Biological Evaluation for Sensitive Fish and Wildlife Species at the Proposed Residential Pier Construction on Lake Washington, King County, WA: NWS-2014-____

EXHIBIT # 9

Prepared for:
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Prepared on behalf of:
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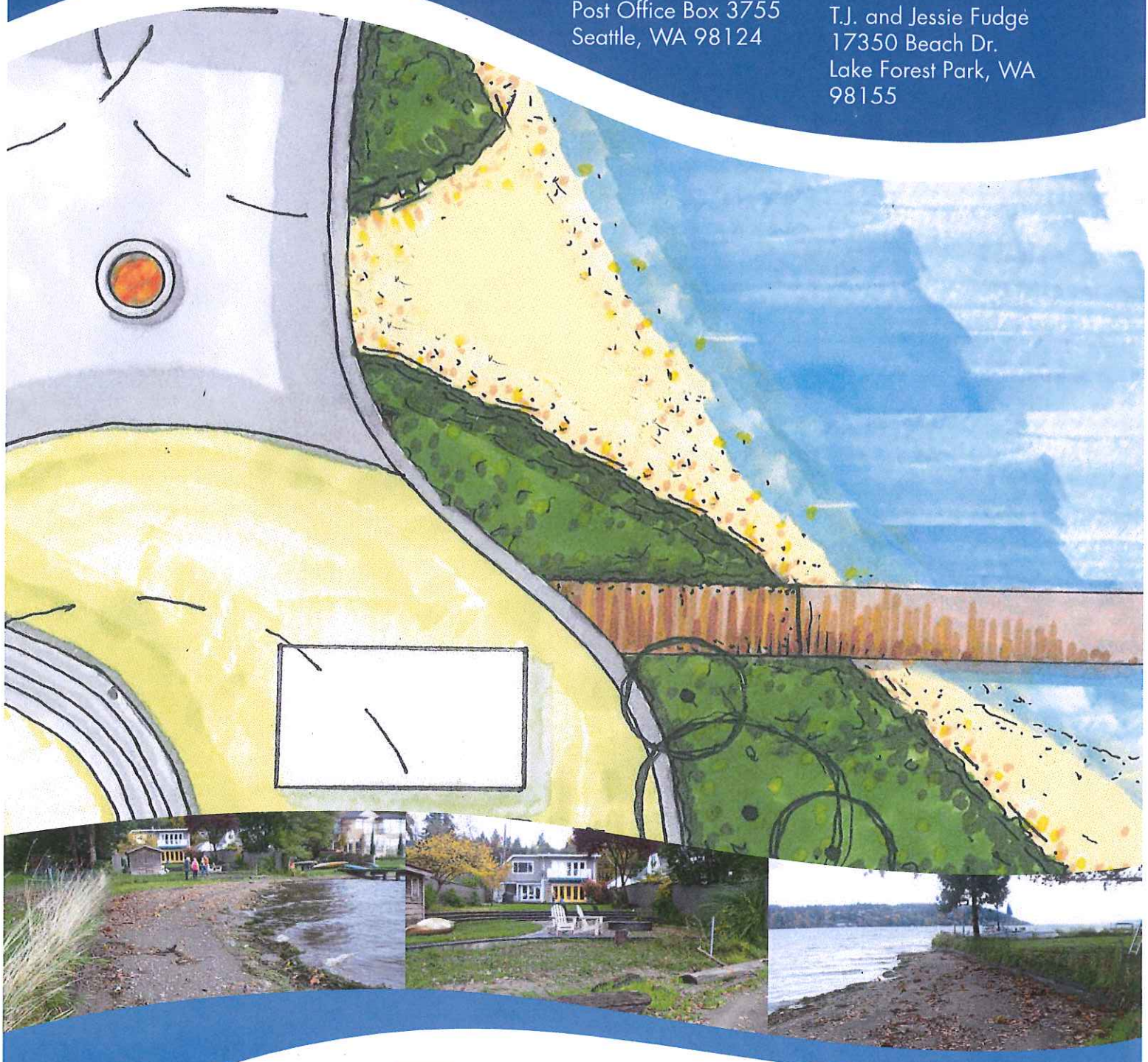

THE WATERSHED COMPANY

December 2014

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SECTION 7, ENDANGERED SPECIES ACT

Applicant: T.J. and Jessie Fudge

Corps Reference #: NWS-2014-___

1 INTRODUCTION

Construction of a residential pier is proposed for a privately-owned, single-family residential property on Lake Washington. This Biological Evaluation is prepared to facilitate Section 7 consultation requirements between the U. S. Army Corps of Engineers (Corps), the National Marine Fisheries Service and the U. S. Fish and Wildlife Service.

2 DESCRIPTION OF PROPOSED ACTION

2.1 Location

The proposed project is located on the northwestern shoreline of Lake Washington, northeast of the Lake Forest Park Civic Club and Lyon Creek Waterfront Park. The residential property is located at 17350 Beach Drive Northeast, Lake Forest Park, Washington (SE ¼ of Section 10, Township 26 North, Range 4 East; 47.753434 Latitude, -122.274141 Longitude; Figures 1 & 2). Tax parcel number: 4030100055. The project area falls within the Lake Washington/Cedar/Sammamish Water Resource Management Area (WRIA 8).

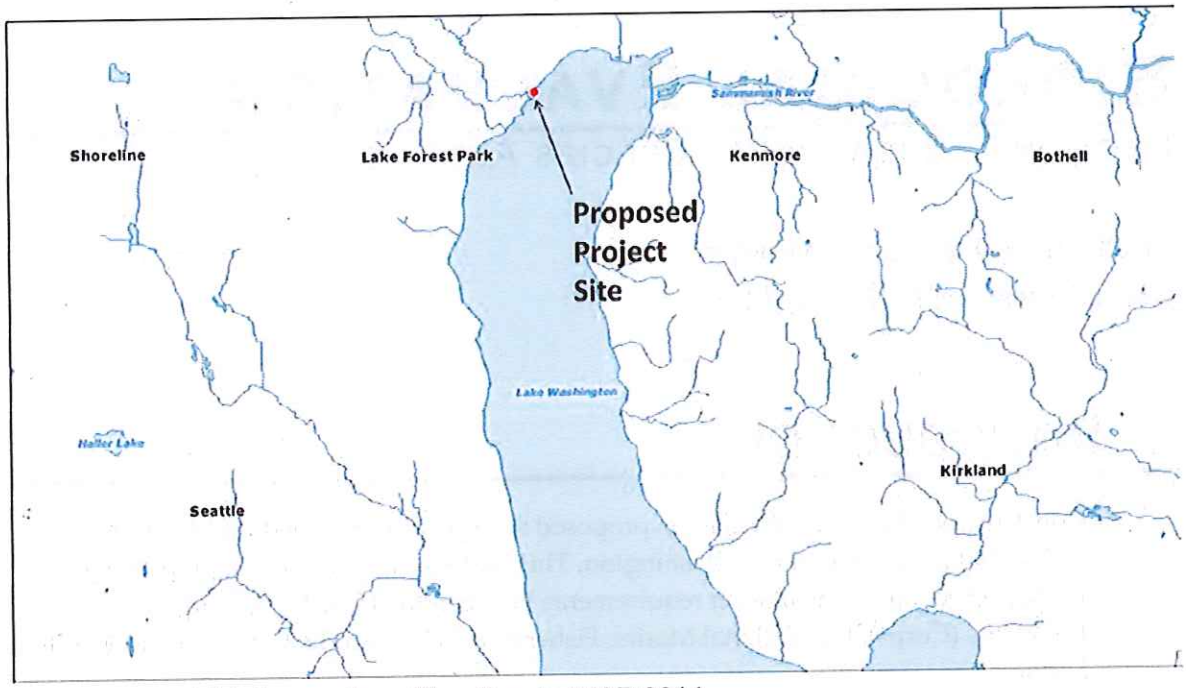

Figure 1. Vicinity map from King County iMAP 2014.

Figure 2. Aerial view of proposed project parcel from King County iMAP 2014.

2.2 Project Description

The applicant proposes to install a new straight walkway pier with boatlift and two jet-ski lifts (See Appendix A for project plans). As a result of site conditions, which include shallow waters and a neighboring bulkhead, which extends approximately 100 feet

perpendicular to the shoreline of the subject property, the proposed pier structure must extend 233 feet waterward of the ordinary high water mark (OHWM) in order to reach a depth of five feet at high water level (three feet at low water level). The pier will consist of a new straight walkway, 3' 10 ¾" wide, with fully grated decking. Twenty 6-inch steel pilings will be driven using a vibratory driver.

Above the OHWM, native riparian vegetation will be planted an average width of ten feet across over approximately 75 percent of the length of the shoreline. The planted area will include emergent vegetation. No spawning substrate will be added to the project area because the existing gradually sloping, fine sediment conditions are preferable to rearing juvenile Chinook salmon (Sergeant and Beauchamp 2006).

2.3 Construction Sequence

Construction activities will occur in the following sequence (provided by Waterfront Construction Inc. and modified by The Watershed Company):

Pile driving and pier construction

1. Mobilize crew and construction barge on site, taking care to ensure the barge does not ground out on the lake bottom.
2. Pre-fabricated pier sections, piling, and all construction materials delivered on construction barge.
3. With the barge based crane, install new steel piles with a vibratory driver.
4. Install and secure new steel cap beam assemblies to new piling.
5. Place and secure pre-fabricated pier sections onto the cap beam assemblies.
6. Complete decking with screw down of approved True-Deck grating pieces.
7. Install boat lift on northeast side of the terminus of the pier and two jet-ski lifts on the southeast terminus of the pier.
8. Clear shoreline area and install shoreline planting mitigation during appropriate installation seasons.

2.4 Minimization Measures

The following measures will ensure that any disturbance to sensitive fish and wildlife species utilizing the action area will be minimized.

Timing Restriction: No in-water work will occur from February 2nd through July 15th or August 1st through November 15th, per the protection policies of the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), and Washington Department of Fish and Wildlife (WDFW) for bull trout (*Salvelinus confluentus*), steelhead (*Oncorhynchus mykiss*), and Chinook salmon (*O. tshawytscha*). The proposed project is located well north, and outside, of an area identified as a potential sockeye salmon (*O. nerka*) spawning area; therefore, additional timing restrictions for sockeye spawning from WDFW are not anticipated.

The combined fish and wildlife timing restrictions are depicted graphically in Table 1. The applicant would comply with any amendments made to the timing restrictions following U.S. Army Corps of Engineers (Corps), NMFS, USFWS, and WDFW review.

Table 1. Applicable work window.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Federal & State fish protection		No in-water work						No in-water work				

Minimization of Construction Impacts: The pier pilings will be installed using a vibratory driver to limit noise impacts during construction. All in-water work will be staged from a barge. The barge will not be allowed to ground.

Minimization of Impacts to Shallow Water Habitat: The pier was designed to minimize impacts to shallow water habitat. Specifically, the proposed pier will be fully grated with Tru Deck grating. The pier will be a narrow width (3' 10 3/4") over the full length to minimize effects of shading on migration and submerged vegetation. The size and number of piles is minimized to limit effects on in-water structure. The pier is designed to be the minimum length necessary to reach a depth of 5 feet at high water.

Shoreline Vegetation: Shoreline vegetation an average of ten feet in width landward from the OHWM will be planted along 75 percent of the length of the shoreline. The planting plan includes native trees, shrubs, grasses, and groundcovers that will be planted adjacent to the shoreline.

2.5 Action Area

"Action area" is defined as "all areas to be affected directly or indirectly by the proposed action and not merely the immediate area involved in the action." The aquatic action area is based on the distance for aquatic noise to attenuate to background conditions. Disturbance effects of this project on Chinook salmon, bull trout and steelhead would be realized within 33 feet of project operations based on a practical spreading loss equation from vibratory pile driving of 6-inch diameter steel piles (see Section 6.1 for further explanation). Airborne noise from construction is expected to attenuate to background levels within a 0.8 mile radius of the pier. This distance was calculated with the practical spreading loss equation, using inputs based on noise levels measured for a vibratory pile driver at 94 dB at 50 feet from the source and ambient noise of 55 dB measured 50 feet from the source (WSDOT 2014). No other areas would be affected directly or indirectly. The project action area is displayed in Figure 3.

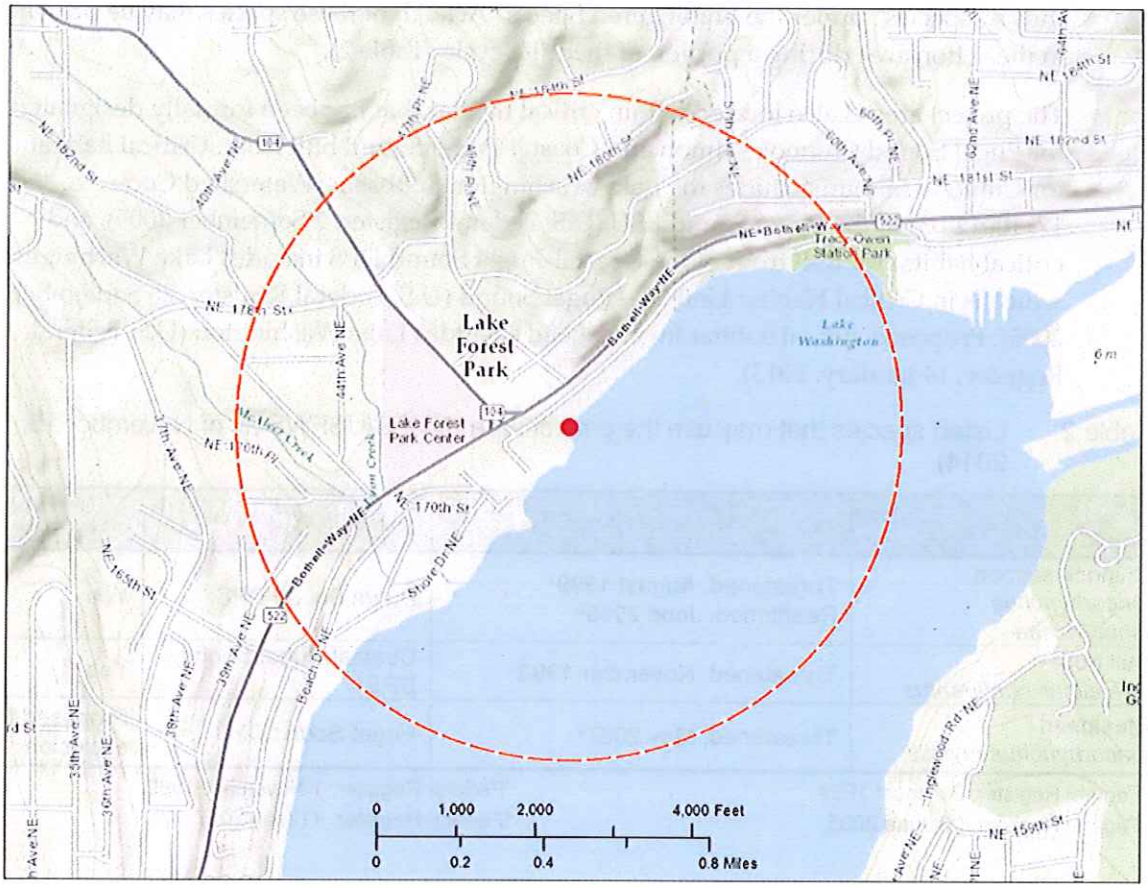

Figure 3. General depiction of project action area, with area of potential airborne noise (0.8 mile radius) in orange (ESRI World Topography Map). The aquatic action area extends approximately 33 feet from project operations.

3 LISTED SPECIES

The action area is located within the geographic range of three federally listed species of salmonids: 1) Chinook salmon of the Puget Sound Evolutionary Significant Unit (ESU) (Reaffirmed as Threatened, U.S. Federal Register, 28 June 2005), 2) bull trout of the Coastal-Puget Sound Distinct Population Segment (DPS) (Threatened, U.S. Federal Register, 1 November 1999), and 3) steelhead of the Puget Sound DPS (Threatened, U.S. Federal Register, 11 May 2007). Coho salmon of the Puget Sound-Strait of Georgia ESU are also present in the watershed and are currently considered a Species of Concern (U.S. Federal Register, 15 April 2004), indicating that they are under less active consideration for formal listing. An ESU of Pacific salmon is considered to be a DPS and

thus a "species" under the Endangered Species Act. All of these species may be present in the action area during a portion of their life cycle (Table 2).

The project area is also located within critical habitat that has been formally designated for Puget Sound Chinook salmon and Coastal-Puget Sound bull trout. Critical habitat for Chinook salmon includes the Lake Washington Subbasin (Watershed Code 17110012-03) of the Puget Sound ESU (U.S. Federal Register, 2 September 2005), and critical habitat for bull trout of the Coastal-Puget Sound DPS includes Lake Washington, which is in Critical Habitat Unit 28 – Puget Sound (U.S. Federal Register, 26 September 2005). Proposed critical habitat for steelhead excludes Lake Washington (U.S. Federal Register, 14 January, 2013).

Table 2. Listed species that may use the project area (NMFS/USFWS as of November 15, 2014).

Species	Federal Status	ESU/DPS/Region	Critical Habitat
Chinook salmon *Oncorhynchus tshawytscha*	Threatened, August 1999[1] Reaffirmed, June 2005[2]	Puget Sound DPS	Yes
Bull trout *Salvelinus confluentus*	Threatened, November 1999[3]	Coastal-Puget Sound DPS	Yes
Steelhead *Oncorhynchus mykiss*	Threatened, May 2007[4]	Puget Sound DPS	Proposed for exclusion

[1]Federal Register, 2 August 1999.
[2]Federal Register, 28 June 2005.
[3]Federal Register, 1 November 1999.
[4]Federal Register, 11 May 2007.

In addition to listed salmonids, the US Fish and Wildlife Service identifies the following listed species as occurring in King County: Oregon spotted frog, northern spotted owl, marbled murrelet, yellow-billed cuckoo, Canada lynx, gray wolf, grizzly bear, and golden paintbrush.

The Oregon spotted frog requires perennial bodies of water adjacent to expansive meadow or wetland vegetation to complete their life cycle. The action area does not contain suitable habitat, therefore, the project will have **no effect on Oregon spotted frog** and this species will not be further addressed in this document.

There are no mature coniferous forests located within or in the vicinity of the action area that contain breeding or foraging habitat suitable for northern spotted owls or marbled murrelets. Northern spotted owls do not normally nest outside of mature, closed-canopy forests, which are not present in the action area, and trees of preferred perching and roosting size are not available on the site. Marbled murrelets inhabit mature, coniferous forests in dense coastal stands and forage in marine nearshore areas, neither of which are present in the action area. Yellow-billed cuckoos are extremely rare in Washington and are restricted to willow and cottonwood forests along large rivers, which are not present in the action area. Therefore, the project will have **no effect on northern spotted**

owl, marbled murrelet, or yellow-billed cuckoo or their designated critical habitats and these species will not be further addressed in this document.

Grey wolf, Canada lynx, and grizzly bear suitable habitat may occur in eastern King County, but not in the urban and suburban areas of western King County. Therefore, the project will have **no effect on grey wolf, Canada lynx, or grizzly bear** and these species will not be further addressed in this document.

The action area does not contain suitable prairie conditions needed to support golden paintbrush, and there is no historical record of golden paintbrush occurring in the action area. Therefore, the project will have **no effect on golden paintbrush**, and this species will not be further addressed in this document.

4 ENVIRONMENTAL SETTING

The baseline conditions that Chinook salmon, steelhead, and bull trout presently face in the Lake Washington watershed are described in the *Endangered Species Act Guidance for New and Replacement Piers and Bulkheads in Lake Washington, Lake Sammamish, and the Ship Canal, Including Lake Union* (Corps et al. 2001); *Salmon and Steelhead Habitat Limiting Factors Report for WRIA 8* (Kerwin 2001); and the *Lake Washington/Cedar/Sammamish Watershed (WRIA 8) Chinook Salmon Conservation Plan* (WRIA 8 2005). This discussion describes the relevant site-specific baseline conditions within the action area, in particular focusing on those items that are different in condition from Lake Washington as a whole.

Sarah Sandstrom and Courtney Landoll of The Watershed Company conducted a site visit on November 11, 2014. At the time of the site visit, the lake level was 20.75 feet (Corps of Engineers 1919 datum) (Corps 2014, electronic data). Lake levels in Lake Washington reach an elevation of 21.80 feet in the summer months. The following description of existing conditions is based upon observations from the site visit and from materials supplied by the applicant and contractor.

The property is located in a residential community on the northwestern shoreline of Lake Washington, approximately 200 feet northeast of Lyon Creek Waterfront Park. The property features a primary residence with a terraced, mown lawn, and sandy sloping shoreline. Several small logs are located along the OHWM. Vegetation landward of the OHWM includes herbaceous weeds and grasses. The foundation of the primary residence is located approximately 140 feet landward of the shoreline.

The subject property is situated between residential properties to the northeast and southwest. The adjacent property to the southwest features a concrete bulkhead that extends along the shared property line approximately 100 feet southeast from the OHWM of the subject property. The bulkhead has resulted in the accretion of sandy

sediment, which has created the shallow water conditions in front of the subject property's shoreline (Figure 4). Both adjacent properties have residential piers.

Grasses, including reed canarygrass and velvetgrass, and other weedy species cover most of the sandy nearshore, which extends several feet landward from the OHWM (Figure 5). A patio and firepit are situated at the eastern edge of the property where a concrete step marks the transition from shoreline vegetation to mown lawn. A wooden boat shed is located at the western edge of the property across from the patio. The upland edges of the subject property are landscaped with ornamental trees and shrubs.

Figure 4. Beach on subject property and bulkhead and adjacent property to the southwest.

Figure 5. Current nearshore vegetation and patio with fire pit.

5 Species Information and Site Use

Site-specific information about each species is presented below. General and lake-specific life history information related to temperature, diet, and migration is contained in the Federal Register listings (Table 2) and the *Endangered Species Act Guidance for New and Replacement Piers and Bulkheads in Lake Washington, Lake Sammamish, and the Ship Canal, Including Lake Union* (Corps et al. 2001).

All anadromous fish spawning in streams, rivers, and lakes in the Lake Washington basin must travel through the Ballard Locks, Lake Union and the Lake Washington ship canal on their way to and from Puget Sound and the Pacific Ocean. Some of these salmonids may migrate along the Lake Forest Park portion of the Lake Washington shoreline.

5.1 Chinook Salmon

In the Lake Washington watershed, Chinook salmon are broken into two stocks: 1) the Cedar River, and 2) the Sammamish River (City of Seattle 2008). The majority of summer/fall-run Chinook salmon migrate through the Lake Washington ship canal to reach spawning habitat in either the Cedar or Sammamish River systems, while a smaller proportion of Chinook salmon spawn in other Lake Washington tributaries. The Lake Washington basin has seen an average escapement of 1,021 returning Cedar Chinook salmon and 1,497 returning Sammamish Chinook salmon from 1999 to 2013 (WDFW electronic reference).

Occasional beach spawning within Lake Washington has also been observed (Hendry and Quinn 1997). Adults migrate into freshwater in late July through early September and spawn in the tributaries to Lake Washington between August and November (City of Seattle 2008). Typically, Chinook salmon travel through the ship canal in two or fewer days at depths of approximately 20 feet (City of Seattle 2008).

Graphs of trapping data indicate that juvenile Chinook salmon migrating from the tributaries into Lake Washington exhibit two basic strategies: 1) direct migration to the lake as fry without extended stream rearing; and 2) migration to the lake as parr or smolts (average length 100 mm), following extended stream rearing. Chinook fry begin entering Lake Washington around the first of the year, peaking in February, while parr and smolts enter the lake from April through July, peaking in late May (Tabor et al. 2006). Early in the period of lake residency, Chinook salmon fry are typically found along the shorelines in waters less than 1.6 feet deep (Tabor et al. 2006). Juveniles entering the lake as fry rear until they emigrate as smolts beginning in April. The majority of the juvenile Chinook salmon in the Lake Washington basin emigrate from the system via the Lake Washington ship canal by mid-summer, peaking in June, and most of the remaining juveniles have left by September. However, some juveniles exhibit extended rearing in the Lake Washington basin (emigrating as 2-year olds), while a small fraction have been observed to residualize in the lake.

The project site is located at the northern end of the lake, approximately 1.8 km (shoreline length) west of the mouth of the Sammamish River. The mouth of the Cedar River is located at the opposite end of the lake as the project site. The nearest Chinook salmon spawning stream is McAleer Creek, located approximately 0.5 km southwest of the project site.

Most naturally-produced Chinook salmon juveniles in Lake Washington originate in the Cedar River, and a smaller number of juveniles originate in Bear Creek, a tributary to the Sammamish River (Celedonia et al. 2008). Large numbers of hatchery reared Chinook salmon are released from the Issaquah State Hatchery in May or June and enter Lake Washington through Sammamish River (Celedonia et al. 2008). Past studies of juvenile Chinook salmon in Lake Washington indicate that juvenile Chinook salmon were concentrated in the south end of Lake Washington from February to May and the

density of Chinook salmon fry using lake shorelines in the spring decreases logarithmically with increasing distance from the mouth of the Cedar River (Figure 6, Tabor et al. 2006). Unlike the Cedar River where Chinook tend to migrate as fry without extended stream rearing, Chinook salmon in Bear Creek and from the Issaquah hatchery primarily migrate to the lake as larger parr, which tend to use deeper waters further offshore. Given the location of the project area in relation to the mouth of the Cedar River, few Chinook salmon fry would be expected to rear along the shorelines of the project area.

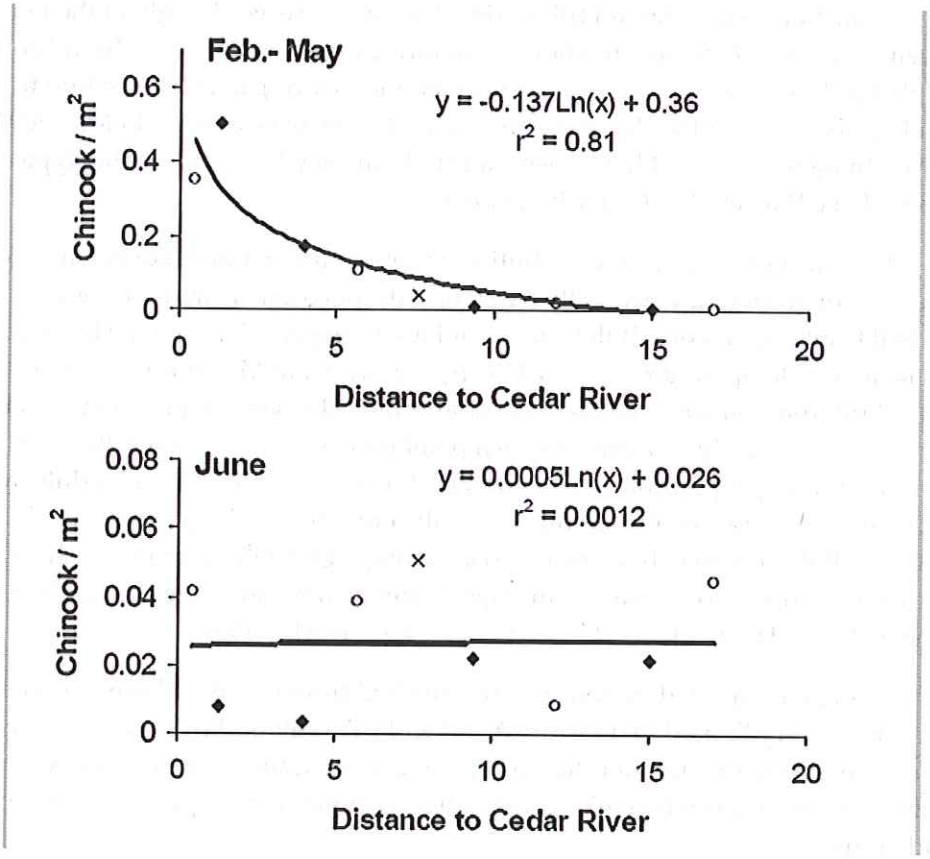

Figure 6. Relationship (logarithmic function) between the mean juvenile Chinook salmon density and the shoreline distance (km) to the mouth of the Cedar River in south Lake Washington, 2003.

From Tabor et al. 2006. West shoreline=o, east shoreline=♦, and Mercer Island=x.

In conclusion, juvenile Chinook salmon may migrate past the action area from January through September. However, based on the location of the action area, it is unlikely that significant numbers of Chinook salmon fry rear in the area. Chinook salmon parr and smolts likely use the area, but they tend to occur in the area later in the year and generally away from the shoreline. Adult Chinook salmon may pass through the action

area from June through September, but would not be expected in the nearshore area where pier construction work would occur.

5.2 Bull Trout

Native char are not commonly observed within Lake Washington. Bull trout are observed at the Ballard Locks every year with numbers observed or caught varying from three to nine fish per year (F. Goetz, pers. comm., 14 May 2004). Bull trout entering and exiting the ship canal would likely occur between February and June, with those fish coming from North Puget Sound tributaries. They are observed/caught at the Locks between May and July (note: little or no monitoring occurs at the Locks from February through April, so data are not available for that time period). In 2003, two bull trout were observed entering the ship canal in June (F. Goetz, pers. comm., 14 May 2004). In Lake Washington, bull trout have been captured during winter and spring, typically in the south Lake Washington/Cedar River area.

Little is known about bull trout distribution or habitat use within Lake Washington, and any current projections are generally based on extrapolation of similar information from other bull trout populations. Bull trout would not be expected within the littoral zone when nearshore temperatures exceed 15°C (generally, from May through mid-October). Juvenile bull trout remain in headwater streams until the onset of piscivory, at a body length of approximately 300 mm, at which point they migrate as subadults in search of improved foraging opportunities. Subadult bull trout often migrate with adults to headwater streams during the summer and fall, and return to larger rivers to overwinter. Bull trout may be attracted to spawning aggregations of prey fish. Many native char in populations from north Puget Sound exhibit anadromy, migrating to marine waters in late winter (F. Goetz, pers. comm., 14 May 2004).

In conclusion, the expected presence of juvenile bull trout in Lake Washington near the project area is very limited to unlikely. Adult and subadult bull trout would avoid the littoral zone during the summer due to excessive temperatures and are not expected to use the nearshore areas where pier construction activities for the proposed project would occur.

5.3 Steelhead

Steelhead are currently present in the watershed. The Cedar River and South Lake Washington Winter steelhead are identified as a discrete stock within the Puget Sound steelhead DPS. These steelhead are characterized as a native stock with wild production. Historic steelhead escapement for the Lake Washington basin was estimated at 1,816 in 1986 and has steadily declined since that time. In 2002 their stock status was adjusted downward from "depressed" to "critical" due to chronically low escapements and severe short-term declines in escapement in 2000 and 2001. The basin saw an average escapement of 33 returning steelhead from 1999 to 2013, with zero fish returning in 2009 and 2012 (WDFW electronic reference).

Steelhead likely spawned historically in many Lake Washington and Lake Sammamish tributaries. Adult steelhead may pass through the ship canal from February through June (City of Seattle 2008). The steelhead spawning period in the Lake Washington basin currently extends from March to September (City of Seattle 2008), with most adult fish in the run typically returning to the Cedar River. Both anadromous (steelhead) and resident (rainbow trout) life forms of *O. mykiss* (based on life history characteristics) are likely present in the Lake Washington basin.

Juveniles generally emigrate as smolts between April and June, after two years of stream residence. However, the duration of freshwater rearing can range from one to seven years before juveniles grow large enough (>170 mm) to undergo smoltification. Steelhead exhibit a highly variable anadromous life history. Steelhead in the Lake Washington basin are winter run fish, characteristic of coastal streams. They enter freshwater from November to April and spawn shortly thereafter (Busby et al. 1996).

Summer surface temperatures in the Lake Washington system often exceed the thermal preferences of most salmonids, including steelhead.

In conclusion, juvenile steelhead may be emigrating through Lake Washington throughout the year, but would likely not rear in Lake Washington. Adult steelhead would not be present in the action area until after the construction period had ended. The nearest stream with documented steelhead use is McAleer Creek, located approximately 0.5 km southwest of the project site.

6 Effects of the Action

The proposed project could potentially affect Chinook and coho salmon, bull trout and steelhead in generally similar manners. Effects may often occur through impacts to their forage species. Thus, unless otherwise noted, there will be no distinction between listed salmonids in the following discussion.

6.1 Direct Effects on Salmonids

1. **Noise:** The driving of piles for the new pier will produce temporary noise and vibration resulting from use of the barge, vibratory driver, and other construction equipment. Underwater noise from vibratory driving of piles will be greater than that of other construction equipment. Underwater noise generated from the vibratory pile driving would be expected to be less than 150 dB RMS (CALTRANS 2007). This estimate is based on results from vibratory driving of 12-inch steel piles in numerous marine projects throughout Northern California. Actual underwater noise from vibratory driving of new 6" steel piles would be expected to be even lower. Noise would be attenuated to a level below "effective quiet" and the

disturbance threshold for small fish (150 db) at a distance of approximately 33 feet from the project area (WSDOT 2014).

In conclusion, noise levels are not anticipated to cause direct injury to salmonids, although fish present within 33 feet of the project activities could display an avoidance response, which could force them away from preferred rearing areas. In order to minimize the impacts on Chinook and coho salmon, bull trout, and steelhead, the above timing restriction (no in-water construction from August 1st through November 15th and February 2nd through July 15th) would be followed. This restriction is adequate to minimize the probability that those species would be in the action area during construction. By constructing during the approved work windows, noise impacts are rendered insignificant and discountable.

2. **Habitat:** The proposed design will install a new walkway pier and boatlift, as well as native shoreline planting.

   Due to constraints of the lot, the proposed design would construct the pier in shallow water. Past studies in Lake Washington have found that during the period from mid-February to mid-April, juvenile Chinook salmon rear along shorelines less than 1.6 feet in depth and with less than 20 percent slopes (Tabor et al. 2006). However, based on the position of this property at the north end of Lake Washington, few Chinook salmon fry, which particularly depend on shallow waters would be expected to occur in the area (described Section 5.1).

   Juvenile Chinook salmon display avoidance behavior of piers. Surface water observations found that upon approaching a pier, juvenile Chinook salmon will move into deeper water and either pass under or swim around the pier (Tabor et al. 2006). Similarly, in acoustic tracking studies, Chinook smolts avoided areas under overwater structures and changed course to move around such structures (Celedonia et al. 2008). The change in light levels associated with piers and other overwater structures may make it difficult for juvenile Chinook salmon to detect predators (Tabor et al. 2006), and salmon predators like smallmouth bass are often associated with pier piles (Celedonia et al. 2008). Potential impacts to shallow water habitat and outmigration will be minimized through the narrow design of the pier with fully grated decking, both of which maximize light transmission. Potential predator structure is minimized by limiting the number and size of the steel pilings. The design alternates between one and two piles placed every 18 feet.

   Juvenile Chinook salmon prefer shoreline habitats with overhanging vegetation (Tabor et al. 2004, 2006). The area of overhanging vegetation will be increased by the proposed shoreline planting plan.

   Construction will disturb the benthic substrate within the immediate project area during the implementation of the project. This disturbance will be limited to the area immediately surrounding construction and significant turbidity is not expected to

result from installation of the pier. Boat activity in or adjacent to vegetated shallows has been documented to damage and/or destroy vegetated shallows (Fonseca et al. 1998). As stated above, the barge would not be permitted to ground.

In conclusion, potential impacts to nearshore habitat will be minimized through design of a narrow, fully grated pier, with widely spaced six-inch piles. Given the limited occurrence of Chinook salmon fry in the north end of the lake, the minimization measures and the proposed planting of native vegetation, the effects of the project on habitat are expected to be insignificant.

3. **Direct Mortality:** The potential to kill Chinook salmon, bull trout, steelhead, or coho salmon exists as long as they are present in the action area during construction and excavation activities. In order to minimize the project impacts on these salmonids, the previously stated timing restriction (no in-water construction at a minimum from August 1st through November 15th and February 2nd through July 15th) would be followed. This restriction is adequate to minimize the probability that salmonids would be in the action area during construction activities such that potential for direct mortality is discountable.

6.2 Indirect Effects on Salmonids

The effects resulting from the activity that are later in time could include changes in water quality experienced by juvenile salmonids.

1. **Water Quality:** Rigid-stemmed vegetation helps filter nutrients and contaminants from upland runoff, contributing to improved water quality conditions in the lake over time. The proposed project will increase the density and aerial coverage of vegetation along the majority of the shoreline on the property, potentially resulting in modest improvements to nearshore water quality.

2. **Habitat:** Vegetation will be installed along the majority of the shoreline. As the vegetation matures, detritus and terrestrial insect input from the overhanging vegetation will eventually increase allochthonous food supply for juvenile salmon. Thus, the implementation of this shoreline restoration will likely improve foraging conditions for juvenile salmonids in the action area.

6.3 Effects to Critical Habitat

6.3.1 Chinook Salmon

Critical habitat was designated for the Puget Sound Chinook salmon DPS on 2 September 2005 (U.S. Federal Register), specifically including the Lake Washington sub-basin (Watershed Code 1711001203). Critical habitat includes areas with physical or biological features essential to the conservation of the species and which may require special management considerations or protection. Primary constituent elements of Chinook salmon critical habitat are listed as:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
2. Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
3. Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.
4. Estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation.
5. Nearshore marine areas free of obstruction with water quality and quantity conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation; and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels.
6. Offshore marine areas with water quality conditions and forage, including aquatic invertebrates and fishes, supporting growth and maturation.

Project activities that introduce or remove physical elements to and/or from Lake Washington, or that contribute to short-term changes in water quality, may alter certain primary constituent elements (Table 3). For the proposed project, this includes the pier installation.

Table 3. Assessment of primary constituent elements for Chinook salmon.

Primary Constituent Elements	Direct, Indirect, Interrelated and Interdependent Effects
1. Freshwater spawning	Typically not applicable in a lake environment. Chinook rarely spawn in Lake Washington. The same threats exist under the present site conditions and no change in usage of the site would occur with the proposed project.
2. Freshwater rearing	The proposed project may impair shoreline foraging and refuge habitat for juvenile Chinook salmon during construction activities. Impacts will be minimized appropriately by following the conservation measures and timing restrictions mentioned previously. The proposed pier would be located in shallow water. Impacts of the overwater structure will be minimized by using fully grated

Primary Constituent Elements	Direct, Indirect, Interrelated and Interdependent Effects
	decking, a narrow deck width, and maximum pile spacing. The project will improve freshwater rearing by planting native riparian vegetation along the shoreline. Overhanging vegetation provides shade as well as detritus and terrestrial insect inputs.
3. Freshwater migration	Juvenile and adult Chinook salmon migrate past the project site. The proposed project may result in avoidance behavior during and following pier construction. Impacts will be minimized by following the conservation measures and timing restrictions mentioned previously.
4. Estuarine areas	The project would have no effect on estuarine areas.
5. Nearshore marine areas	The project would have no effect on nearshore marine areas.
6. Offshore marine areas	The project would have no effect on offshore marine areas.

As stated in Table 3, it is unlikely that Chinook salmon would migrate past the project site during the construction period. Proposed impact minimization measures would minimize impacts to nearshore foraging and migratory conditions for juvenile Chinook salmon. Given the direct, indirect, interrelated, and interdependent effects from the proposed action, the proposed project:

- **may affect, but is not likely to adversely affect the critical habitat of the Puget Sound Chinook salmon DPS.**

6.3.2 Bull Trout

The action area includes critical habitat for bull trout, which has been defined for lakes as "the perimeter of the water body as mapped on standard 1:24,000 scale maps" (U.S. Federal Register, 26 September 2005). The action area is in the *Puget Sound Unit* (Unit 28), *Lake Washington CHSU* (critical habitat subunit). Bull trout critical habitat includes these primary constituent elements (excerpted from the final rule, U.S. Federal Register, 26 September 2005):

1. Water temperatures ranging from 36 to 59 [deg]F (2 to 15 [deg]C), with adequate thermal refugia available for temperatures at the upper end of this range. Specific temperatures within this range will vary depending on bull trout life history stage and form, geography, elevation, diurnal and seasonal variation, shade (such as that provided by riparian habitat), and local groundwater influence;

2. Complex stream channels with features such as woody debris, side channels, pools, and undercut banks to provide a variety of depths, velocities, and instream structures;

3. Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. A minimal amount of fine substrate less than 0.25 in (0.63 cm) in diameter and minimal substrate embeddedness are characteristic of these conditions;

4. A natural hydrograph, including peak, high, low, and base flows within historic ranges or, if regulated, a hydrograph that demonstrates the ability to support bull trout populations by minimizing daily and day-to-day fluctuations and minimizing departures from the natural cycle of flow levels corresponding with seasonal variation;

5. Springs, seeps, groundwater sources, and subsurface water connectivity to contribute to water quality and quantity;

6. Migratory corridors with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows;

7. An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish;

8. Few or no nonnative predatory, interbreeding, or competitive species present; and

9. Permanent water of sufficient quantity and quality such that normal reproduction, growth and survival are not inhibited.

According to the Federal Register, Lake Washington "provides FMO [foraging, migratory and overwintering] habitat for amphidromous bull trout outside of currently delineated core areas in the Puget Sound Recovery Unit." Project activities that introduce or remove physical elements from the lake, or that contribute to short-term changes in water quality may alter certain primary constituent elements (Table 4).

Table 4. Assessment of primary constituent elements for bull trout.

Primary Constituent Elements (PCEs)	Direct, Indirect, Interrelated and Interdependent Effects
1. Water temperature	The project would have no effect on water temperature.
2. Complex stream channel	N/A in a lake environment.
3. Substrate	N/A in a lake environment.
4. Natural hydrograph	The project would have no effect on the natural hydrograph.
5. Spring, seeps, groundwater sources and subsurface water connectivity	The project would have no effect on groundwater sources or connectivity.
6. Migratory corridors with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering and foraging habitats	The proposed project would not create any barrier to migration, particularly as lake bull trout are larger fish that are not generally subject to predation-pressure and are not oriented near the shoreline.
7. Abundant food base	The project would have little to no effect on food supplies.

Primary Constituent Elements (PCEs)	Direct, Indirect, Interrelated and Interdependent Effects
8. Few or no nonnative predatory, interbreeding, or competitive species	The proposed project is not expected to increase populations of any predatory, interbreeding or competitive species.
9. Permanent water of sufficient quantity and quality such that normal reproduction, growth and survival are not inhibited.	The same threats exist under the present site conditions with some change in recreational usage of the site expected as a result of the proposed project. Impacts will be minimized appropriately by following the conservation measures and timing restrictions mentioned previously.

Given the direct, indirect, interrelated, and interdependent effects from the proposed action, the proposed project:

- **may affect, but is not likely to adversely affect the critical habitat for the Coastal-Puget Sound bull trout DPS.**

6.3.3 Steelhead

Critical habitat was proposed for Puget Sound steelhead on January 14, 2013 (Federal Register). The entire Lake Washington watershed was excluded from the proposed critical habitat area for economic reasons. Because steelhead critical habitat is not proposed for Lake Washington, the project will have no effect on proposed critical habitat for steelhead.

6.4 Cumulative Impacts

Cumulative impacts were assessed through the review of aerial photos and a site visit. Any plans for activities subject to local, but not federal, regulation would comply with all applicable ordinances governing construction and soil disturbance near water. These regulations are becoming increasingly restrictive to the benefit of sensitive fish and wildlife in response to the listings of Chinook salmon, bull trout, and steelhead, and the potential listing of coho salmon in the future. There are no significant wildlife habitats or special habitat elements present on the property that would be disturbed by any foreseeable activity.

Waterward of the OHWM in the action area, future activities include recreational boating/activities and ongoing moorage of boats along nearby docks. Projections of activities not under federal regulation on properties adjacent to the action area are speculative at best. Changes in presently ongoing activities are not expected.

7 DETERMINATION OF EFFECT

Several measures of the proposed project will be implemented to avoid, minimize, and offset potential impacts. These include: timing the project to occur during a period when listed salmonids are least likely to be present in the action area and implementing

measures to minimize habitat disturbance. Because these measures will be implemented, potential effects of the proposed project are expected to be insignificant or discountable, as described in Section 6.

Therefore, given the direct, indirect, interrelated, and interdependent effects from the proposed action, the proposed project **may affect, but is not likely to adversely affect, Chinook salmon, bull trout and steelhead**. Species specific effect determination details are provided below.

7.1 Chinook Salmon

The project may affect Puget Sound Chinook salmon because:

- Summer/fall-run Chinook are documented in Lake Washington
- Juvenile Chinook may be migrating past the action area from January through September and adult Chinook may pass through the action area from June through September.

The project is not likely to adversely affect Puget Sound Chinook salmon because:

- Few Chinook salmon fry, which prefer shallow waters, are expected to occur in the action area as a result of the distance of the site from the Cedar River mouth. Adult Chinook salmon would not be expected in the shallow nearshore area where pier installation would occur.
- In-water work will be limited to the approved work window when Chinook salmon are least likely to be present.
- Habitat impacts will be minimized by using fully grated decking and a narrow width for light transmission and limiting the number and size of supportive steel pilings used.
- Native vegetation will be planted along the shoreline.

7.2 Bull Trout

The project may affect Coastal-Puget Sound bull trout because:

- Coastal-Puget Sound bull trout are documented as occurring in Lake Washington. Therefore, though unlikely, bull trout could be present within the action area.

The project is not likely to adversely affect Coastal-Puget Sound bull trout because:

- The presence of juvenile or spawning bull trout in Lake Washington is unlikely. Adult and subadult bull trout are not expected to use the nearshore areas where construction activities for the proposed project would occur.

- In-water work will be limited to the approved work window per the protection policies of NOAA Fisheries, USFWS, and WDFW for bull trout.
- Habitat impacts will be minimized by using fully grated decking and a narrow width for light transmission and limiting the number and size of supportive steel pilings used.
- Native vegetation will be planted along the shoreline.

7.3 Steelhead

The project may affect Puget Sound steelhead because:

- Puget Sound steelhead occur in Lake Washington. Juveniles may emigrate through the lake at any time of the year and could be present within the action area.

The project is not likely to adversely affect Puget Sound steelhead because:

- Steelhead are not expected to use the shallow nearshore areas where construction activities for the proposed project would occur.
- In-water work will be limited to the approved work window when steelhead are least likely to be present.
- Habitat impacts will be minimized by using fully grated decking and a narrow width for light transmission and limiting the number and size of supportive steel pilings used.
- Native vegetation will be planted along the shoreline.

7.4 Critical Habitat

Given the direct, indirect, interrelated, and interdependent effects from the proposed action, the proposed project **may affect, but is not likely to adversely affect** the designated critical habitat of the Puget Sound Chinook salmon and Coastal-Puget Sound bull trout. Species specific effect determination details are provided below.

7.4.1 Chinook Salmon

A may affect determination is warranted for Puget Sound Chinook salmon critical habitat because:

- The project occurs in a designated critical habitat area.
- Primary constituent elements for Chinook salmon critical habitat that are in the project action area include freshwater rearing and migration.

The project is not likely to adversely affect Puget Sound Chinook salmon critical habitat because:

- In-water work will be limited to the approved work window when Chinook are least likely to be present.
- Habitat impacts will be minimized by using fully grated decking and a narrow width for light transmission and limiting the number and size of supportive steel pilings used.
- Native vegetation will be planted along the shoreline.

7.4.2 Bull Trout

A may affect determination is warranted for Coastal-Puget Sound bull trout critical habitat because:

- The project occurs in a designated critical habitat area.
- According to the Federal Register, Lake Washington "provides FMO [foraging, migratory and overwintering] habitat for amphidromous bull trout outside of currently delineated core areas in the Puget Sound Recovery Unit."

The project is not likely to adversely affect Coastal-Puget Sound bull trout habitat because:

- In-water work will be limited to the approved work window when bull trout are least likely to be present.
- Habitat impacts will be minimized by using fully grated decking and a narrow width for light transmission and limiting the number and size of supportive steel pilings used.
- Native vegetation will be planted along the shoreline.

7.5 Effect Determinations Summary

Determination of effect for all species and their respective assessment areas are listed in Table 5. The proposed pier installation and shoreline planting project may affect, but is not likely to adversely affect, Puget Sound Chinook salmon, Coastal-Puget Sound bull trout and Puget Sound steelhead.

Given the direct, indirect, interrelated, and interdependent effects from the proposed action, the proposed project would not adversely modify the critical habitat of the Puget Sound Chinook salmon or the Coastal-Puget Sound bull trout.

Table 5. Determination of Effect.

Species	Overall Project Effect	Effect on Critical Habitat
Puget Sound DPS Chinook salmon	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Coastal-Puget Sound DPS Bull trout	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Puget Sound DPS Steelhead	May affect, not likely to adversely affect	No Effect

8 ESSENTIAL FISH HABITAT

The following is a description of Pacific salmon essential fish habitat (EFH) per the federal Fisheries Management Plan (FMP). EFH for the Pacific coast salmon fishery means those waters and substrate necessary for salmon production needed to support a long-term sustainable salmon fishery and salmon contributions to a healthy ecosystem. To achieve that level of production, EFH includes all those streams, lakes, ponds, wetlands, and other currently viable water bodies and most of the habitat historically accessible to salmon in Washington, Oregon, Idaho, and California. Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds wetlands, and other water bodies currently or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the Pacific Fishery Management Council), and longstanding, naturally-impassable barriers (e.g., natural waterfalls in existence for several hundred years).

Pacific salmon EFH relates to habitats used by Chinook, coho, and pink salmon. Within the Lake Washington basin, pink salmon are not present. Discussions regarding EFH related to Pacific salmon present in the Lake Washington basin are indirectly included in this Biological Evaluation (BE) through discussions of potential effects to Chinook salmon. The information below identifies where these discussions are located within this BE, provides additional information related to the life histories of coho salmon, and concludes with a determination of effect. In accordance with prior concurrence letters from NOAA Fisheries, this discussion should be considered sufficient to make this determination.

8.1 Project Description

The project description and location are described within Section 2 of the BE. This description gives a thorough explanation of the pier installment activities. Pacific salmon species of interest related to EFH in the project area are Chinook and coho salmon (U.S. Federal Register 15 October 2008).

8.2 EFH Conservation Measures

The following impact minimization measures are being incorporated into the proposed project in order to reduce the collective impact of the project on salmonids:

1. Timing Restriction: In-water work will be limited to the period between November 16th through February 1st or July 16th through July 31st, per the protection policies of the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (USFWS), and Washington Department of Fish and Wildlife (WDFW). This work window is adequate to minimize the probability that Chinook and coho salmon would occur within the action area.

2. Nearshore Habitat: Impacts to nearshore fish habitat will be minimized through design of a narrow, fully grated pier. The size and number of piles will be minimized to limit effects on in-water structure. The pier is designed to be the minimum length necessary to reach a depth of 5 feet at high water.

3. Shoreline Vegetation: Shoreline vegetation an average of ten feet in width landward from the OHWM will be planted along 75 percent of the length of the shoreline. The planting plan includes native trees, shrubs, grasses, and groundcovers that will be planted adjacent to the shoreline.

8.3 Species Description and Site Use

8.3.1 Chinook Salmon

A description of the life histories and site use of Chinook salmon is provided in Section 5.1 of the BE.

8.3.2 Coho Salmon

In the Lake Washington watershed, coho salmon are broken into two stocks: 1) the Cedar River, and 2) the Lake Washington/Sammamish River Tributaries (WDFW electronic reference). Adult coho salmon migrate through Lake Union and the ship canal to reach tributaries suitable for spawning from late-September through November. Adults spawn from October through February, peaking between November and December in most tributaries (City of Seattle 2008).

Most juvenile coho enter Lake Washington from tributaries as smolts (average length >100 mm) in mid-May to late June or as young-of-year fish (City of Seattle 2008). Beak Consultants Incorporated (1998) reported that the peak coho smolt migration from the Sammamish River into Lake Washington occurs April through mid-May, coinciding with releases from the Issaquah hatchery. In general, peak coho outmigration takes place in May (Weitkamp et al. 1995). Thus, the majority of juvenile coho are not rearing in Lake Washington for extended periods; rather, they are emigrating via the ship canal, only spending a matter of days in the system before transitioning to saltwater (City of Seattle 2008). However, a small number of coho juveniles have been found to migrate

out of the Lake Washington system one or two years later than the bulk of the population (DeVries et. al. 2005). This variation in juvenile salmonid emigration timing may be attributable to increasing water temperatures, primarily caused by increasing air temperatures throughout the northwest (Wetherbee and Houck 2000). Smolts may respond to water temperatures through: 1) avoidance (~15°C), 2) smoltification ability (15-16°C), and 3) changes in growth (19-20°C) (City of Seattle 2008). Juvenile coho may avoid the high temperatures in the littoral zone during the summer, and are likely to migrate from the littoral zone or from the lake before water temperatures exceed 17°C, which often occurs in shallow areas by mid- to late-June.

In conclusion, juvenile coho may be emigrating through Lake Washington from mid-March through June. Given the life-history strategy of juvenile coho salmon, juvenile rearing in the action area is not expected. Adult coho may be in the action area from August to December, but would not be expected in the nearshore area where pier construction activities would occur. The nearest stream with documented coho use is McAleer Creek, located approximately 0.5 km southwest of the project site.

8.4 Effects of the Project

A description of the effects of the project are described in Section 6 of this BE. The potential effects to coho salmon are expected to be the same as those described for listed salmonids in Section 6. As described in Section 6 of the BE, potential direct effects are related to habitat disturbance from the installation of the pier; nearshore habitat improvements from planting native riparian vegetation; and the potential to kill salmonids as long as they are present in the action area during construction activities. Potential indirect effects may include improving water quality, and increasing the supply of allochthonous material to the nearshore through the shoreline revegetation plan. In addition, the potential for new or increased boat activity associated with the pier may have negative impacts on water quality.

Conclusion: All of the proposed project's potential impacts on Pacific salmon EFH are considered collectively. While there are both beneficial and detrimental effects that could result from the proposed project, the detrimental effects have been minimized. Thus, the collective impact of the proposed project:

- **will not adversely affect, Pacific salmon EFH.**

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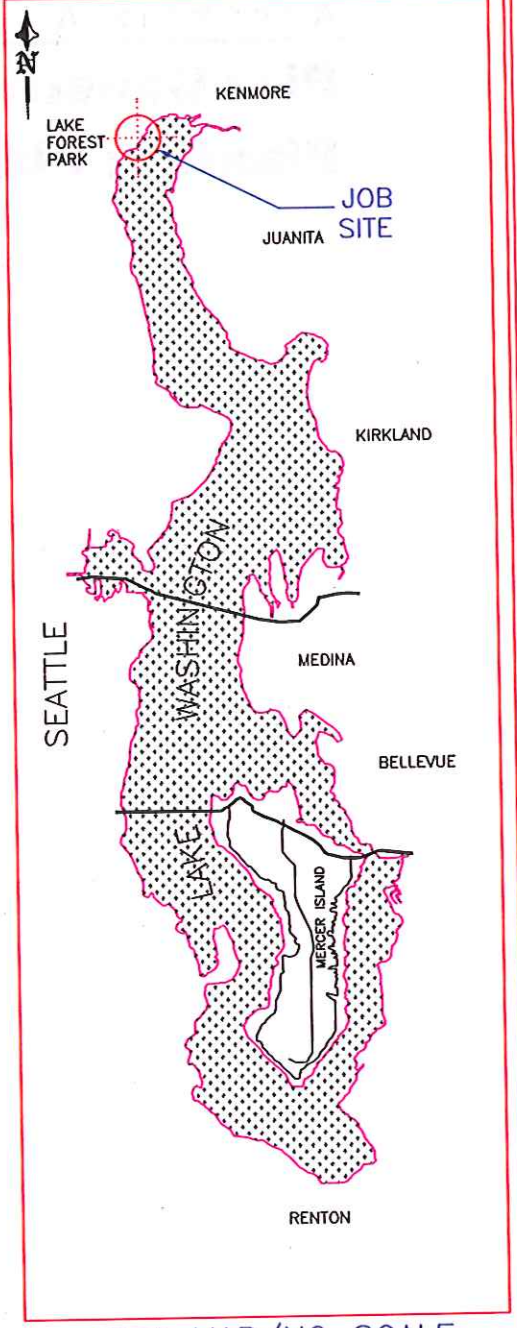
APPENDIX A

Pier Construction and Shoreline Planting Plans

PROJECT DESIGNED BY:

Waterfront Construction Inc.

VICINITY MAP/NO SCALE



AREA MAP/NO SCALE

LEGAL DESCRIPTION

1/4 SEC: SE10 26N 04E
TAXLOT #: 4030100055
LAT: 47.753434 (47°45'12.3618")
LONG: -122.274141 (122°16'29.9076")

LAKE FOREST PARK WATERFRONT ADDITION, NORTH EASTERLY 50 FT OF SWLY 289.45 SH LDS ADJ

PURPOSE: PROPERTY ENHANCEMENT WITH NEW DOCK

DATUM: COE 0.0' EST 1919

ADJACENT OWNERS:

1. SHNEIDMAN, DAVID & DANITA
   17356 BEACH DR
   LAKE FOREST PARK 98155
2. TURNER, TOD CHARLES
   17347 BEACH DR
   LAKE FOREST PARK 98155

PROJECT NAME: FUDGE, T.J.

REFERENCE #:

SITE LOCATION ADDRESS:

17350 BEACH DRIVE
LAKE FOREST PARK WA. 98155

DWG#: 14-32052-A.1-1

PROPOSED:

STRAIGHT GRATED WALKWAY PIER, BOAT LIFT AND JET SKI LIFTS

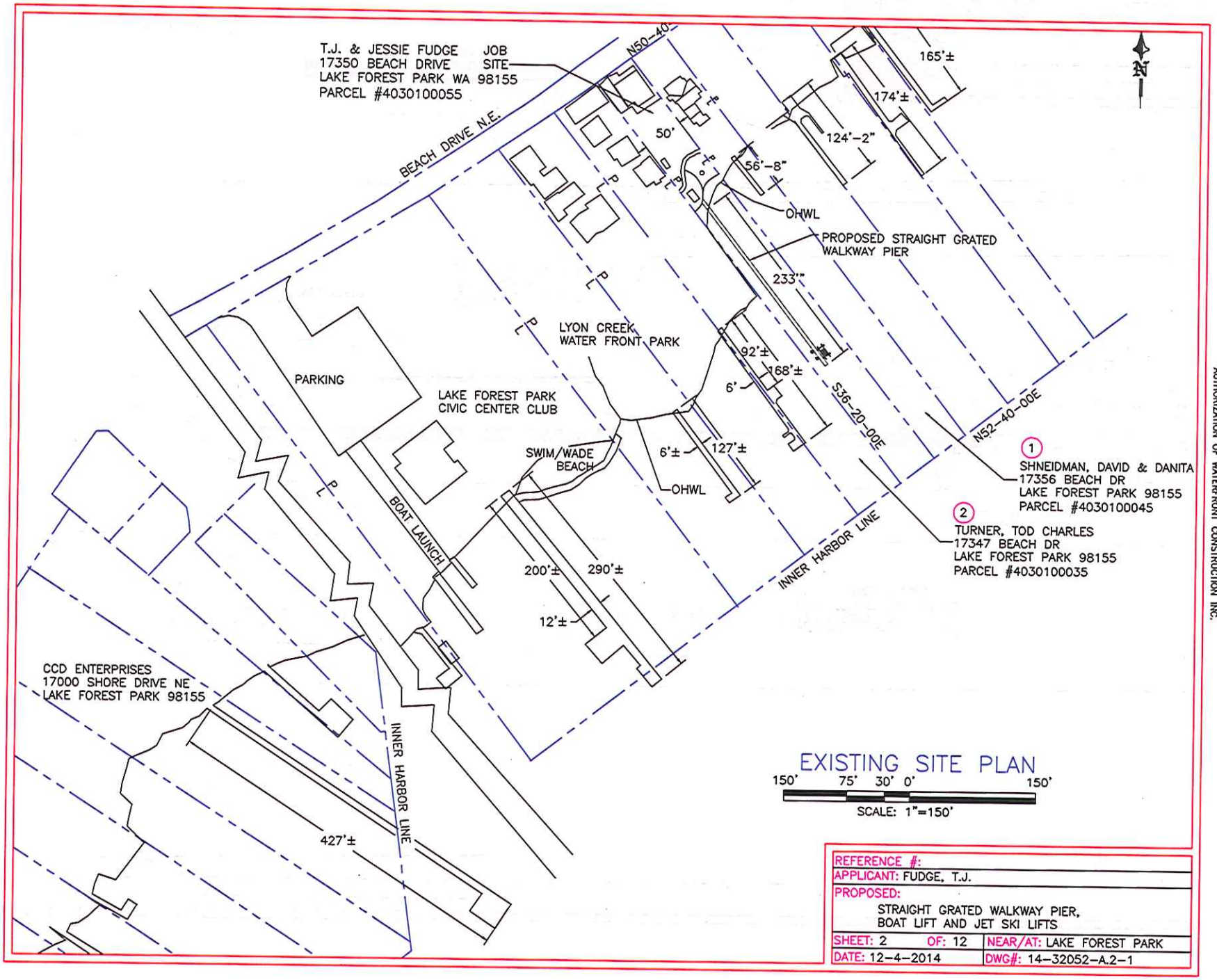
IN: LAKE WASHINGTON

NEAR/AT: LAKE FOREST PARK

COUNTY: KING | STATE: WA

APPL BY: FUDGE, T.J.

SHEET: 1 OF: 12 | DATE: 12-4-2014



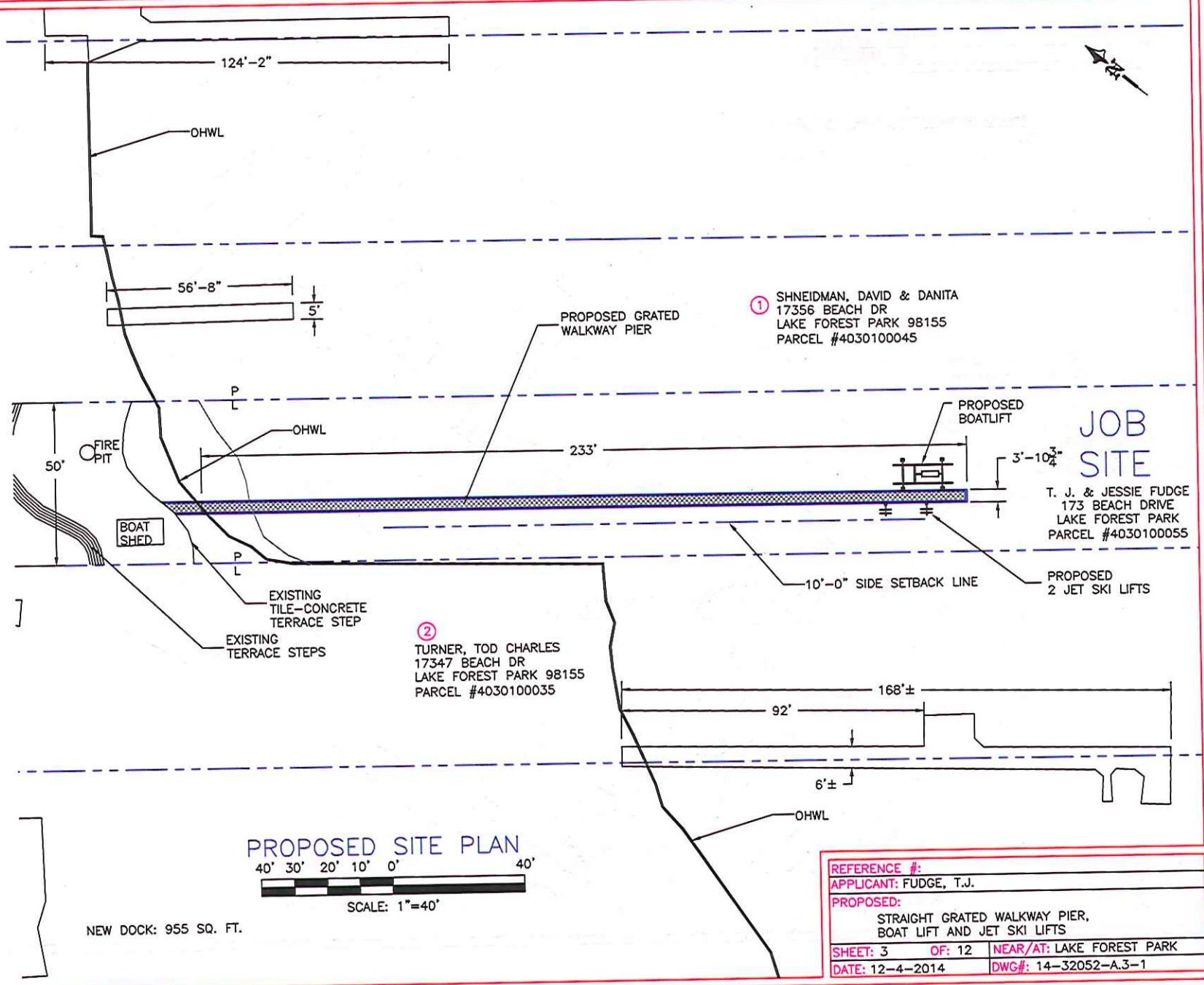
EXISTING SITE PLAN

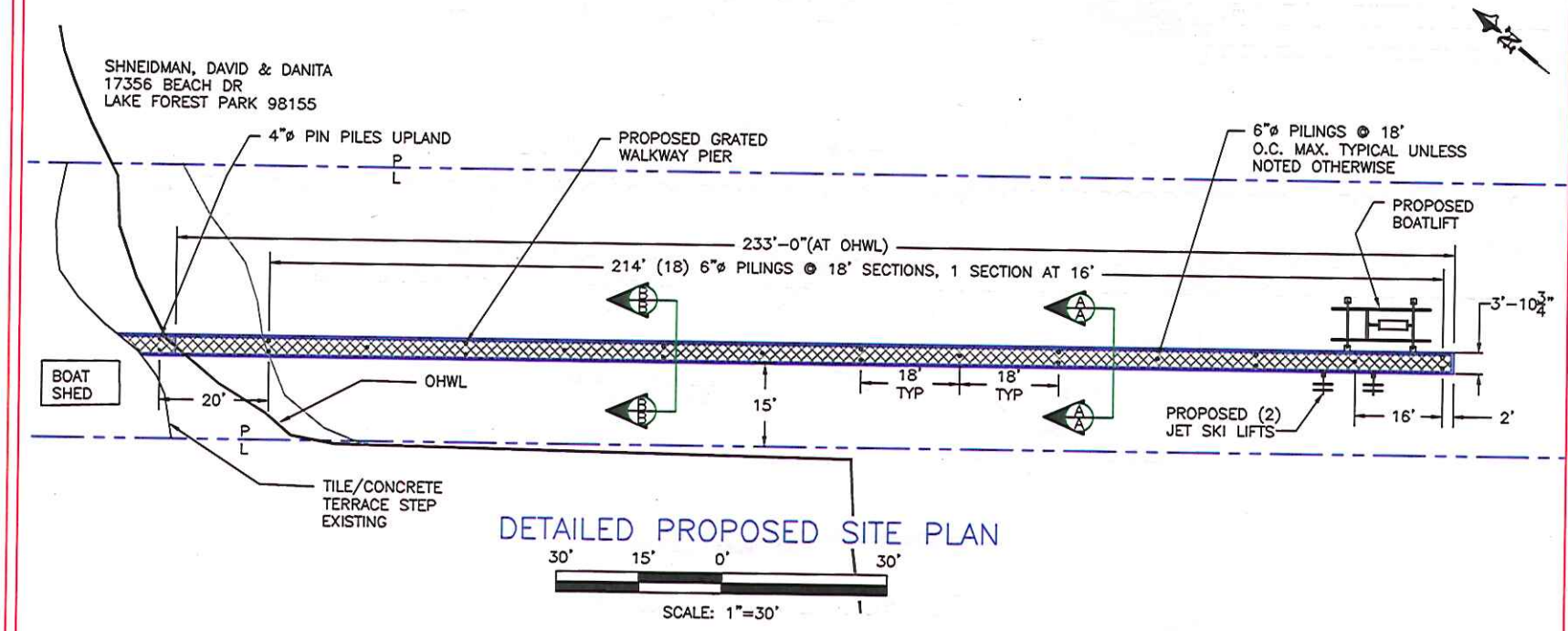
150' 75' 30' 0' 150'

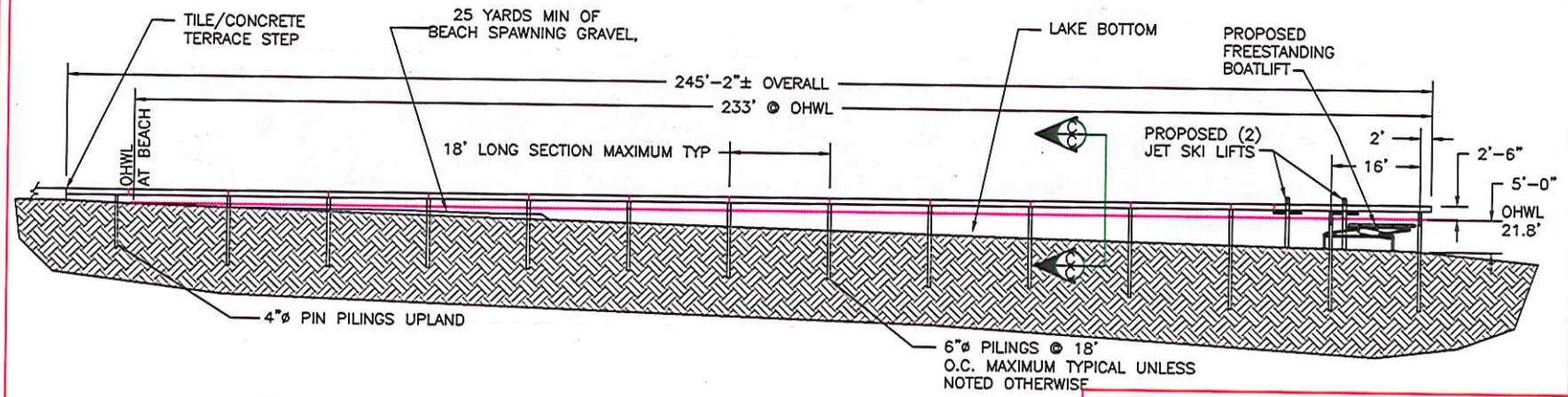
SCALE: 1"=150'

REFERENCE #:	
APPLICANT: FUDGE, T.J.	
PROPOSED: STRAIGHT GRATED WALKWAY PIER, BOAT LIFT AND JET SKI LIFTS	
SHEET: 2 OF: 12	NEAR/AT: LAKE FOREST PARK
DATE: 12-4-2014	DWG#: 14-32052-A.2-1

PROJECT DESIGNED BY:
Waterfront Construction Inc.





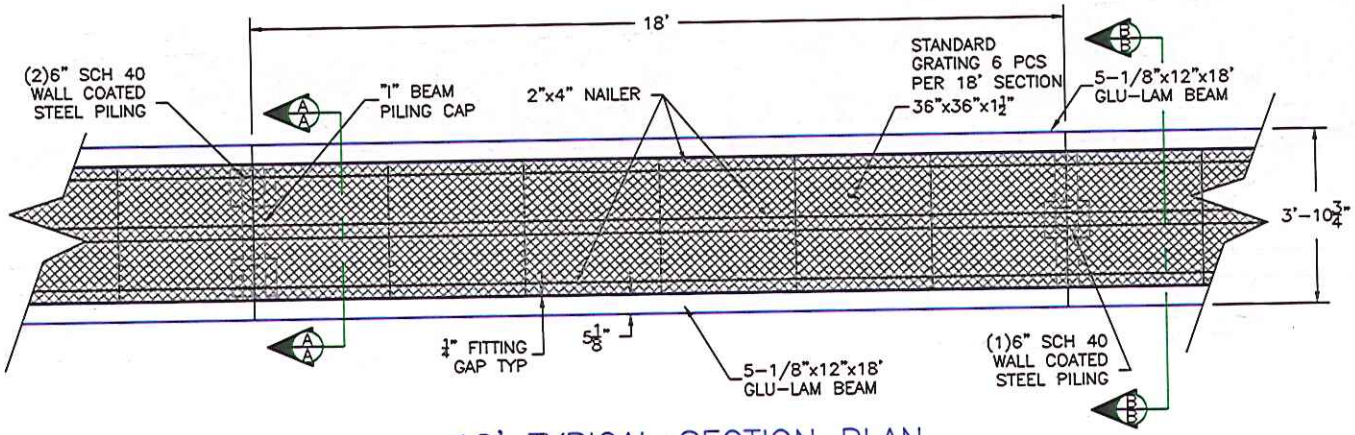


DETAILED PROPOSED ELEVATION

30' 15' 0' 30'

SCALE: 1"=30'

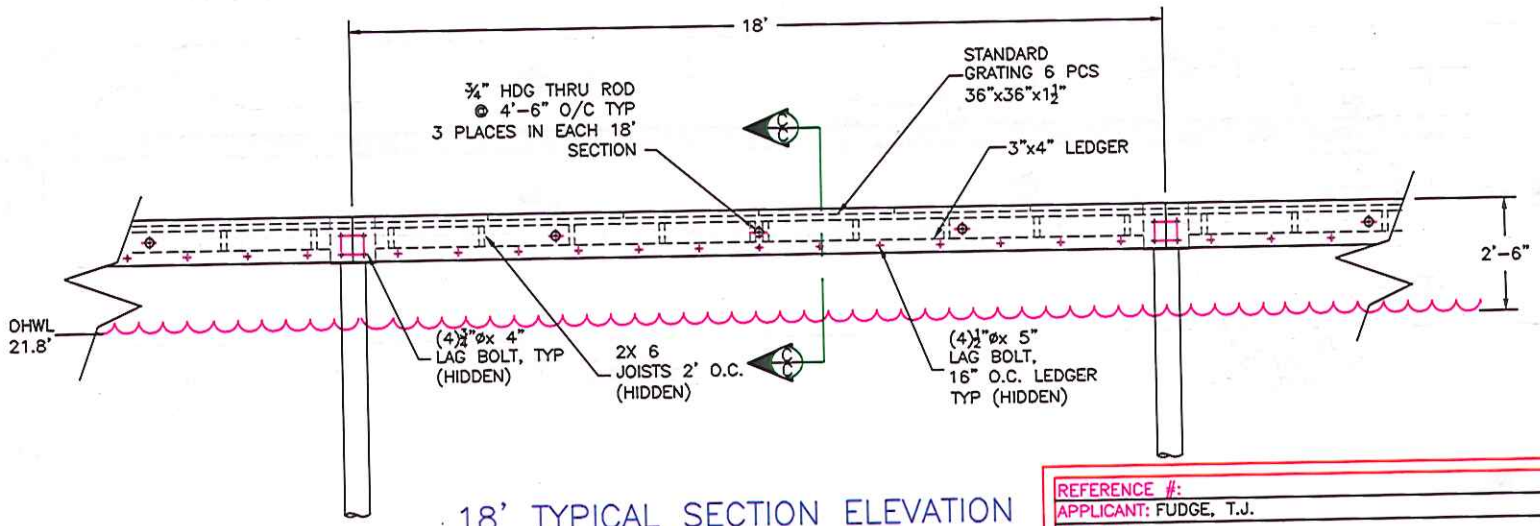
REFERENCE #:	
APPLICANT: FUDGE, T.J.	
PROPOSED: STRAIGHT GRATED WALKWAY PIER, BOAT LIFT AND JET SKI LIFTS	
SHEET: 4 OF: 12	NEAR/AT: LAKE FOREST PARK
DATE: 12-4-2014	DWG#: 14-32052-A.4-1



18' TYPICAL SECTION PLAN

4' 3' 2' 1' 0' 4'

SCALE: 1/4"=1'



18' TYPICAL SECTION ELEVATION

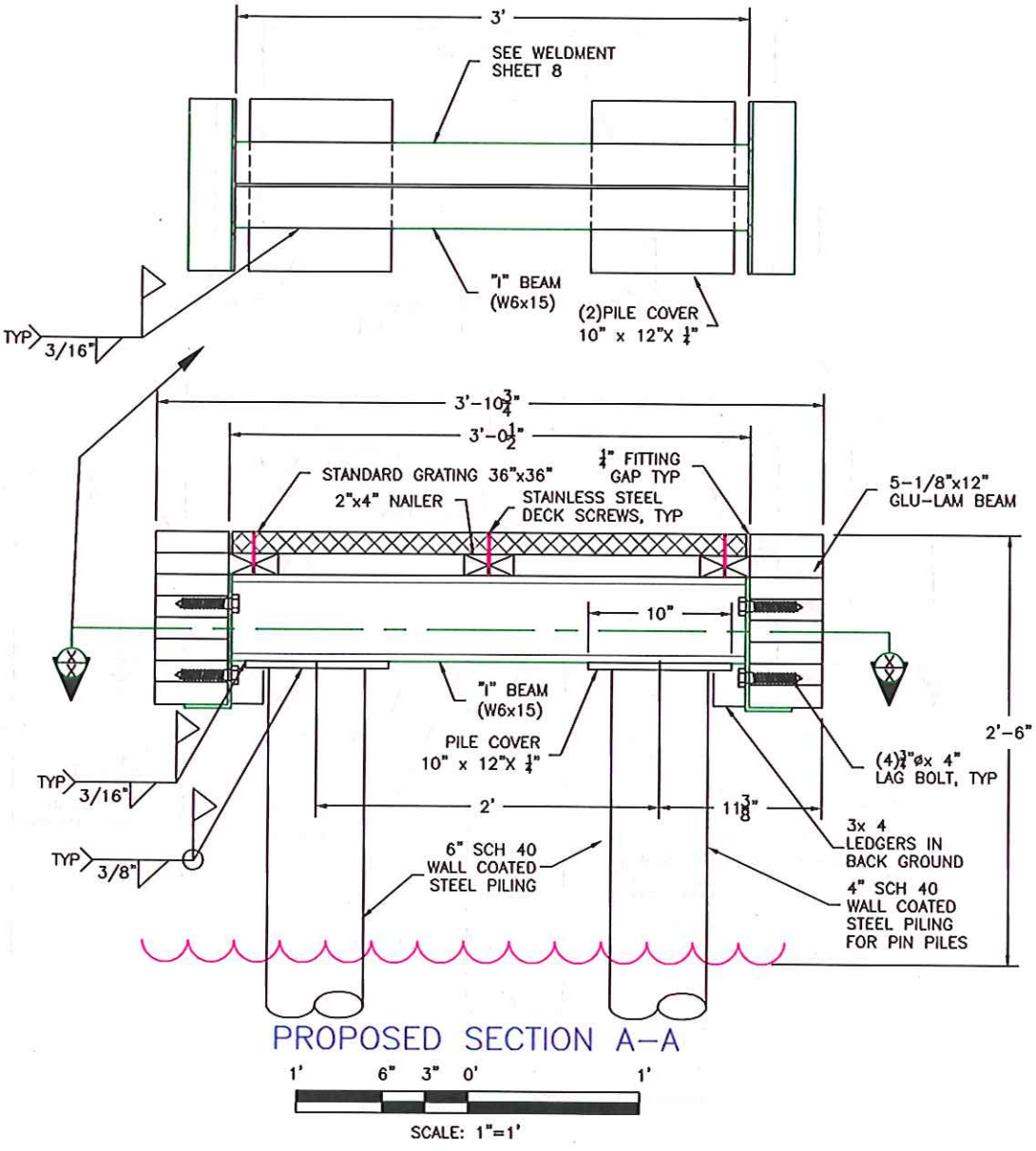
4' 3' 2' 1' 0' 4'

SCALE: 1/4"=1'

REFERENCE #:	
APPLICANT: FUDGE, T.J.	
PROPOSED: STRAIGHT GRATED WALKWAY PIER, BOAT LIFT AND JET SKI LIFTS	
SHEET: 5 OF: 12	NEAR/AT: LAKE FOREST PARK
DATE: 12-4-2014	DWG#: 14-32052-A.5-1

PROJECT DESIGNED BY: Waterfront Construction Inc.

PROJECT DESIGNED BY:
Waterfront Construction Inc.

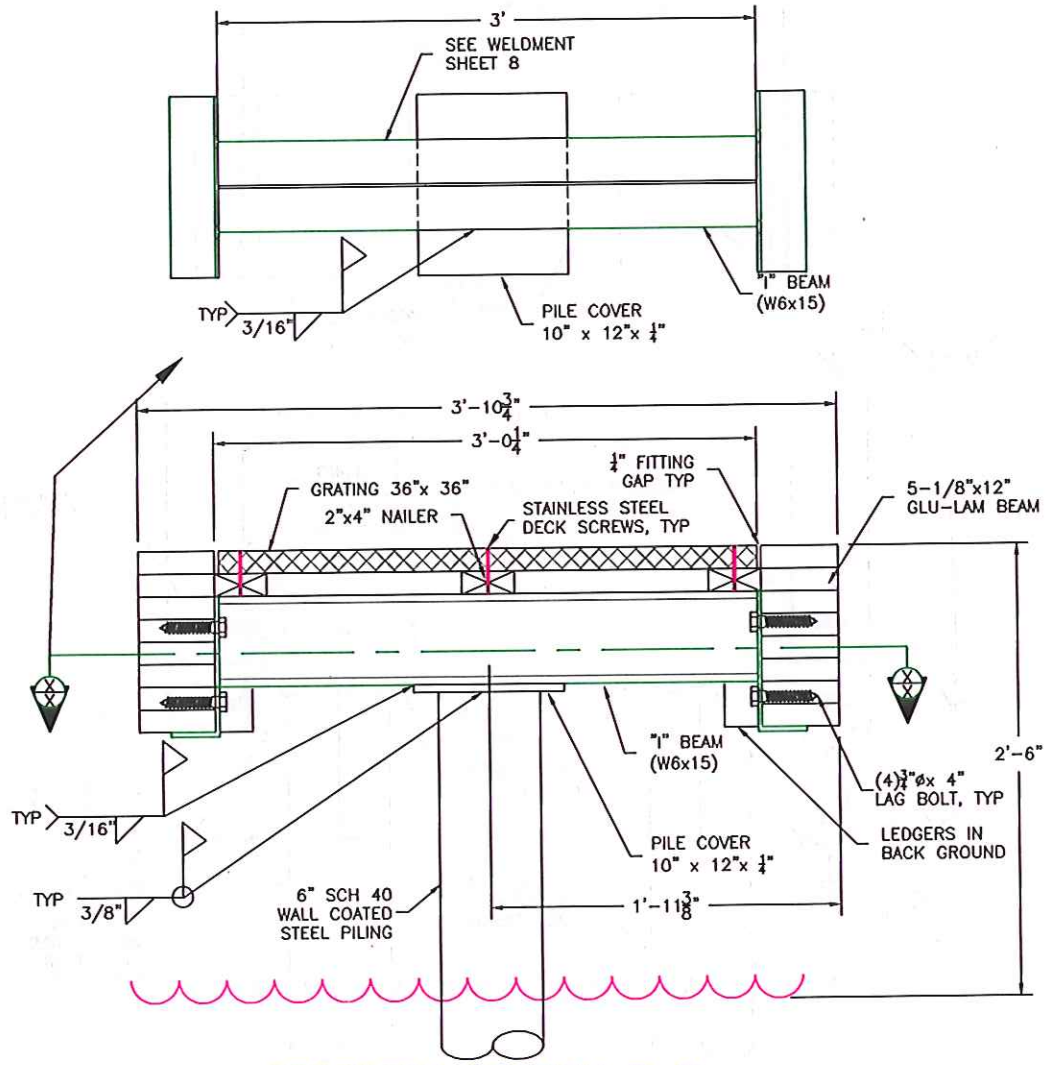


PROPOSED SECTION A–A

1' 6" 3" 0' 1'

SCALE: 1"=1'

REFERENCE #:	
APPLICANT: FUDGE, T.J.	
PROPOSED: STRAIGHT GRATED WALKWAY PIER, BOAT LIFT AND JET SKI LIFTS	
SHEET: 6 OF: 12	NEAR/AT: LAKE FOREST PARK
DATE: 12-4-2014	DWG#: 14-32052-A.6-1

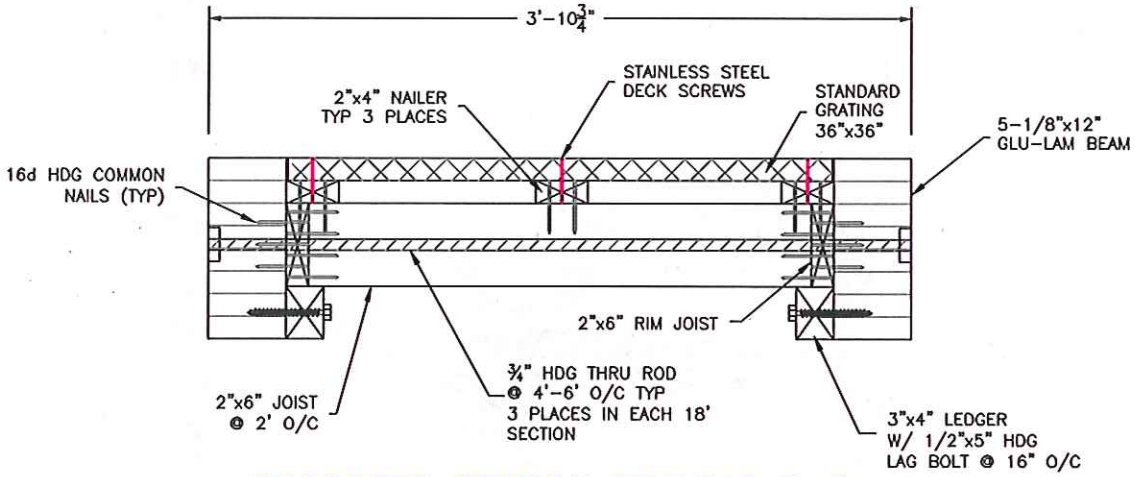


PROPOSED SECTION B–B

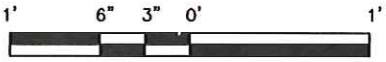
1' 6" 3" 0' 1'

SCALE: 1"=1'

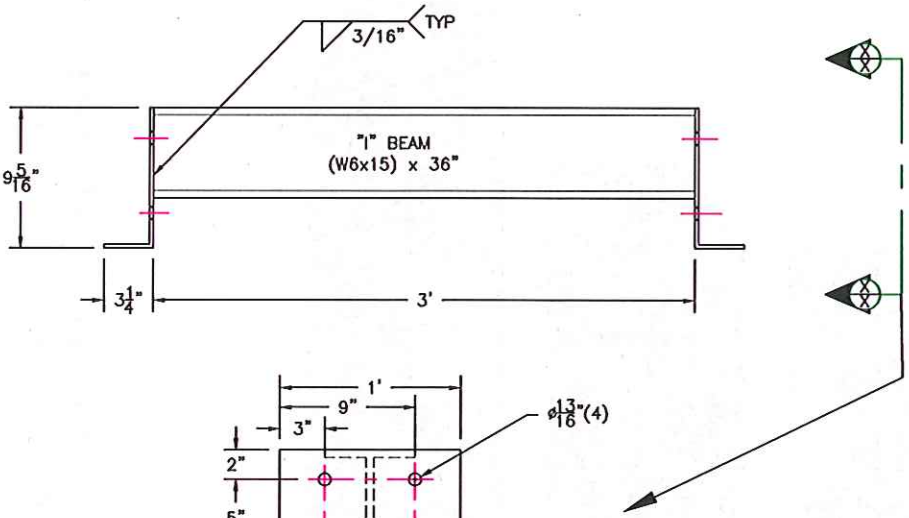
REFERENCE #:	
APPLICANT: FUDGE, T.J.	
PROPOSED: STRAIGHT GRATED WALKWAY PIER, BOAT LIFT AND JET SKI LIFTS	
SHEET: 7 OF: 12	NEAR/AT: LAKE FOREST PARK
DATE: 12-4-2014	DWG#: 14-32052-A.7-1



PROPOSED SECTION FRAMING C-C

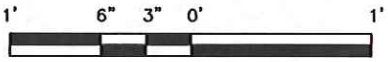


SCALE: 1"=1'



BENT PLATE
MAKE 2 EACH-28 TOTAL

PIER CAP WELDMENT
GALVANIZE AFTER FAB
MAKE 14



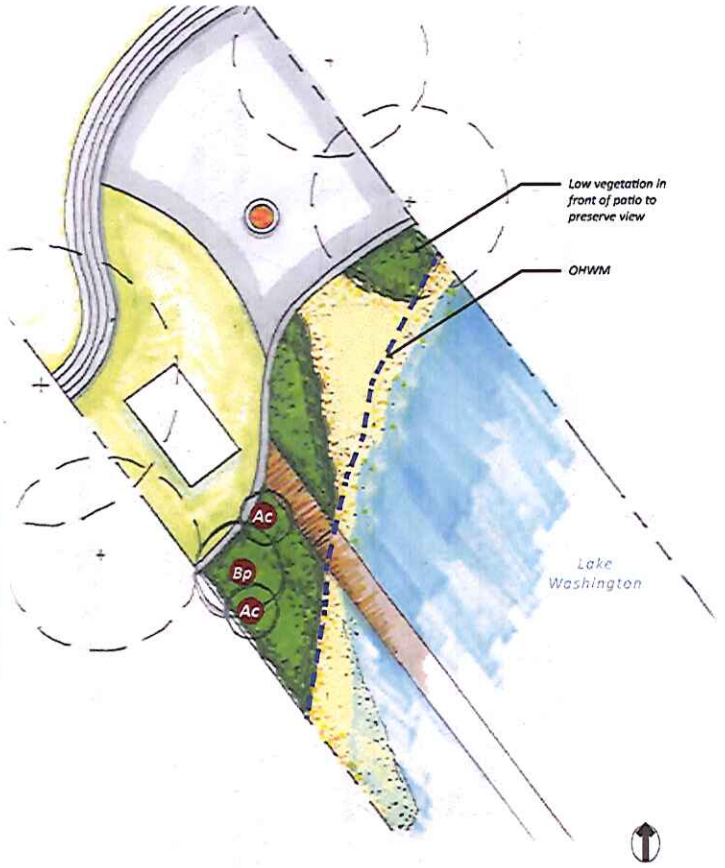
SCALE: 1"=1'

REFERENCE #:	
APPLICANT: FUDGE, T.J.	
PROPOSED: STRAIGHT GRATED WALKWAY PIER, BOAT LIFT AND JET SKI LIFTS	
SHEET: 8 OF: 12	NEAR/AT: LAKE FOREST PARK
DATE: 12-4-2014	DWG#: 14-32052-A.8-1

Trees (left to right): Betula papyrifera / Paper Birch; Acer circinatum / Vine Maple

Shrubs (left to right): Cornus sericea / Redtwig Dogwood; Ribes sanguineum / Red-flowering Currant; Symphoricarpos albus / Snowberry; Vaccinium ovatum / Evergreen Huckleberry

Groundcovers & Perennials (left to right, top to bottom): Deschampsia cespitosa / Tufted Hairgrass; Fragaria chiloensis / Coastal Strawberry; Iris tenax / Oregon Iris; Juncus effusus / Soft Rush; Armeria maritima / Sea Thrift; Juncus ensifolius / Dagger-leaf Rush



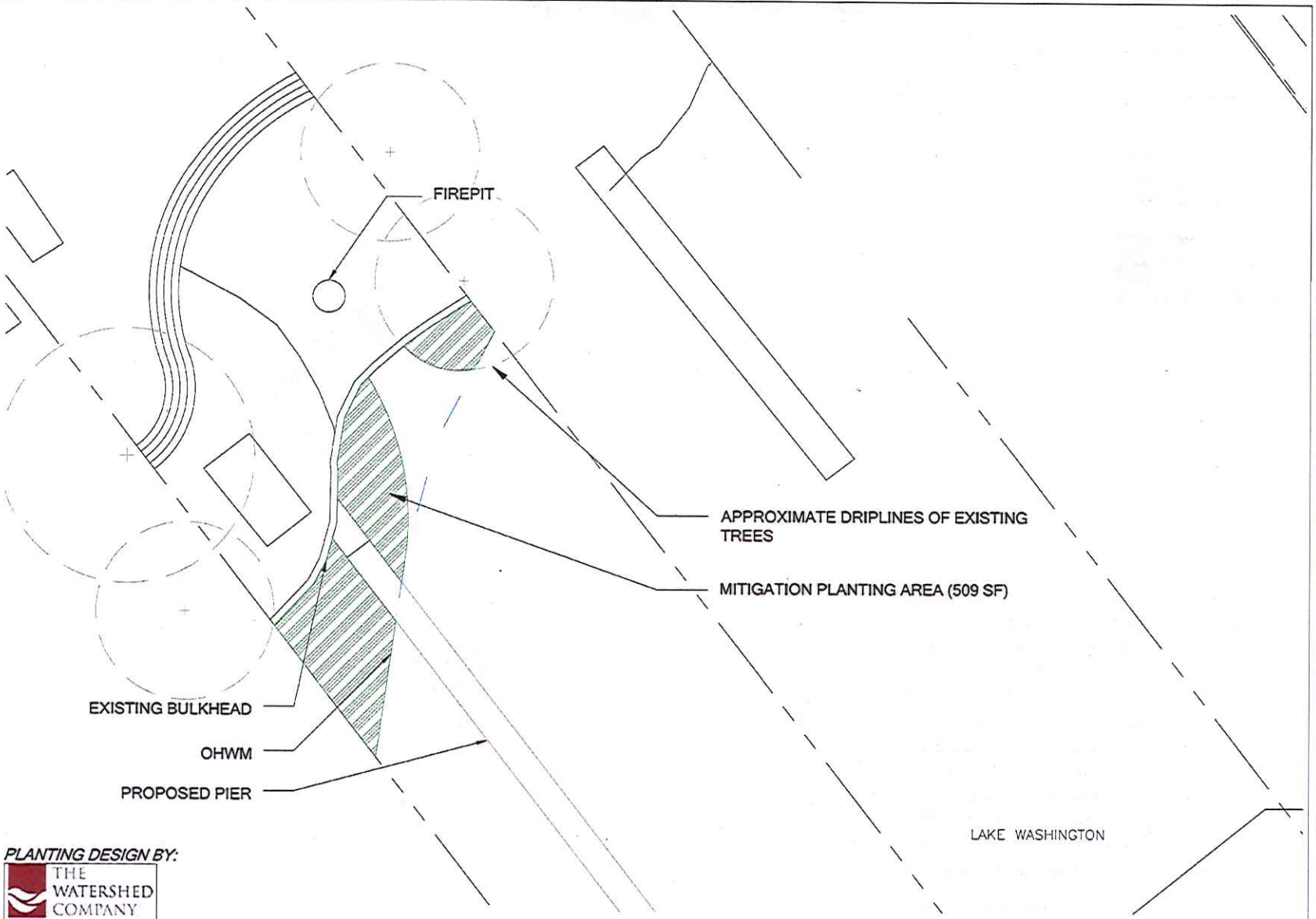
FUDGE RESIDENTIAL SHORELINE

Lake Forest Park, WA

The Watershed Company
November 2014

REFERENCE #:	
APPLICANT: FUDGE, T.J.	
PROPOSED: STRAIGHT GRATED WALKWAY PIER	
SHEET: 9 OF: 12	NEAR/AT: LAKE FOREST PARK
DATE: 12-4-2014	DWG#: 141102

PROJECT DESIGNED BY:
Waterfront Construction Inc.



MITIGATION LAYOUT

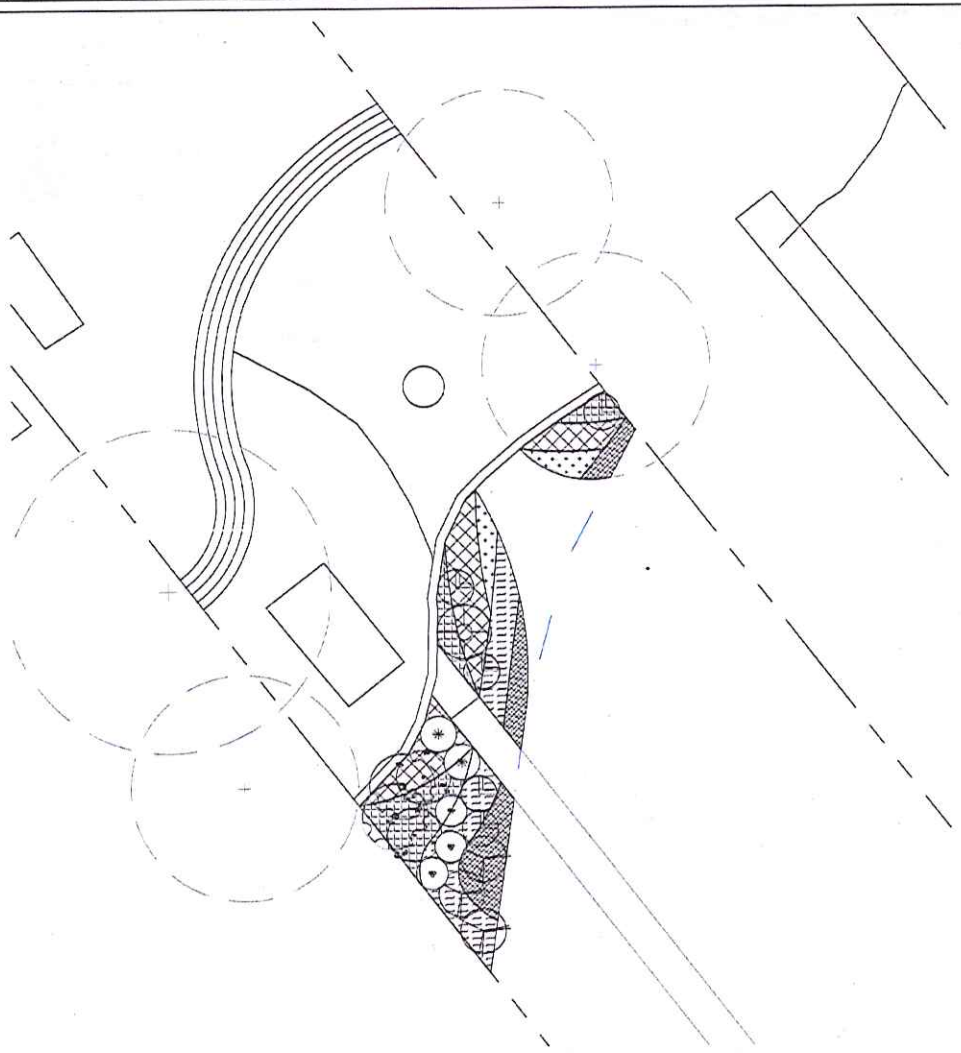
20' 15' 10' 5' 0' 20'

SCALE: 1"=20'

PLANTING DESIGN BY:

THE WATERSHED COMPANY
750 Sixth Street South
Kirkland . WA 98033
p 425.822.5242
f 425.827.8136
watershedco.com

REFERENCE #:	
APPLICANT: FUDGE, T.J.	
PROPOSED: STRAIGHT GRATED WALKWAY PIER	
SHEET: 10 OF: 12	NEAR/AT: LAKE FOREST PARK
DATE: 12-4-2014	DWG#: 141102



PLANT SCHEDULE - ALL SHEETS

NAME	QTY	SIZE / REMARKS
TREES - ALL TREES TO BE HEALTHY & WELL BRANCHED		
ACER CIRCINATUM / VINE MAPLE	2	2 GAL
BETULA PAPYRIFERA / PAPER BIRCH	2	2 GAL
SHRUBS - ALL SHRUBS TO BE HEALTHY, FULL & VIGOROUS		
CORNUS SERICEA / REDTWIG DOGWOOD	3	1 GAL
RIBES SANGUINEUM / RED-FLOWERING CURRANT	1	1 GAL
RUBUS PARVIFLORUS / THIMBLEBERRY	5	1 GAL
SYMPHORICARPOS ALBUS / SNOWBERRY	2	1 GAL
VACCINIUM OVATUM / EVERGREEN HUCKLEBERRY	3	1 GAL
PERENNIALS / GROUNDCOVERS		
ARMERIA MARITIMA / SEA THRIFT	41	4" POTS, 24" O.C.
DESCHAMPSIA CESPITOSA / TUFTED HAIRGRASS	40	4" POTS, 24" O.C.
FRAGARIA CHILOENSIS / COASTAL STRAWBERRY	10	4" POTS, 24" O.C.
IRIS TENAX / OREGON IRIS	72	4" POTS, 24" O.C.
JUNCUS EFFUSUS / SOFT RUSH	27	4" POTS, 24" O.C.

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PLANTING PLAN AND LEGEND

20' 15' 10' 5' 0' 20'

SCALE: 1"=20'

REFERENCE #:	
APPLICANT: FUDGE, T.J.	
PROPOSED: STRAIGHT GRATED WALKWAY PIER	
SHEET: 11 OF: 12	NEAR/AT: LAKE FOREST PARK
DATE: 12-4-2014	DWG#: 141102

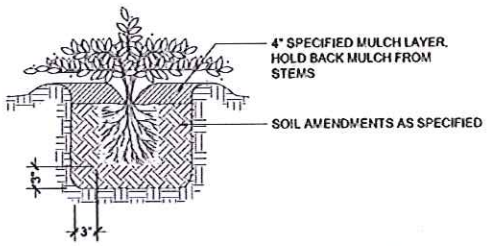
PROJECT DESIGNED BY:
Waterfront Construction Inc.

GENERAL PLANTING SEQUENCE:

1. Native plant installation shall occur during frost-free periods only for best survival. Preferred months for installation are between September 15th and April 15, prior to hot, dry weather. Plants may be installed during hot weather if the applicant agrees to irrigate the entire planting area, delivering at least 2" of water per week from June 1 through September 15th.
2. Procure plants in legend and insure that material meets the minimum requirements outlined in the plant legend and planting details.
3. Locate all existing utilities within the limit of work. The contractor is responsible for any utility damage as a result of the landscape construction.
4. Remove all invasive weeds within the project area.
5. Amend soils by tilling in a 3" depth layer of compost. Avoid existing tree roots.
6. Insure that no adverse drainage conditions exist that may affect proper plant growth and establishment.
7. Layout plant material per plan for inspection by the Restoration Specialist. Plant substitutions will NOT be allowed without Agency approval.
8. Install plants per planting details.
9. Water each plant thoroughly to remove air pockets.
10. Install a 4" depth, coarse wood-chip mulch layer throughout entire project area. (This layer retains soil moisture and helps to prevent weeds from germinating.)
11. Install a temporary or permanent irrigation system capable of delivering a minimum of 2" of water per week to the entire planted area. Maintain irrigation system in working condition for the first two (2) summers after initial plant installation.

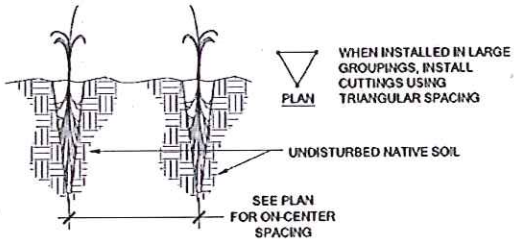
The applicant shall maintain all plant material until final inspection and approval by agencies. If the owner or applicant chooses to hire a landscape contractor, then all plantings and workmanship shall be guaranteed for one year following final owner acceptance.

NOTES:
1. PLANT GROUNDCOVER AT SPECIFIED DISTANCE ON-CENTER (O.C.) USING TRIANGULAR SPACING, TYP.
2. LOOSEN SIDES AND BOTTOM OF PLANTING PIT AND REMOVE DEBRIS
3. LOOSEN ROOTBOUND PLANTS BEFORE INSTALLING
4. SOAK PIT BEFORE AND AFTER INSTALLING PLANT



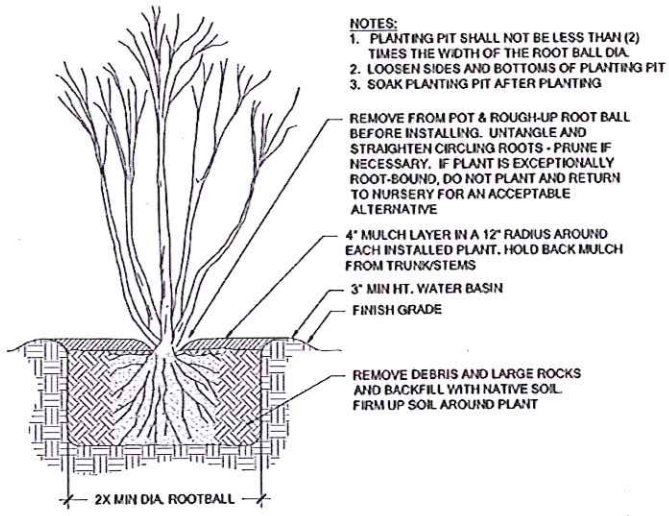
A GROUNDCOVER AND PERENNIAL PLANTING DETAIL — NTS

NOTES:
1. MAKE SUITABLE HOLE WITH A ROCK BAR OR EQUIV. PLANTING TOOL
2. INSTALL PLUG DIRECTLY INTO NATIVE SOIL



B EMERGENT PLANTING DETAIL — NTS

NOTES:
1. PLANTING PIT SHALL NOT BE LESS THAN (2) TIMES THE WIDTH OF THE ROOT BALL DIA.
2. LOOSEN SIDES AND BOTTOMS OF PLANTING PIT
3. SOAK PLANTING PIT AFTER PLANTING



C TREE AND SHRUB PLANTING DETAIL — NTS

PLANTING DESIGN BY:

THE WATERSHED COMPANY
750 Sixth Street South
Kirkland, WA 98033
p 425.822.5242
f 425.827.8136
watershedco.com

NOTES AND DETAILS

REFERENCE #:	
APPLICANT: FUDGE, T.J.	
PROPOSED: STRAIGHT GRATED WALKWAY PIER	
SHEET: 12 OF: 12	NEAR/AT: LAKE FOREST PARK
DATE: 12-4-2014	DWG#: 141102