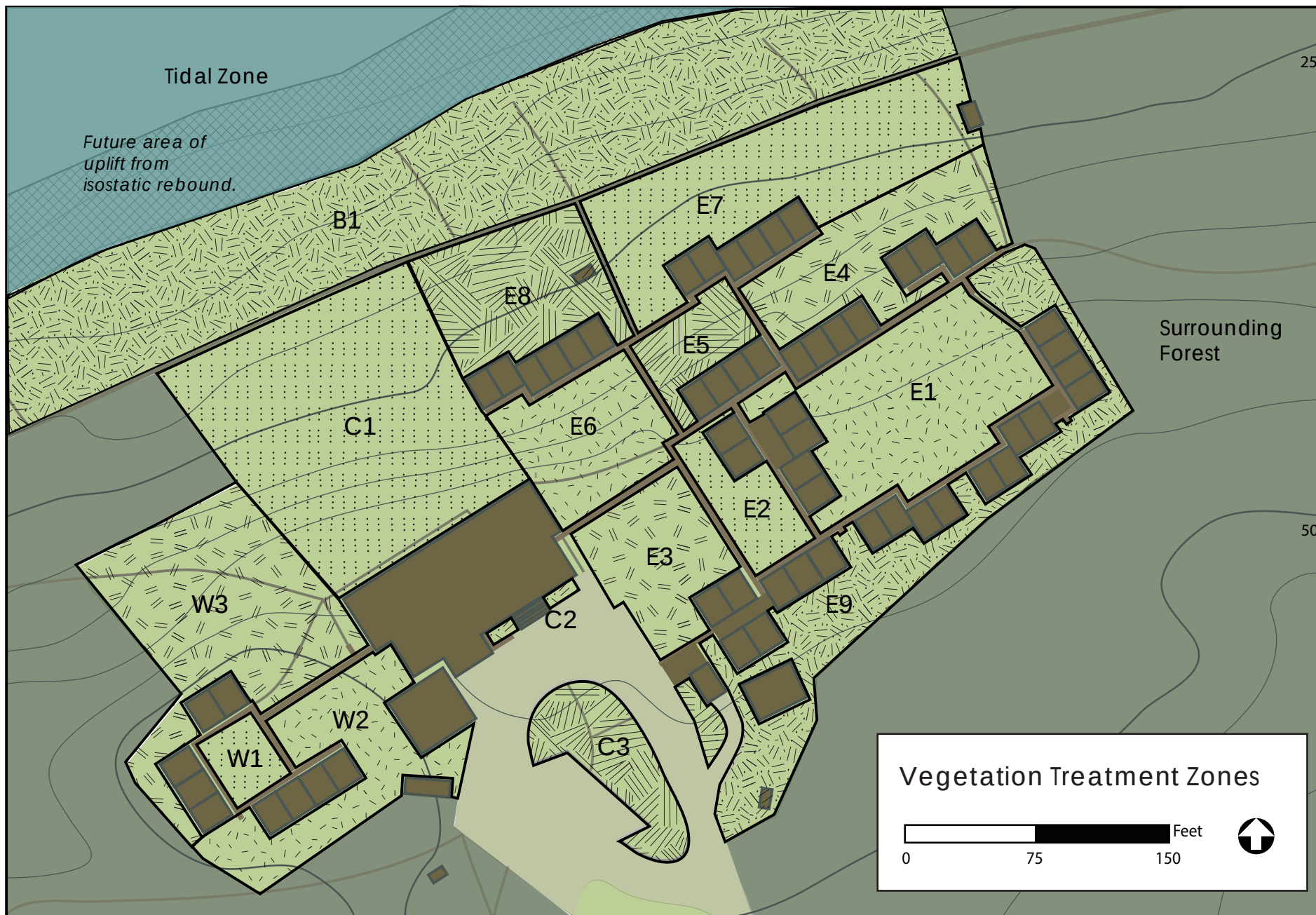
Vegetation management at the GLBA Lodge Complex consists of the two following components: Rehabilitation Treatment and Preservation Maintenance. Rehabilitation is one of four treatments outlined in *The Secretary of Interior's Standards for the Treatment of Historic Properties*.

Rehabilitation accommodates site changes and, therefore, is the most appropriate treatment for the historic district's dynamic vegetation. This treatment consists of bringing the landscape into the desired condition by identifying and completing primarily deferred maintenance tasks. Preservation maintenance follows the initial landscape treatment. It serves to perpetuate the character achieved as a result of larger initial interventions.

The rehabilitation treatment would be a multi-phase project that would bring the landscape into a condition that could be more consistently maintained by the concessionaire and park staff. The rehabilitation includes all of the baseline thinning and large tree removal, as well as infill planting in areas that have been disturbed or lack diverse vegetation. Vegetation treatment can be completed incrementally in order to balance workload and avoid drastic landscape alterations.

The individual courtyards and open spaces have unique vegetative characteristics, thus, for this plan the site was divided into 16 treatment zones (See Vegetation Treatment Zones map). Sections W1, W2, and W3 represent the western courtyard and adjacent landscape where employee housing is located. Sections C1, C2, and C3 are located in the center of the landscape in front of and behind the lodge. Sections E1 to E9 are located in the eastern section of the landscape from the southeast forest boundary down to the beach trail. Lastly, the beach vegetation to the north of the beach trail is landscape treatment zone B1. Each zone has specific treatment needs including a combination of alder pruning and removal, cottonwood thinning and removal, spruce thinning, infill plantings, view edge feathering, and baseline pruning. The description below of landscape work in each category provides general guidance for experienced arborists, landscape gardeners, trail maintenance staff, and general maintenance staff to complete the landscape rehabilitation.

Treatment Summary by Zone	
Treatment Task	Vegetation Zone
Alder Pruning	W1, C3, E1, E2, E3, E4, E5, E6, E7, E8, E9, B1
Alder Removal	C1, E7, E8, E9, B1
Spruce Thinning	W1, W2, W3, E1, B1
Cottonwood Thinning and Removal	W2, C3, E2, E3
Infill Plantings	W2, C2, C3, E3
View Edge Feathering	C1, E7, E8
Baseline Pruning	C3



Glacier Bay Lodge Complex Historic District
Vegetation Treatment and Preservation Maintenance Plan

Alder Pruning and Removal

Sitka alder, a pioneer species, grows in dense thickets. In open areas, alder often dominates smaller, less aggressive shrubs. In order to establish the filtered character of the site and avoid species domination, alder thickets require pruning. The pruning budget should be adjusted according to the density of the thicket; denser thickets require more branch removal. Alder is a cane growing plant, rather than a tree-like shrub. Cane growing plants do not have primary “trunk” structures and their growth extends from the base of the plant. The rehabilitative pruning process for cane growing shrubs consists of removing approximately 1/3 of the plant branches (canes) down to ground level. Cane growing plants do not respond well to height reduction and should be allowed to reach their natural height. If a reduction in height is desired, thinning and/or removal are the preferred alternatives. Large thickets can be reduced in size by cutting entire plants down to ground level around the thicket edge; however, this will not likely kill the plant, and will require continued maintenance. Filtered views can be created through alder by reducing the number of canes more heavily in periodic locations along a thicket. Alders are vigorous plants that will not be damaged by pruning at any time of year. However, heavy pruning should be conducted in the dormant season when the stem structure is more visible. In addition to its dense growth patterns, Sitka alder can grow up to 20 feet



Figure 6. Overgrown Alder east of the lodge.



Figure 7. Alder Pruning Zones



Figure 8. Alder Removal Zones

high. Therefore, removing alder in the viewshed between the lodge and the beach trail (C1) is recommended. Park staff have found that cutting alder shrubs to ground level for 3-4 years will reduce the plants vigor and prevent resprouting. Removing young alder plants before roots are established will prevent colonization and reduce future shrub removal. Use of a weed wrench can facilitate shrub and root removal.



Overgrown Alder.



Cane Pruning Complete.

Figure 9. Alder cane pruning.

Cottonwood Thinning and Removal

The largest cottonwood trees on site are located directly east of the lodge in E3. Small cottonwood sprouts currently grow to the east of the driveway and in other open areas on the site. Cottonwood trees were not indicated on the 1966 planting plan. Large thickets of cottonwood trees are undesirable within the landscape. Their dense growth pattern blocks views. In addition, they have a short life span and, due to weak rot resistance, a high likelihood of becoming hazard trees. They also produce numerous root sprouts and opportunistic volunteer plants, creating additional maintenance problems.

Cottonwood growth should be limited within the historic district. An arborist, or park staff with significant felling experience, should remove the largest cottonwood trees in E3, while being careful to avoid damage to buildings



Figure 10. Cottonwood volunteers to east of driveway to be removed.



Figure 11. Cottonwood Thinning and Removal Zones.

and boardwalks (see attached Arborist Contract for Tree Pruning and Removal). After the trees are removed, stumps should be ground to eliminate any above-ground remnants and avoid sprouting. Select mid-sized cottonwood trees can be retained, but should be closely monitored. Small volunteer cottonwoods should be removed by digging entire young trees with roots or using a weed wrench. Alternately, staff can repeatedly cut small trees to the ground until they lose vigor (3-4 years), as recommended for alder.

Spruce Thinning

The dense young spruce thickets in the lodge landscape represent the largest negative impact to the site's character. As part of the rehabilitation phase of treatment, experienced trail maintenance staff or an arborist should thin approximately 50 percent of spruce tree trunks around the western cabins (W1, W2, W3) and in the largest eastern courtyard (E1). The majority of trees removed in these zones should be young enough to not dramatically impact the overall canopy cover. When thinning W3, retain enough trees so that the Whale Skeleton Shelter remains concealed.

Between the beach trail and the ocean (B1), more substantial thinning should occur to create intermittent views. Over 50 percent of the trees trunks can be removed, while retaining at least an overall 30 percent canopy cover. Thinned openings should correspond to lodge and cabin views, with more open views in front of the lodge and semi-filtered views in front of the cabins.

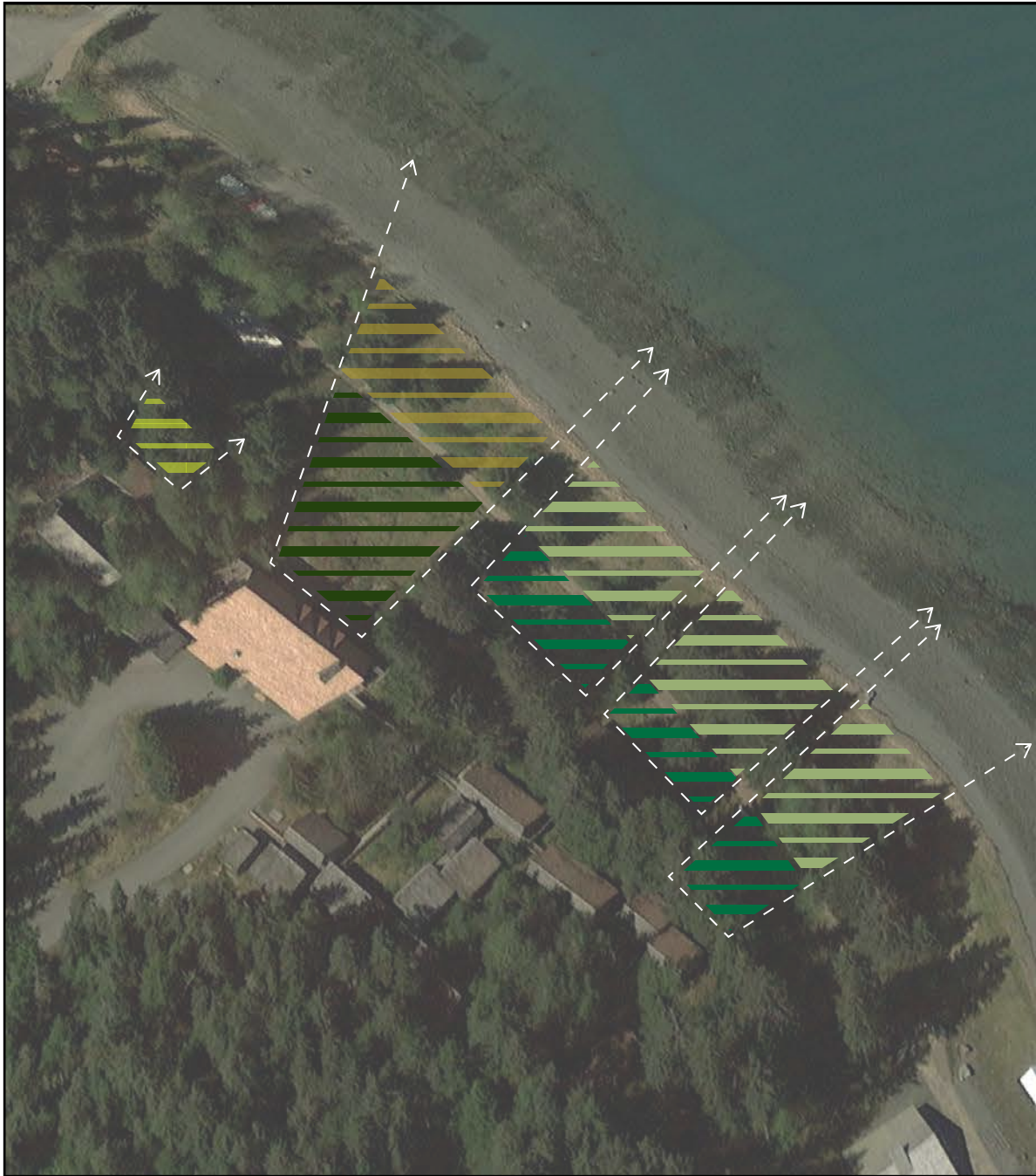
Spruce trees should be thinned in a naturalistic pattern, leaving small groupings to avoid a grid. The youngest and least vigorous spruce trees should be prioritized for removal. Trees should be cut flush to the ground, roughened with an axe (to encourage decay), and concealed with duff. In order to avoid over-thinning, a staff member with training in preservation horticulture and view management should flag initial trees for removal and monitor thinning progress. The Alaska Regional Office Landscape Architects can provide on-site technical assistance with tree flagging, which could be completed in one to two days.

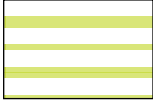


Figure 12. Dense spruce trees growing in courtyard E1, to be thinned.

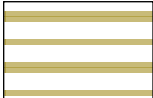


Figure 13. Spruce Thinning Zones

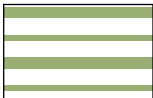


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View from Units 7-8. Thin Forest to open water views while maintaining screen of Whale Skeleton Shelter.
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Clearing from Lodge to beach trail. Maintain clearing. Feather edges to create naturalistic aesthetic.
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Beach trail to tidal zone in front of lodge. Thin trees in groupings to create open view from lodge deck and filtered view from trail.
- 

View from Units 9-21 and 35-38. Maintain open forest for filtered views.
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Beach trail to tidal zone in front of Units 9-21 and 35-38. Thin trees in groupings to create filtered view from cabins and beach trail.

View Management Treatment Map

Ocean views from Glacier Bay Lodge and Cabins





Figure 14. Selective spruce and alder removal, view from lodge to water.

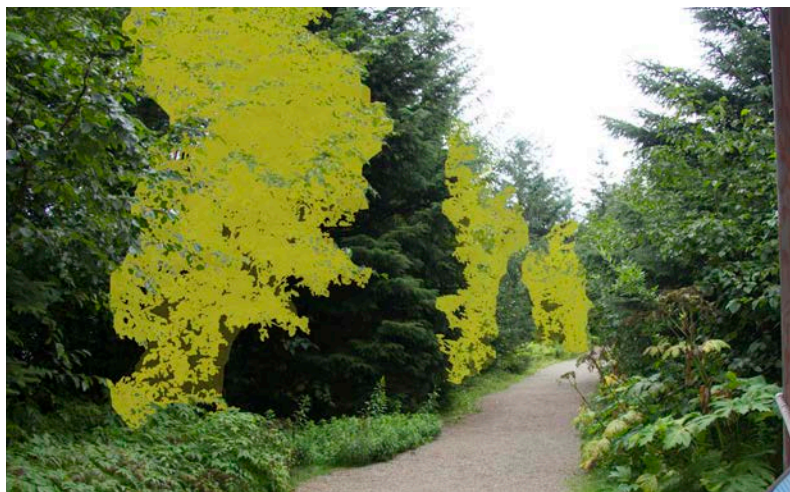


Figure 15. Selective spruce and alder removal, view from Whale Shelter to east.

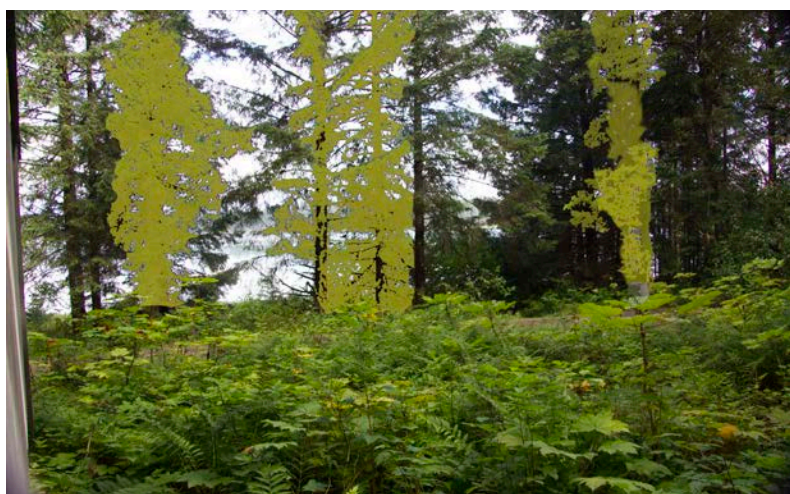


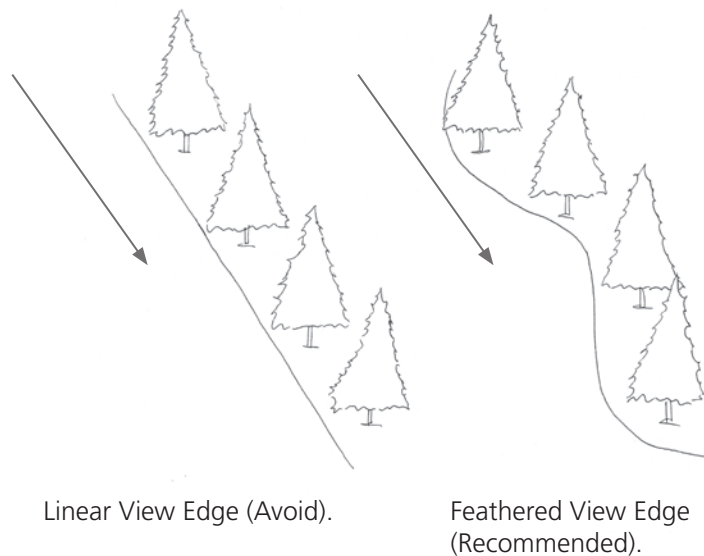
Figure 16. Selective spruce removal to create filtered view, view from beach trail to water.

View Edge Feathering

The view from the lodge is framed by the forest to the west and retained native trees adjacent to shoreline cabins to the east. Spruce, hemlock, and alder along view edges should be cut in an undulating curvilinear manner, in order to avoid an abrupt transition between the forest and the open area. This will provide for a framed and naturalistic view.



Figure 17. View Edge Feathering Zones.



Linear View Edge (Avoid).

Feathered View Edge
(Recommended).

Figure 18. Feathered View Edge Thinning, view from Lodge to water.

Hazard Tree Inspection

Coinciding with tree thinning, park staff should conduct an initial hazard tree inspection for the site. In addition, the remaining plants in thinned groves may have lanky structures and should be closely monitored for several years. Potential defects should be identified. Defects include cracks, weakened branch unions, fungal fruiting bodies, internal rot, dead top or large amount of deadwood, cankers, infestation, and leaning. Trees with a high risk of failure should be removed. Western hemlock's average lifespan is 400-500 years and Sitka spruce can live to 700 years old. Therefore, age alone should not be considered a deficiency.

Baseline Pruning

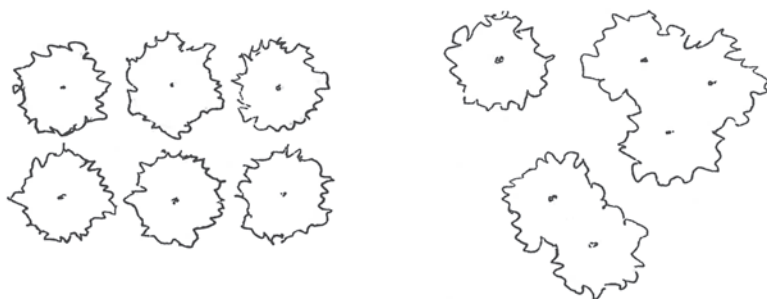
Generally, the trees and shrubs on site should be allowed to take their natural form. However, select limbs should be removed from the spruce trees in the planting island (C3) to allow for filtered views from the entrance drive to the lodge. Pruning should be completed carefully to maintain the trees' naturalistic appearance, and all cuts should follow ANSI A300 Pruning Standard. Pruning can be completed by park staff with a pole pruner.

Infill Plantings

After the vegetation zones in the upland areas of the historic district are treated through vegetation removal, thinning, and pruning, installing select infill plantings is the final step of rehabilitation treatment. Infill plantings will create a naturalistic, open, and aesthetically pleasing setting appropriate for the lodge entrance. In W2 and E3 an understory should be established, and spruce should be planted adjacent to remaining cottonwoods in E3. In C2, native plants should be installed in the containers near



Figure 19. Infill Planting Zones



Grid Pattern (Avoid).

Naturalistic Pattern (Recommended).

Figure 20. Naturalistic thinning and planting pattern.

the lodge steps. In C3, sun-tolerant native shrubs should be planted and consistently maintained as a native plant garden.

The park can obtain native plant stock by harvesting during park construction projects or from within the forests in the developed area (campground to park headquarters). The park or regional botanist should direct plant salvage and collection. If plants are harvested from the frontcountry forest, distribute the harvesting area to lessen impacts. Plants can also be propagated from local seeds and cuttings, but because only a relatively small number of plants are needed, plant harvest may be more efficient and have a negligible effect. All plants should be planted in the fall, mulched with woodchip mulch, and monitored through establishment.

PRESERVATION MAINTENANCE

After the initial rehabilitation project, preservation maintenance tasks will be limited. Consistent completion of these tasks will reduce the need for large scale maintenance projects in the future. The below list identifies the key preservation maintenance tasks required to maintain the landscape from an aesthetic, natural and cultural resource, and safety perspective.

Task 1: Building/Structure Interface

- a) Annually, cut new tree volunteers to ground level from within eight feet of the boardwalks and buildings.
- b) Prune limbs growing up to seven feet over the boardwalk to the branch collar. Avoid cutting branches in half and removing branches from only one side of a tree.
- c) If large tree roots encroach on the boardwalk foundation, prune roots underneath boardwalk and monitor. Remove the tree if it continues to impact foundation.
- d) Prune dead, diseased, and damaged tree limbs growing over buildings. Maintain at least a four foot clearance between building roofs and live tree branches.
- e) Maintain building surfaces to allow shrubs and groundcovers to grow directly adjacent to buildings without causing damage. If necessary, shrubs can be pruned lightly to create a one foot clearance to allow air to flow between buildings and plants.
- f) Monitor large trees already growing in the vicinity of buildings and remove select trees if they have caused, or are predicted to cause, damage to buildings not otherwise preventable through standard maintenance (removing dead limbs, clearing roofs of vegetation debris).

Task 2: Hazard Tree Inspection

- a) Inspect trees on site annually, including trees within the adjacent forest. Look for signs of potential defects (cracks, weakened branch unions, fungal fruiting bodies, internal rot, dead top or large amount of deadwood, cankers, infestation, and leaning).
- b) Remove trees that have substantial defects indicating a high risk of failure and have a high probability of damaging buildings or structures.

Task 3: Maintain Open Forest

- a) Monitor growth of young spruce trees.
- b) Allow for a limited number of hemlock and spruce seedlings to grow to eventually replace older trees.
- c) Remove remaining dense young spruce seedlings every three years.

Task 4: Viewshed Clearing

- a) In the clearing between the lodge and the beach trail, cut spruce to the ground every three years. Maintain a feathered edge. Select trees can be allowed to grow in the clearing if

majority of view is maintained.

b) Open the beachfront forest through thinning select trees every three to five years. As isostatic rebound occurs and the shoreline moves outward, continue to maintain expanded beachfront area where woody vegetation colonizes to retain views.

c) Remove alder in lodge viewshed and in front of beach cabins annually. (Alder will die after 3-4 reductions).

d) Monitor views from all north-facing cabins on top and side of hill (Cabins 7-21 and 28-38). Thin vegetation to create filtered views as needed.



Figure 21. Beach trail with overgrown vegetation, view to west.

Task 5: Alder Thicket Reduction

a) Prune thickets of alder by reducing total canes. Remove alder shrubs on the perimeter of alder thickets every two years to avoid alder domination.

Task 6: Invasive Plant Monitoring

a) Treatment work resulting in a more open landscape could create opportunities for non-native species colonization. Following Executive Order 13751: Safeguarding the Nation From the Impacts of Invasive Species, monitor site annually for non-native species. Invasive plants known to grow in the vicinity of the historic district include common plantain (*Plantago major*), creeping buttercup (*Ranunculus repens*), dandelion (*Taraxacum officinale*), mouse-ear chickweed (*Cerastium fontanum*), non-native forget-me-nots (*Myosotis* spp.), orchardgrass (*Dactylis glomerata*), oxeye daisies (*Leucanthemum vulgare*), reed canarygrass (*Phalaris arundinacea*), spotted deadnettle (*Lamium maculatum*), timothy (*Phleum pratense*), and white clover (*Trifolium repens*).

b) If invasive plants are identified, eradicate using the least impactful method. Manual

eradication will be effective on small populations. Follow the [Alaska Region Invasive Plant Management Plan](#) when conducting invasive plant removal.

c) Utilize certified weed free soil during any post-construction revegetation projects to avoid invasive plant introduction.

d) In all cases involving any ground disturbance, always endeavor to avoid exposing mineral soil, which is an ideal seedbed for invading non-native weeds.

Other Recommendations

Plant Toxicity

Baneberry and cow parsnip are both native plants that pose a health risk to humans. Baneberry is poisonous and cow parsnip can cause photosensitivity in skin. Consider removing these plants where they grow directly adjacent to trails and roads in the lodge district.

Debris Removal

During both the rehabilitation treatment and preservation maintenance projects plant debris will be created including entire down trees, tree branches, and shrub branches. Because of the high traffic and open nature of the site, remove plant debris. Haul to maintenance yard or other location not accessible to visitors. Chip the debris using a wood chipper to create a mulch pile. The wood-chip mulch can be used as needed for trail projects, plant installation, and to restore soil after construction projects within the entire Bartlett Cove developed area.

IMPLEMENTATION

Current Maintenance Practices

The concessionaire is primarily responsible for landscaping the area adjacent to the lodge, cabins, and road (see Context Map). The park is responsible for maintaining the viewshed to the north of the lodge, the area to the north of the northeastern ocean-view cabins, and the landscape between the beach trail and the ocean. The current Concessionaire Contract (NO. CC-GLBA001-15), covering the period October 1, 2015 through September 30, 2025, requires the following of the concessionaire related to vegetation maintenance:

- Maintain the grounds,
- Develop a Vegetation Management Plan,
- Perform preventative and cyclic maintenance to include vegetation management,
- Identify hazard trees and work with NPS to remove,
- Control invasive plants with guidance from NPS, and
- Remove adjacent and overhanging tree limbs that could damage roofs of the lodge or cabins.

The primary vegetation management conducted by the concessionaire is removal of vegetation from around the boardwalks.

The GLBA maintenance team has taken responsibility for removing large trees on site and periodically clearing alder from within the viewsheds. Some courtyards have not received consistent maintenance for decades. The priority for both the NPS and the concessionaire has been building maintenance and, with the exception of some view management and hazard tree removal, the landscape has been largely overlooked.

Implementation Recommendations

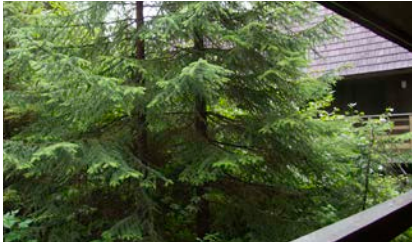
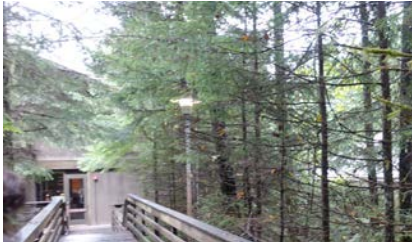
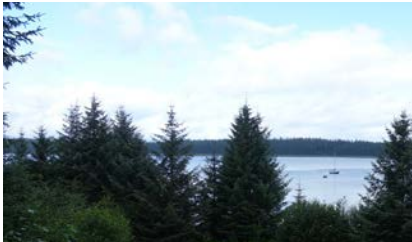
The rehabilitation treatment and preservation maintenance recommended within the Glacier Bay Lodge Complex Historic District can be implemented by park maintenance staff, park natural resource staff, the concessionaire, and contractors. The concessionaire most likely does not possess the expertise to complete the vegetation management tasks required to implement the rehabilitation treatment. Therefore, park staff and contractors with expertise in arboriculture and ornamental native plant landscaping should implement the rehabilitation treatment with project funding. The park can utilize Concessions Franchise funding or other facilities funding source to fund the project. The project should be phased over a two to three year period. Landscape Architects in the Alaska Regional Office (located in Cultural Resources and Planning Divisions) should serve as project consultants.

Park maintenance staff can prune shrubs and remove trees according to their felling capabilities. If park staff do not have substantial felling experience, arborists should be hired for large tree removal. Thinning, view management, and large tree removal should occur in the off-season

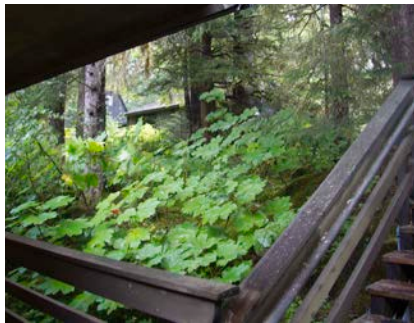
when the lodge is closed. The planting can occur the following fall. Selective pruning, if done correctly, will not affect plant health, and can be done throughout the year. When pruning during the visitor season, use hand tools to avoid auditory and visual impacts to the visitor.

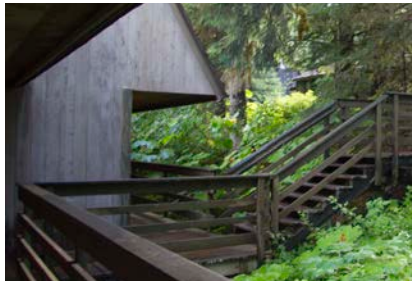
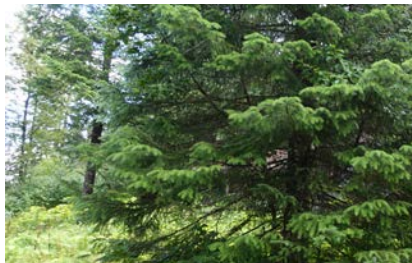
After completion of the rehabilitation treatment, NPS staff should work closely with the concessionaire to provide guidance on preservation maintenance. The tasks can be divided into skilled (view management) and non-skilled work (alder removal). Park staff should supervise all skilled landscape work to be completed by the concessionaire. GLBA staff trained in preservation maintenance, viewshed management, and native plant establishment would be a strong partner for the concessionaire. With proper guidance, the concessionaire staff would view landscape maintenance as a priority, as it would improve the guest experience.

VEGETATION MANAGEMENT ZONES: EXISTING CONDITIONS, PLANT PALETTE, AND TREATMENT RECOMMENDATIONS

Vegetation Zone	Existing Conditions and Primary Plant Palette	Existing Conditions Image	Treatment Recommendation
W1	Existing Conditions: A diverse mixture of shrubs grow in this open courtyard. Young Sitka spruce grow on the south side. Plant Palette: Sitka spruce (<i>Picea sitchensis</i>), blueberry & huckleberry (<i>Vaccinium spp.</i>), salmonberry (<i>Rubus spectabilis</i>), currant & gooseberry (<i>Ribes spp.</i>), bunchberry (<i>Cornus canadensis</i>), horsetail (<i>Equisetum sp.</i>), baneberry (<i>Actaea rubra</i>), cow parsnip (<i>Heracleum lanatum</i>)		Thin spruce and prune alder to reduce density. Retain three specimen spruce trees.
W2	Existing Conditions: This zone along the western boardwalk is a dense canopied Sitka spruce forest. Plant Palette: Sitka spruce (<i>Picea sitchensis</i>), black cottonwood (<i>Populus balsamifera</i>)		Remove cottonwood. Remove dead trees and branches. Thin young living spruce (approximately 50% of trunks). Plant infill shade tolerant native shrubs harvested from local forest or park construction projects in fall.
W3	Existing Conditions: The canopy is dominated by Sitka spruce with some hemlocks. A shrub understory grows in the forested portion, and herbaceous groundcovers grow at the edge of trails. Plant Palette: Sitka spruce (<i>Picea sitchensis</i>), western hemlock (<i>Tsuga heterophylla</i>), blueberry & huckleberry (<i>Vaccinium spp.</i>), salmonberry (<i>Rubus spectabilis</i>), Sitka alder (<i>Alnus viridis</i>), devil's club (<i>Oplopanax horridus</i>)		Selectively thin young spruce and hemlock trees under 5" diameter (approximately 50% of trunks). Retain enough trees so that the Whale Skeleton Shelter remains concealed
C1	Existing Conditions: This open area in front of lodge is dominated by alder. Maintenance staff has periodically cleared trees to maintain views. Plant Palette: Sitka spruce (<i>Picea sitchensis</i>), Sitka alder (<i>Alnus viridis</i>), cow parsnip (<i>Heracleum lanatum</i>), bunchberry (<i>Cornus canadensis</i>), beach strawberry (<i>Fragaria chiloensis</i>)		Remove alder annually. Thin trees on edge of view to create feathered edge. Remove spruce trees that emerge in the clear viewshed area every five years.

Vegetation Zone	Existing Conditions and Primary Plant Palette	Existing Conditions Image	Treatment Recommendation
C2	Existing Conditions: Native plants grow in small planting beds at the entry to the lodge. Ornamental flower mixes grow in planting boxes adjacent to steps. Plant Palette: Sitka spruce (<i>Picea sitchensis</i>), cow parsnip (<i>Heracleum lanatum</i>), red elderberry (<i>Sambucus racemosa</i>), western columbine (<i>Aquilegia formosa</i>)		Prune elderberry to form tree-like shrub. Plant existing containers with native plants such as bunchberry and common red paintbrush. Remove spruce tree directly adjacent to building ramp.
C3	Existing Conditions: The southern section of the driveway island is covered in herbaceous groundcovers with one alder patch. Young Sitka spruce grow to the north. Plant Palette: Sitka spruce (<i>Picea sitchensis</i>), Sitka alder (<i>Alnus viridis</i>), black cottonwood (<i>Populus balsamifera</i>), horsetail (<i>Equisetum</i> sp.), common red paintbrush (<i>Castilleja</i> spp.), mixed grasses		Prune alder to reduce density. Selectively prune limbs on spruce to improve visibility. Plant sun and moisture tolerant herbaceous perennials and low-growing native shrubs (up to 2.5' in height). In small vegetated area to the south of accessible boardwalk, remove cottonwood sprouts and plant with select native shrubs. Install bolder edging around planting island, mimicking historic edging.
E1	Existing Conditions: A dense, young Sitka spruce canopy dominates this courtyard. Blueberries and other shrubs grow in the understory and on the border. Plant Palette: Sitka spruce (<i>Picea sitchensis</i>), Sitka alder (<i>Alnus viridis</i>), western hemlock (<i>Tsuga heterophylla</i>), red elderberry (<i>Sambucus racemosa</i>), blueberry & huckleberry (<i>Vaccinium</i> spp.), salmonberry (<i>Rubus spectabilis</i>), currant & gooseberry (<i>Ribes</i> spp.), devil's club (<i>Oplopanax horridus</i>)		Heavily thin at least 50 percent of spruce trees trunks (youngest and most diseased). Thin trees in naturalistic pattern (leave small groupings) to avoid grid. Retain hemlocks. Prune alder canes to reduce density.

Vegetation Zone	Existing Conditions and Primary Plant Palette	Existing Conditions Image	Treatment Recommendation
E2	Existing Conditions: This open courtyard contains a mix of low shrubs and groundcovers, with one Sitka spruce and a small patch of alder. Plant Palette: Sitka spruce (<i>Picea sitchensis</i>), Sitka alder (<i>Alnus viridis</i>), black cottonwood (<i>Populus balsamifera</i>), red elderberry (<i>Sambucus racemosa</i>), blueberry & huckleberry (<i>Vaccinium spp.</i>), salmonberry (<i>Rubus spectabilis</i>), cow parsnip (<i>Heracleum lanatum</i>), currant & gooseberry (<i>Ribes spp.</i>), bunchberry (<i>Cornus canadensis</i>), horsetail (<i>Equisetum sp.</i>)		Selectively prune alder branches. Remove cottonwood sprouts. Prune elderberry where touching boardwalk.
E3	Existing Conditions: A drainage ditch runs along the west side of this zone and is bordered by young hemlocks. The east side of the zone is covered by a canopy of cottonwoods and spruce. Plant Palette: Sitka spruce (<i>Picea sitchensis</i>), western hemlock (<i>Tsuga heterophylla</i>), black cottonwood (<i>Populus balsamifera</i>)		Remove largest cottonwood trees and grind stumps. Retain select cottonwood trees, and all spruce and hemlock. Prune alder branches at base to reduce density. Replant area with three evergreen trees (spruce or hemlock), and shrub mixture of locally harvested shrubs.
E4	Existing Conditions: An older canopy of Sitka spruce with a blueberry and moss understory grows in this zone. Open areas are covered in alder and other shrubs. Plant Palette: Sitka spruce (<i>Picea sitchensis</i>), western hemlock (<i>Tsuga heterophylla</i>), Sitka alder (<i>Alnus viridis</i>), blueberry & huckleberry (<i>Vaccinium spp.</i>), salmonberry (<i>Rubus spectabilis</i>), currant & gooseberry (<i>Ribes spp.</i>), devil's club (<i>Oplopanax horridus</i>), lady fern (<i>Athyrium filix-femina</i>)		Prune alder branches at base to reduce density. Keep large spruce and hemlocks. As new trees grow, retain some spruce and hemlocks for replacement trees and thin remainder to maintain an open character. Cut a few inches off the top of large Sitka spruce root where touching foundation of boardwalk. (Other roots will compensate for light root damage.) Monitor and remove tree if necessary.

Vegetation Zone	Existing Conditions and Primary Plant Palette	Existing Conditions Image	Treatment Recommendation
E5	Existing Conditions: Two large spruce grow at the west and east side of this zone. Alder and other shrubs cover the middle of the site. Plant Palette: Sitka spruce (<i>Picea sitchensis</i>), Sitka alder (<i>Alnus viridis</i>), blueberry & huckleberry (<i>Vaccinium spp.</i>), red elderberry (<i>Sambucus racemosa</i>), currant & gooseberry (<i>Ribes spp.</i>), devil's club (<i>Oplopanax horridus</i>)		Prune alder to reduce density. Retain large spruce. Allow for occasional replacement trees to grow.
E6	Existing Conditions: Older spruce and hemlock canopy with shrub understory grow in the northern portion of this zone. Alder, mixed shrubs, and herbaceous groundcovers grow on the forest edge. Plant Palette: Sitka spruce (<i>Picea sitchensis</i>), western hemlock (<i>Tsuga heterophylla</i>), Sitka alder (<i>Alnus viridis</i>), black cottonwood (<i>Populus balsamifera</i>), blueberry & huckleberry (<i>Vaccinium spp.</i>), devil's club (<i>Oplopanax horridus</i>), salmonberry (<i>Rubus spectabilis</i>), currant & gooseberry (<i>Ribes spp.</i>), lady fern (<i>Athyrium filix-femina</i>), baneberry (<i>Actaea rubra</i>), cow parsnip (<i>Heracleum lanatum</i>), goat's beard (<i>Aruncus dioicus</i>), common red paintbrush (<i>Castilleja spp.</i>), mixed grasses		Prune alder to reduce density. Retain large spruce. Retain select younger trees as replacements.
E7	Existing Conditions: This zone is primarily open with low shrub cover. An alder thicket grows on the eastern edge. Plant Palette: Sitka spruce (<i>Picea sitchensis</i>), Sitka alder (<i>Alnus viridis</i>), devil's club (<i>Oplopanax horridus</i>), salmonberry (<i>Rubus spectabilis</i>), red elderberry (<i>Sambucus racemosa</i>), currant & gooseberry (<i>Ribes spp.</i>), lady fern (<i>Athyrium filix-femina</i>), cow parsnip (<i>Heracleum lanatum</i>)		Prune alder heavily to reduce density, remove if needed. Remove majority of young hemlocks to maintain views in front of cabins, retain select specimen trees. Create feathered edge at adjacent forest over time.

Vegetation Zone	Existing Conditions and Primary Plant Palette	Existing Conditions Image	Treatment Recommendation
E8	Existing Conditions: Large spruce grow on the eastern section of this zone. Alders and other shrubs grow in the more open areas. Plant Palette: Sitka spruce (<i>Picea sitchensis</i>), Sitka alder (<i>Alnus viridis</i>), blueberry & huckleberry (<i>Vaccinium spp.</i>), currant & gooseberry (<i>Ribes spp.</i>), salmonberry (<i>Rubus spectabilis</i>)		Prune alder at edge of viewshed to reduce density. Remove alder in the center of viewshed. Retain specimen trees for filtered view.
E9	Existing Conditions: The forest edge is dominated by alder mixed with grasses and other shrubs. Sitka spruce and some hemlocks grow in the adjacent forest. Plant Palette: Sitka spruce (<i>Picea sitchensis</i>), western hemlock (<i>Tsuga heterophylla</i>), Sitka alder (<i>Alnus viridis</i>), blueberry & huckleberry (<i>Vaccinium spp.</i>), horsetail (<i>Equisetum sp.</i>), mixed grasses		Remove alder within 10' of buildings. Prune alder to reduce density from 10-25' of buildings.
B1	Existing Conditions: Alder, young spruce, and hemlock grow on the upper shore. The mid-shore is covered in herbaceous groundcovers. Plant Palette: Sitka spruce (<i>Picea sitchensis</i>), western hemlock (<i>Tsuga heterophylla</i>), Sitka alder (<i>Alnus viridis</i>), cow parsnip (<i>Heracleum lanatum</i>), beach pea (<i>Lathyrus japonicus</i>), Nootka lupine (<i>Lupinus nootkatensis</i>), beach strawberry (<i>Fragaria chiloensis</i>), chocolate lily (<i>Fritillaria camschatcensis</i>), beach grass (<i>Leymus mollis</i>)		Thin large thickets of spruce on shoreline to create and maintain views. Over 50 percent of the trees can be removed, while retaining at least an overall 30 percent canopy cover. Remove alder on the beach annually. Consider moving kayak shelters. If retained, keep adjacent spruce and alder to conceal shelters. Zone will expand with isostatic rebound. Continue to maintain open view in front of lodge and filtered view in front of cabins in expanded vegetated zone.

TERMINOLOGY

Cultural landscape - a geographic area (including both cultural and natural resources and the wildlife or domestic animals therein), associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values.

Historic character - the sum of all visual aspects, features, materials, and spaces associated with a cultural landscape's history, i.e. the original configuration together with losses and later changes. These qualities are often referred to as character-defining.

Preservation maintenance - the practice of monitoring change, controlling growth, replacing in-kind, and minimizing disturbance in the landscape to ensure that features, such as vegetation, paths, walls, and other landscape furnishings, are not lost and the character of the place is not compromised.

Rehabilitation- the process of returning a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values.

BIBLIOGRAPHY

Morse, John. 1996. Letter to Jim Brady, June 6.

Morse, John & Associates and Metcalf & Eddy, Inc. 1973. *Predesign Study for Road, Building, and Utility Projects, Bartlett Cove, Glacier Bay National Monument, Alaska*. John Morse & Associates, Seattle, WA.

National Park Service. 1960. Invitation for Offers and Prospectus, Concession Facilities and Services. National Park Service, Washington, D.C.

National Park Service. 2015. Concession Contract No. CC-GLBA001-15. National Park Service, Glacier Bay National Park and Preserve, AK.

Wackrow, Kathleen. 2018. *Historic Structure Report: Glacier Bay Lodge Complex Historic District, Glacier Bay National Park and Preserve*. National Park Service, Anchorage, AK.

Welzenbach, Corinna and Kathryn Sears. 2011. *Cultural Landscape Inventory: Glacier Bay Lodge Complex, Glacier Bay National Park and Preserve*. National Park Service, Anchorage, AK.

ARBORIST CONTRACT FOR TREE PRUNING AND REMOVAL

NATIONAL PARK SERVICE
SPECIFICATIONS – TREE MAINTENANCE
National Park Unit

PART 1: SCOPE

A. The Contractor shall furnish all equipment and sufficient personnel for selected maintenance (ie: tree pruning, removal) and all related incidental work as in accordance with the bid schedule and specifications stated herein. Therefore, any items not specifically noted, but necessary for performance in accordance with accepted industry standards, shall be furnished under this contract.

B. Nearly all trees are located within developed areas containing high densities of pedestrians, vehicles, utilities, and structures.

PART 2: GENERAL PROVISIONS

2.01 Quality Assurance:

201.1 Professional Qualifications:

A. All work shall be under the direction and general supervision of an Arborist(s) certified by the International Society of Arboriculture (ISA), or equivalent state certification, who, possess verifiable experience and technical competence in tree physiology, identification, diagnosis of disorders, and current tree care and safety practices in accordance with accepted industry standards. The Arborist shall be the primary contact with the Contracting Officer's Technical Representative and shall be responsible for controlling the quality of work and inspecting all completed work to ensure that contract performance requirements are met.

B. All tree workers shall, through related training and on the job experience, be familiar with the technical aspects and hazards of tree maintenance work and equipment used in such operations. All tree workers shall abide by any code of ethics or professional conduct established by the Tree Care Industry Association and the International Society of Arboriculture.

2.01.2 EQUIPMENT REQUIREMENTS:

A. All equipment must meet all federal OSHA, state and local safety requirements and must be properly licensed. This includes equipment such as bucket trucks, aerial lifts, chipper trucks, wood trucks, stump grinders, etc., which may be needed to correctly perform tree pruning and removal in accordance with the specifications stated herein.

B. No vehicles, including but not limited to Bucket trucks, Aerial lifts, Cranes, Bobcats, Log loaders, and Chipper trucks, shall be driven on any lawn areas with out the use of protection mats (i.e. Alturna mat), without the permission of the Contracting Officer (COR).

2.01.3 MONETARY ADJUSTMENT FOR INADEQUATE PERFORMANCE:

Irreversible damage to the tree(s) will be subject to liquidated damages in accordance with the Guide for Plant Appraisal authored by the Council of Tree and Landscape Appraisers.

2.01.4 REPORTS:

A. The contractor shall note and report to the COR in writing the presence of any structural weakness, girdling roots, disease conditions, decayed trunk or branches, and split crotches or branches, or any other hazardous condition that has potential for damage to property or personal injury that can not be corrected within the scope of work described herein.

2.02 SCHEDULING AND COORDINATION:

A. Quantities and scope of work will be outlined in the bid schedule.

B. Prior to commencing work the contractor is responsible for inspecting all affected trees to ensure that the prescribed work is in accordance with the scope of the specifications stated herein.

C. The Contracting Officer's Representative will be responsible for acting on behalf of the Contracting Officer on all matters of work within the scope of the contract. Approval of work beyond the scope of the contract (ie: cabling and bracing, wound treatment, technical removals requiring the use of a crane etc.) is reserved for the Contracting Officer. The contractor is responsible for notifying the COR in writing all work that is beyond the scope of the contract and include a proposal for performing the prescribed work that includes a breakdown with unit prices for labor, materials, and equipment required to ensure that the tree can be safely removed and/or the hazards corrected. The COR will evaluate the proposal and if valid will seek approval from the Contracting Officer. Failure of the contractor to obtain the approval of the Contracting Officer for work beyond the scope of the contract will release the government from any obligation to pay for services claimed.

D. Work schedule will be determined at contractors meeting.

E. If, at any time, the COR determines that the work is unsatisfactory or being conducted in an unsafe manner, the contractor will be notified and shall immediately cease all work activities.

2.03 SAFETY:

A. All operations shall be conducted in accordance with ANSI Z133.1-2006 Safety Requirements for Pruning, Trimming, Repairing, Maintaining and Removing Trees and Cutting Brush and all federal OSHA, state and local safety requirements.

2.04 RESPONSIBILITY REGARDING EXISTING STRUCTURES, UTILITIES, EXISTING PLANT MATERIAL AND OTHER LANDSCAPE FEATURES:

A. The contractor shall preserve and protect all cultural and natural resources including existing vegetation, structures and buildings adjacent to the work area.

2.05 CLEANUP AND RESTORATION:

A. The contractor shall remove all wood debris and chips from site, unless directed otherwise by the COR

or provisions of the contract.

2.06 DEFINITIONS:

A. Shall - As used in these specifications denotes a mandatory requirement

B. Should - As used in these specifications denotes an advisory recommendation.

C. Diameter at Breast Height (DBH) - The DBH shall be the trunk diameter measured at a point 4.5 feet above the average ground level.

D. Pruning Types:

Pruning: All trees designated as Pruning are in developed areas. Trees shall be pruned to maintain and/or improve health and structure and shall follow ANSI A300 part 1 standards.

1. Crown Reduction: Shall consist of the selective removal of branches and stems to decrease the height and/or spread of a tree or shrub. Crown reduction should be accomplished with reduction cuts, not heading cuts.

2. Crown Cleaning: Shall consist of the removal of dead, dying, diseased, interfering, objectionable weakly attached, low vigor branches, and up to 1/3 of water sprouts on the main trunk as well as those within the leaf area one inch in diameter and greater not taking more than 25% of live foliage. Dead wood greater than 2 feet in length shall be removed regardless of diameter. An occasional branch up to one inch diameter may remain within the main leaf area where it is not practical to remove.

3. Crown Raising: Shall consist of the selective removal of branches to provide vertical clearance. Crown raising shortens or removes lower branches of a tree to provide clearance for buildings, signs, vehicles, pedestrians, and vistas.

4. Crown Thinning: shall consist of the selective removal of small live branches to reduce crown density to increase light penetration and air movement through the crown.

5. Structural Pruning- Shall consist of the selective removal of live branches and stems to influence the orientation, spacing, growth rate, strength of attachment, and ultimate size of branches and stems.

6. Pruning to Restore- The selective removal of branches, sprouts, and stubs from trees and shrubs that have been topped, severely headed, vandalized, lion tailed, broken in a storm, or otherwise damaged. The goal of restoration is to improve a tree's structure, form, or appearance.

7. Pollarding- The selective heading cuts the first year followed by annual sprout removal to maintain trees or shrubs at a pre-determined size or to maintain a "formal" appearance.

PART 3: EXECUTION

3.01 PRUNING

3.01.1 Scope

The work to be performed under this section shall include pruning trees in accordance with the American National Standard for Tree Care Operations - Tree, Shrub, and Other Woody Plant Maintenance - Standard Practices, ANSI A300 (Part 1) -2008 Pruning, and ANSI Z133.1-2012.

3.02 REMOVALS

3.02.1 Scope

The work to be performed under this section shall include removing trees in accordance with the American National Standard for Arboricultural Operations - Pruning, Repairing, Maintaining and Removing Trees and Cutting Brush - Safety Requirements - ANSI Z133.1-20012

STUMP REMOVAL

A. Stumps indicated for removal shall be ground only to a depth of 4" below grade disturbing as little dirt as possible due to the Archaeological significance of the grounds, and then backfilled with topsoil supplied by the park.