MARINE FLOAT, DOCK AND PILE REPAIR CONDITION SURVEY & SCOPING REPORT

Prepared for

PUBLIC WORKS

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INTRODUCTION

This draft condition survey and scoping report summarizes the results of a site/condition survey inspection visit on April 10. 2012, to four San Juan County marine facilities: Orcas Landing, Obstruction Pass, West Sound, and Odlin Park. The purpose of the site visits was to conduct a cursory condition survey of the structures, and discuss possible repair and replacement options with San Juan County staff. The timber docks were not inspected because of the emphasis placed on repair and replacement of float piles and pile retainers. The inspection team consisted of: Russ Harvey, SJC Operations Manager, Kelly D. LaFave, P.E. and John A. Van Lund, P.E. both with Marine Structures Engineering, Inc., John Wyss and Tim Arnold, Lopez Island Road crew, and Dave Roseberry, Orcas Island Road crew.

As part of the inspection process, basic measurements were taken to describe the structures being inspected and to produce schematic drawings of the facilities for the Scoping Report. Freeboard and water depths were taken along the floats. Measurements were taken using fiberglass and steel tape measures. Soundings were taken with fiberglass tape measure with lead weight. Depth measurements were taken and corrected to mean lower low water (MLLW) elevations using predicted tide tables.

After a review of existing plans and documents, preliminary repair concepts were developed and studied, required permits and procedures determined, preliminary engineering feasibility calculations performed, and construction cost estimates calculated.

For each facility, a table of recommended repairs, timeframe, and construction costs are included. The Recommendations section shows prioritized repairs followed by total project costs for 2012 and 2013 for budget purposes, and required permits.

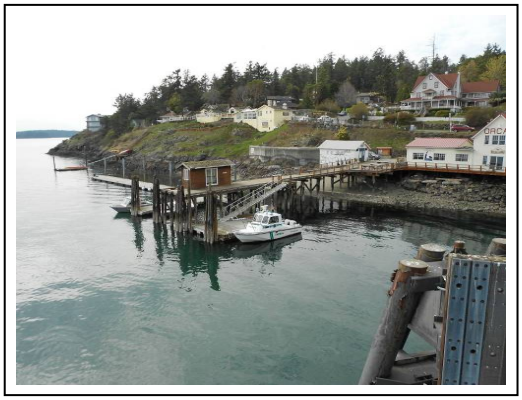
Photographs for each facility are shown in the Appendix A.

ORCAS LANDING

The Orcas Landing property (formerly Jacobson's Landing) is located directly west of the Washington State ferry terminal on Orcas Island, Washington. The facility provides year-round moorage for the Sheriff's boat and the Public Works Department's boat, and provides approximately 150 lineal feet of day-use moorage along the west float.

County Designation: Orcas Landing

DNR lease # 20-C102276 expires August 31, 2021
Location: WSF Landing & Orcas Rd
Tax Parcel Number: 262222014
Latitude & Longitude: N48° 35′ 51″, W122° 56′ 37″
Tidal info: MHHW = 7.90′



Existing Facility:

The existing facility consists of a timber pier with a timber float for mooring the Sheriff's vessel on the east side and timber transient moorage floats on the west. The Sheriff's float on the east side of the pier is approximately 20′ x 28′ and is held in place by four timber piles and is accessed by a 3′ x 35′ aluminum gangway. The transient moorage floats on the west side of the pier include a 10′ x 40′ float oriented north-south and a 10′ x 150′ float oriented east-west. The transient moorage floats are accessed with a 3′ x 35′ aluminum gangway onto an 18′ x 18′ timber gangway landing float. The Sheriff's float is decked full-width with timber planks and the 10′ wide transient floats have a 4′ wide strip of grating down the center with timber planks each side of the grating. The transient moorage floats are held in place with 12 ¾″ diameter, galvanized steel pipe piles. There is one electrical service pedestal located on the Sheriff's float.

Existing Condition:

An overall condition study was performed on the facility by MSE in 2008. In general, the pier is in good condition with some timber members in need of repair or replacement. The gangways are in fair condition, but are not barrier-free and do not meet current codes for handrails and guardrails. The Sheriff's float timber members are in fair to poor condition with damage and wear evident. The Sheriff's float deck planks were observed to be uneven, split and cracked in places and the nails fastening the deck were observed to be rusty and ineffective. The Sheriff's float uses chain and roller pile retainers which allow considerable float movement and are causing damage to the anchor piles. The anchor piles of the Sheriff's float are in poor condition and have been damaged and worn by pile retainers and by repeated contact with the sides of the float.

The transient moorage floats are in good condition with no structural problems observed; however, the hinges between the floats allow excessive float motions and will require repair or replacement in the future. The moorage float anchor piles are in good condition, but he chain and roller pile retainers are causing damage to the galvanizing which leads to corrosion and a reduced service life of the piles.

Issues and Desired Improvements:

The timber pier and aluminum gangways do not provide handrails or guardrails that should be in place in any facility open to public access. In particular, the pier and gangway leading to the Sheriff's float should provide guardrails and handrails to allow for safe access to the float in all weather and when transferring prisoners or equipment to the Sheriff's vessel.

As noted above, the existing chain and roller pile retainers are causing damaged to the galvanizing of the steel pipe piles and have caused significant damage to the timber piles anchoring the Sheriff's float.

The Sheriff's float is in poor condition and does not include grating for light passage.

The creosote-treated timber piles anchoring the Sheriff's float are in poor condition and the creosote-treated timber pile dolphins around the Sheriff's float are in poor condition and are no longer necessary.

Recommendations:

It is recommended that the Sheriff's float be completely replaced with a new timber float that utilizes foam-filled HDPE flotation drums and high-traction fiberglass grate deck. In addition, the existing gangway should be replaced with a new, wider and longer aluminum gangway with barrier-free transition plates, handrails, guardrails and high-traction fiberglass grate deck. Along with the float and gangway, the existing timber anchor piles should be removed and replaced with new galvanized steel pipe piles with energy absorbing, polyethylene lined pile retainers.

It is also recommended that the chain and roller pile retainers on the transient floats be replaced with polyethylene lined, steel pile retainer hoops.

Finally, it is recommended that guardrails be installed along the sides of the pier leading to the Sheriff's float and any area accessible to the public.

The following table summarizes the recommended repairs, their suggested timeframe and estimated construction costs:

Table 1 – Summary of Recommendations for Orcas Landing.

Immediate	Replace the existing chain and roller pile retainers on the transient moorage (West) floats with new UHMW lined pile retainers similar to those used at the Prevost Harbor and Waldron floats to prevent additional damage to float anchor piles.	$6,000 to $7,000 ========== $6,000 to $7,000
0 to 5 Years	Replace the existing Sheriff's float (East) gangway with new 4' wide x 40' long, 100 psf rated aluminum gangway with barrier-free transitions, handrails, guardrails and high-traction fiberglass grate deck. (Reduce to $3,500 to $5,000 if gangway is replaced with existing Odlin Park gangway)	$12,000 to $15,000
	Replace existing Sheriff's float with 20' x 28' timber float with foam-filled HDPE flotation drums, high-traction fiberglass grate deck and energy-absorbing, polyethylene lined steel pile retainers.	$50,000 to $65,000
	Remove (4) existing timber anchor piles and install (3) new 16" diameter galvanized steel pipe piles.	$30,000 to $35,000
	Remove two existing timber pile dolphins in front of Sheriff's float.	$10,000 to $15,000
	Install additional guardrails around top end of Sheriff's float gangway and other public access areas.	$3,000 to $5,000 ========== $105,000 to $135,000

Note: Construction costs are in 2013 $'s and do not include engineering, permits, or administration.

OBSTRUCTION PASS PIER AND FLOAT

The Obstruction Pass pier and float is located at the South end of the East side of Orcas Island and provides primary commercial and community access to Blakely and Obstruction Islands.

County Designation: DK066

DNR lease #20011622 expires Dec 31, 2012.
Location: Obstruction Pass Rd between
Wind-e-mill Lane & Jovian Place
Tax Parcel Number: 161650110
Latitude & Longitude: N48° 36′ 24″, W122° 48′ 52″
Tidal info: MHHW= 8.0′

Existing Facility:

The existing facility consists of a timber pier with gangway and float. The 12′ x 107′ timber pier was constructed in 1982 and is rated for H15 vehicle loading. The pier is decked with 4 x 10 treated timber planks and includes a timber bullrail along both sides of the pier but no guardrails. The top of the pier is at +14.0 ft MLLW. The gangway is 4′ x 40′ and constructed of aluminum.

The current float is a 10′ x 40′ one-piece concrete float with timber wales and was installed in 1990-′91 and replaced an 8′ x 40′ float that was deemed too small to be stable The existing concrete float is 43″ deep with a measured freeboard of 18 ± 2″. The buoyant weight of the float is approximately 54,000 lbs or 27 tons.

The float is restrained laterally by five, 12-inch (nominal) timber piles. Two piles, braced across the top, are located on the shoreward end of the float and a three-pile timber dolphin is located on the offshore end. Steel pipe pile retainers that span the width of the float are used at each end to attach the float to the piles. The shoreward end pile retainer attaches to two piles spread across the width of the float and the offshore end retainer attached to a single pile on the float centerline.

The existing parking lot is paved and can hold 19 to 25 vehicles. The pier and float are adjacent to a concrete plank launch ramp that is used by the public and commercial landing craft transports.

Existing Condition:

The timber pier appears to be in good condition overall and no significant damage or wear was observed. Decay was observed in the tops of several of the exposed timber fender piles located on the east side of the pier. The gangway was replaced in 1999 and is in good condition. The float end transition plate was missing.

The timber float piles are in fair to poor condition. Three piles were replaced in 1990 or 1991 and the decayed tops of the onshore piles and bracing timbers were repaired in 2003.

Polyethylene wear strips have been installed on the edges of the anchor piles to reduce wear and damage to the piles from the pile retainer rollers.

The concrete float was observed to be in good condition without damage or significant cracking in the deck. The timber wales were observed to be in fair condition with minor wear and tear. The pile retainers on the ends of the float were observed to be in fair to good condition with some wear and some surface corrosion evident. The pile retainers were observed to not fit the width of the float well and were prone to shearing of the rods holding the pile retainers to the float during storm events.

Issues and Desired Improvements:

The main issue with the facility is high maintenance demands of the float pile retainers. Since the 10' wide float was installed in 1990 or 1991, the pile restrainer system has been repaired or replaced at least three times due to damage or failure from wind and wave induced float motions during storms.

Another issue is the poor condition and performance of the timber anchor piles. Even with being braced at their tops, the timber piles do not provide adequate stiffness to control the motion of the very heavy float during storms. As calculated in Appendix C, the natural period of the float and pile system is within the typical range of periods of waves hitting the float and this leads to very large motions of the float and very large forces acting on the anchor piles and pile retainers.

Lastly, there should be guardrails installed on at least one side of the pier to provide a safer route to and from the float for pedestrians. Unless the pier is regularly used for large vessel access, guardrails should be installed on both sides of the pier for pedestrian safety. If occasional use of the pier by large vessels is anticipated, a portion of the guardrail could be made removable to be removed and replaced by on an as-needed basis.

Recommendations:

It is recommended that guardrails be installed on one or both sides of the pier for pedestrian safety.

It is recommended that the existing float and piles be completely replaced (Option 1). It is recommended that the concrete float be replaced with a lighter and more flexible timber float with foam-filled HDPE floatation drums and high traction fiberglass grate deck. The timber float will be less buoyant and will ride out storm events better than a concrete float. It is also recommended that new 12 ¾" diameter steel pile piles be used to anchor the new timber float.

Since the existing concrete float is in fairly good overall condition, it could be retained for five to 10 more years if desired. However, if the existing concrete float were to be retained, the existing timber anchor piles need be replaced with new 16" diameter steel pipe piles (Option 2). The existing pile hoops on the ends of the concrete float would be then be modified to fit the steel piles and to include dampeners and their connection to the float would be strengthened. The new steel pipe piles are required to anchor the existing concrete float more securely and reduce

float motions and pile retainer forces during storms. After a maximum of 10 years, the concrete float would need to be replaced with a new timber float that was sized to fit between the steel piles that were anchoring the concrete float.

Option 1 is recommended as it provides a better and longer-term solution than Option 2 for a small increase in project cost. If Option 2 is selected, there will be additional costs for another mobilization and additional project management that would not be incurred if the float is replaced at the same time as the piles. In addition, the piles required to anchor the concrete floats are larger than required to anchor the timber float.

The following table summarizes the recommended repairs, their suggested timeframe and estimated construction costs:

Table 2- Summary of Recommendations - Obstruction Pass Pier and Float.

0 to 5 Years	Add pedestrian guardrails, full length of pier on one or both sides of pier. ($9,000 per side)	$9,000 to $18,000 ========== $9,000 to $18,000
0 to 5 Years (OPT. 1)	<u>New Timber Float.</u> Remove the five creosote-treated timber piles and cross-bracing and replace with four new 12 3/4" diameter galvanized steel pipe piles. Remove, dispose and replace existing float with a new, heavy duty 10' x 40' timber float with foam-filled HDPE flotation drums and high-traction fiberglass grate deck.	$40,000 to $50,000 $55,000 to $65,000 ========== $95,000 to $115,000
0 to 5 Years (OPT. 2)	<u>Keep Existing Concrete Float.</u> Remove the five creosote-treated timber piles and cross-bracing and replace with four new 16" diameter galvanized steel pipe piles. Replace the existing roller pile retainers with new energy absorbing, polyethylene lined pile retainer hoops and strengthen the retainer connection to the existing float.	$45,000 to $55,000 $10,000 to $15,000 ========== $55,000 to $70,000

Note: Construction costs are in 2013 $'s and do not include engineering, permits, or administration.

OBSTRUCTION PASS MARINE RAMP

The Obstruction Pass marine ramp is located just west of the Obstruction Pass dock and float at the South end of the East side of Orcas Island. The ramp provides commercial access for fuel, propane, and other barge-delivered materials to Orcas Island, as well as, commercial and community access from Orcas Island to Blakely and Obstruction Islands.

County Designation: RP066

DNR lease #20-A11622 expires Dec 31, 2012
Location: Obstruction Pass Rd between
Wind-e-mill Lane & Jovian Place
Tax Parcel Number: 161650110
Latitude & Longitude: N48° 40′ 36″, W122° 48′ 05″
Tidal info: MHHW= 8.0′

Existing Facility:

In 1982, a 16′ x 100′ long ramp was constructed consisting of a 16′ x 58′ cast-in-place concrete ramp with the remainder consisting of precast concrete logs 16′ long x 15″ wide x 6.5″ thick. In the fall of 2004, new precast concrete logs of the same dimension were laid over the existing ramp in an effort to eliminate the accumulation of sand, which required frequent clearing and removal.

Existing Condition:

The existing ramp logs are in fair to poor condition. Concrete spalling and large cracks were observed in the tops and sides of several ramp logs. Rebar was observed to be exposed in several logs and corroding.

Issues and Desired Improvements:

The main issue with the facility is the location of the ramp at the far west side of the parcel, which poses difficult challenges to drivers backing loads on to barges. Ideally, the ramp should be relocated towards the east so that it would be equidistant from the east edge of the existing ramp and the adjacent fixed dock to the east.

As the steel connections between the concrete logs deteriorate, large gaps will open up between the logs, and together with spalling of concrete surfaces, leading to further deterioration and creation of potholes causing problems with trucks achieving sufficient traction while driving on and off barges.

Recommendations:

It is recommended that the ramp be relocated towards the east so that it is equidistant from the existing ramp and the adjacent fixed dock to the east (Option 1). It is also recommended that the new ramp utilize a heavier-duty 12″ thick plank design and concrete specification with wet

cure requirements similar to the planks and concrete used for the MacKaye Harbor Ramp (2007) and the Decatur Island Ramp (2009) to improve the long-term wear and durability.

As an alternate, the existing ramp could be repaired in its original location (Option 2). In this option, the existing ramp planks would be removed and replaced with heavier-duty, 12" thick precast concrete planks using improved concrete mix designs. The main advantage of this option would be to eliminate the extra costs and time required for the design, permitting, earthwork and other construction costs of moving the ramp location.

In either option, it is important that the new ramp elevation matches the elevation of the existing ramp, so as to prevent accumulation of sand on top of the ramp that would require regular removal.

The following table summarizes the recommended repairs, their suggested timeframe and estimated construction costs:

Table 3- Summary of Recommendations - Obstruction Pass Marine Ramp.

3 to 5 Years (OPT. 1)	<u>Relocate Ramp to East.</u> Remove and dispose of existing concrete ramp, restore existing footprint to original condition, new excavation and earthwork for new footprint Fabricate and install new 16′ wide x 12" thick concrete log marine ramp in new location.	$25,000 to $30,000 $120,000 to $140,000 ========== $145,000 to $170,000
3 to 5 Years (OPT. 2)	<u>Replace Ramp in Existing Footprint.</u> Remove and dispose of existing concrete ramp Fabricate and install new 16′ wide x 12" thick concrete log marine ramp in original location.	$10,000 to $15,000 $120,000 to $140,000 ========== $130,000 to $155,000

Note: Construction costs are in 2013 $'s and do not include engineering, permits, or administration.

WEST SOUND

The West Sound pier and float is located on near the North end of West Sound on Orcas Island and is a year-round facility that primarily serves recreational boaters and some light commercial users. There is parking for about 6 cars along Deer Harbor Road, which is often crowded during the summer months.

County Designation: DK 045
DNR lease #20012862 expires March 1, 2019.
Location: Deer Harbor Rd/Crow Valley Rd intersection.
Tax Parcel Number: 260434015
Latitude & Longitude: N48° 37′ 54″, W122° 57′ 39″
Tidal info: MHHW=7.60′

Existing Facility:

The existing facility consists of a timber pier, gangway and float. The pier is 7′ wide x 154′ long pier that was constructed in 1989. The pier includes 2 x 10 timber deck planks on 4 x 10 timber stringers supported on timber piles and timber caps. The deck of the pier is at +13.5′ above MLLW. The gangway is 4′ x 36′ and is made of aluminum. The float system, installed in 1989, consists of two, 8′ x 38′ one-piece concrete floats placed end to end with a 5′ gap between the float ends. Each of the concrete floats is 36″ deep and floats with approximately 13″ to 14″ of freeboard. Each float has a buoyant weight of approximately 31,000 pounds.

The floats are held in place with a total of 11 creosote treated timber piles. There are two, 2-pile dolphins at the onshore end of the float, a braced 4-pile dolphin in the gap between floats, and a 3-pile dolphin at the offshore end. The gap between the floats is spanned by a steel transition bridge. There is parking for six vehicles along Deer Harbor Road.

Existing Condition:

The timber pier was observed to be in good condition with no significant decay or damage detected. The gangway was found to be in fair condition with deck and transition plates showing some wear and light corrosion.

The floats were found to be in fair to good condition with only minor cracking and deck wear observed. The timber float wales were found to be in good to fair condition with only minor wear and tear observed. The float pile retainer hoops were found to be in fair to poor condition with wear and moderate corrosion observed. At the time of inspection, the offshore float was being stored at Rosario awaiting repair of the transition bridge and pile hoops.

The float piles were found to be in fair condition with moderate to severe wear observed caused by the pile retainer hoops. The tops of the braced piles appeared to be in good condition but it was noted that at high tide, there is only a minimum of clearance above the float to the bottom of the pile braces.

The steel transition bridge and steel wear plates mounted to the floats under the transition bridge were observed to be in fair condition with moderate corrosion. Both the transition bridge and the wear plates were damaged by excessive float motion causing the bridge to fall in the gap between the floats and becoming jammed.

Issues and Desired Improvements:

The main issue at the West Sound facility is the high maintenance of the transition bridge that spans the gap between the two independent floats. Because the floats are not connected together and are free to move independently, the difference in elevations between the floats can be quite large during a storm. It is difficult for the transition bridge to handle the range of float motion and the bridge has required major repairs several times since its original installation.

The weight of the floats and the large motions they experience during storms also causes the pile retainer forces to be large and leads to the hoop faces damaging the piles. As calculated in Appendix C, that natural period of the float modules, restrained by timber piles, is in the range of wave periods that regularly hit the float system.

The deck of the gangway and the shore end transition are worn and do not provide a dependable non-skid walking surface, particularly with the gangway being relatively short and steep at low tides.

Recommendations:

Since the timber pier is approaching a 25 years of service, it is recommended that a comprehensive condition inspection and load rating study be performed for the timber pier structure and piles. An overall visual inspection should be performed and soundings, core samples and diver inspections completed as necessary to evaluate the condition and capacity of the pier structure and piles.

It is recommended that the existing independent concrete floats be replaced with a lighter and more flexible full-length timber float with foam-filled HDPE floatation drums and high traction fiberglass grate deck (Option 1). The full-length timber float will be less buoyant and ride out storm events better than the concrete floats. Since the new float is full length, without gaps, there will not be heave differences between floats and a transition bridge spanning between float sections is not required. The new timber float will use new 12 ¾" diameter steel pipe anchor piles with energy absorbing pile retainers.

Since the existing concrete floats are in fairly good overall condition, they could be retained for five to 10 more years if desired. However, if the existing concrete floats were to be retained, the existing timber anchor piles need be replaced with new 16" diameter steel pipe piles (Option 2). The existing pile hoops on the ends of the concrete floats would be then be modified to fit the steel piles and to include dampeners and their connection to the float would be strengthened. After a maximum of 10 years, the concrete floats would be replaced with a new timber float that was sized to fit between the steel end piles that were anchoring the concrete float. The four piles located in between the concrete floats would need to be pulled and re-driven to fit the new timber float.

Option 1 is recommended as it provides a better and longer-term solution than Option 2 for a small increase in project cost. If Option 2 is selected, there will be additional costs for another mobilization, additional project management and pile removal and re-driving that would not be incurred if the floats were replaced at the same time as the piles. In addition, the piles required to anchor the concrete floats are larger than required to anchor the timber float.

The following table summarizes recommended repairs, timeframe and construction costs:

Table 4- Summary of Recommendations – West Sound.

0 to 2 Years	Inspect pier deck, stringers, pile bent caps, and piles. Collect bore samples and conduct underwater pile inspection as necessary to determine condition of pier.	$3,500 to $5,000 ========== $3,500 to $5,000
0 to 5 Years (Opt. 1)	<u>New Timber Float.</u> Remove the eleven creosote-treated timber piles and cross-bracing and replace with eight new 12 ¾" diameter galvanized steel pipe piles. Replace the existing float with a new, heavy duty 8' x 80' timber float with foam-filled HDPE flotation drums and high-traction fiberglass grate deck Install new 4' x 50' aluminum gangway.	$63,000 to $71,000 $62,000 to $70,000 $15,000 to $18,000 ========== $140,000 to $159,000
0 to 5 Years (Opt. 2)	<u>Keep Existing Float.</u> Remove the eleven creosote-treated timber piles and cross-bracing and replace with eight new 16" diameter galvanized steel pipe piles. Replace the existing pile retainers with new energy absorbing, polyethylene lined pile retainer hoops and strengthen the retainer connection to the existing concrete floats. Modify or replace transition bridge.	$80,000 to $88,000 $15,000 to $25,000 ========== $95,000 to $113,000

Note: Construction costs are in 2013 $'s and do not include engineering, permits, or administration.

ODLIN PARK

Although located within Odlin County Park on Lopez Island, the facility is under the jurisdiction of the Public Works Department. The facility serves mostly recreational boaters, and also light commerce and commercial fishery activities. Occasionally, it is used for loading/unloading private passenger ferries, and may also serve passenger feeder boats during emergency closures of the Lopez WSF terminal.

County Designation: DK 128
DNR lease #20-073581 - Lease Not Completed per DNR
Location: End of Odlin Park Road
Tax Parcel Number 250241001
Latitude & Longitude: N48° 33′ 29″, W122° 53′ 28″
Tidal info: MHHW=7.80′

Existing Facility:

The existing facility consists of a timber pier, gangway and float. The pier is 85′ long and includes a 22′ wide x 25′ long approach apron and an 11′ wide x 60′ long trestle. The original pier was rated for H15 vehicles. The pier deck is 4 x 12 timber planks over 4 x 12 stringers. There is a timber bullrail on the offshore end and both sides of the pier. The pier has timber fender piles approximately 12′ on center along the north face of the trestle for large vessel moorage. Timber guardrails are installed on the south side of the approach apron adjacent to the gangway landing. A 4′ x 40′ aluminum gangway attaches to the south side of the approach apron and leads to the timber float. The timber float is 10′ x 50′ and has a solid timber plank deck and continuous timber bullrails each side. The float is held in place with three timber piles along the north side and a 3-pile timber dolphin centered on the offshore end.

Existing Condition:

The pier structure was found to be in good condition with only minor wear or decay observed. Major pier reconstruction and repair was completed in 1992, 1993, 2002 and 2003. The gangway was observed to be in good condition without unusual wear or distress observed. The timber float was found in poor condition since having its last major repair completed in 2006. Wood float members were observed to be in the water with wear and decay evident.

The float anchor piles were observed to be in fair to good condition with minor to moderate wear observed from float pile retainers.

Issues and Improvements:

The two major issues with the facility are the condition of the float and the lack of float side vessel moorage. It is desired to replace the existing float with a longer float or to relocate a new float away from the pier to allow for moorage on both sides.

Recommendations:

Since it has been almost 20 years since the first major pier repair, it is recommended that a comprehensive condition inspection and load rating study be performed for the timber pier structure and piles. An overall visual inspection should be performed and soundings, core samples and diver inspections completed as necessary to evaluate the condition and capacity of the pier structure and piles.

It is also recommended that the existing float be replaced with a new 10′ x 50′ timber float with foam-filled HDPE flotation drums and high-traction fiberglass grate deck. Three options are presented and evaluated to provide additional moorage along the float. In the recommended option, the new float would be relocated approximately 25 feet to the south of the existing pier with a new concrete abutment, a new, longer aluminum gangway and new steel pipe anchor piles (Option 1). The longer gangway is ADA compatible and allows the float to remain in deep enough water to prevent grounding without the need for an approach pier. The existing 3-pile timber dolphin would be removed, two 16″ diameter piles would be installed on the offshore end of the float and two new 12 ¾″ diameter piles would be installed on the shoreward end.

In the second option, the offshore 25′ feet of the existing timber pier is removed to allow moorage on both sides of the new float at the same location as the existing float (Option 2). This option allows the existing gangway to remain but reduces the length of fixed pier access for fishing vessels or temporary passenger ferry loading. The existing 3-pile timber dolphin would be removed and four new steel piles would be installed.

In the third option, the new float would be installed 25′ to the south of the existing pier and access would be provided via a new 3′ x 48′ aluminum gangway spanning from the timber pier at an angle to the float (Option 3). A new angled landing would be installed on the float for the gangway, the 3-pile dolphin would be removed and four new steel pipe piles installed. This option provides for moorage on both sides of the float and keeps the full length of the existing pier without the need for a new gangway abutment on shore.

Option 1 is recommended as it provides the additional moorage desired for the float and adds ADA access while maintaining full length pier access to fishing vessels and temporary passenger loading and unloading capability. To meet ADA compliance under Option 1, the existing access road needs to be chipsealed and appropriate pavement markings and signage are required. Because ADA access is being provided at an existing facility for recreational vessels, it may qualify for grants or other funding sources.

The following table summarizes recommended repairs, timeframe and construction costs:

Table 5- Summary of Recommendations – Odlin Park.

0 to 2 Years	Inspect pier deck, stringers, pile bent caps, and piles. Collect bore samples and conduct underwater pile inspection as necessary to determine condition and capacity of pier.	$3,500 to $5,000 ========== $3,500 to $5,000
0 to 2 Years (Opt. 1)	Remove existing timber float, and a 3-pile timber dolphin. Install new gangway abutment and new 4′ x 80′ aluminum gangway. Chipseal dock access road and add appropriate pavement markings and signage. Install new 10′ x 50′ timber float with foam-filled HDPE flotation drums, high traction fiberglass grate deck and energy absorbing, polyethylene lined pile retainers. Install two new 16″ diameter and two 12 ¾″ diameter steel pipe piles.	$6,000 to $8,000 $62,000 to $74,000 $50,000 to $60,000 $32,000 to $36,000 ========== $150,000 to $178,000
0 to 2 Years (Opt. 2)	Remove existing timber float, 3-pile dolphin and 25 feet of timber pier deck, framing and piles. Install new 10′ x 50′ timber float with foam-filled HDPE flotation drums, high traction fiberglass grate deck and energy absorbing, polyethylene lined pile retainers. Install two new 16″ diameter and two new 12 ¾″diameter steel pipe piles.	$20,000 to $25,000 $50,000 to $60,000 $32,000 to $36,000 ========== $102,000 to $121,000
0 to 2 Years (Opt. 3)	Remove existing timber float and a 3-pile timber dolphin. Install new angled gangway landing and new 3′ x 48′ aluminum gangway. Install new 10′ x 50′ timber float with foam-filled HDPE flotation drums, high traction fiberglass grate deck and energy absorbing, polyethylene lined pile retainers. Install two new 16″ diameter and two new 12 ¾″diameter steel pipe piles.	$6,000 to $8,000 $12,000 to $15,000 $50,000 to $60,000 $32,000 to $36,000 ========== $100,000 to $119,000

Note: Construction costs are in 2013 $'s and do not include engineering, permits, or administration.

OVERALL SUMMARY BY PRIORITY

Priority #1 Obstruction Pass Float and Piles:
In 2012, install guardrail and replace the float and piles as noted in Table 2 (0 to 5 years) (Option 1). Total construction cost is estimated to be $104,000 to $133,000 with an additional $22,300 for engineering PS&E, permits, construction inspection/administration. Total project cost is estimated to be $126,300 to $155,300.

Priority #2 Odlin Park:
In 2012, complete engineering PS&E and permit applications for construction in 2013. Total 2012 cost is estimated to be $27,250 for engineering, permits, surveying, dive survey and CD&P Substantial Shoreline Development Permit application and Public Hearing.

In 2013, inspect the pier and replace the timber float, piles and install ADA gangway as noted in Table 5 (0 to 5 Years) (Option 1). Total 2013 construction cost is estimated to be $129,500 to $155,000 and does not include the $24,000 to $28,000 for chipsealing the access road and installing the ADA pavement markings and signs. With an estimated $5,500 for project administration, the total project is estimated to be $162,250 to $187,750 for the relocated Odlin Park float and ADA gangway.

During the next Lopez Island chipseal cycle in 2015, chipseal the dock access road and add ADA appropriate pavement markings and signage. The cost of the chipseal, pavement markings and signage is estimated at $24,000 to $28,000.

Priority #3 West Sound Float:
In 2012, Inspect pier and replace float, piles and gangway as noted in Table 4 (0 to 5 years) (Option 1). Total construction cost is estimated to be $143,500 to $164,000 with an additional $28,100 for PS&E, CD&P Shoreline Exemption Permit/other permits, SJC construction inspection/administration, and possible dive survey. Total project cost is estimated to be $171,600 to $192,100.

Priority #4 Orcas Landing, West Float (Day Use):
In 2012, remove and replace chain and roller pile retainers with new UHMW lined pile retainers to prevent additional damage to float anchor piles. The construction cost for these repairs is $6,000 to $7,000 with an additional $1,500 for engineering and project administration for a total of $7,500 to $8,500.

Priority #5 Orcas Landing Sheriff's Float:
In 2012, complete PS&E, permits, and possible dive survey for $18,500.

In 2013, replace the Sheriff's float and piles as noted in Table 1 (0 to 5 years). Total construction cost, not assuming re-use of the Odlin gangway, is estimated to be $105,000 to $135,000. Additional costs for project administration are estimated to be $3,300 for an overall project cost of $126,800 to $156,800.

Priority #6 Obstruction Pass Marine Ramp:
In 2015 to 2017, remove the existing marine ramp and replace it closer to the pier as noted in Table 3 (3 to 5 years) (Option 1). Total construction cost is estimated to be $145,000 to $170,000. Additional costs for engineering, permitting and project administration are estimated to be $22,300 for an overall project cost of $167,300 to $192,300.

Table 6- Estimated Project Cost by Year.

Project	2012	2013	2014-2017
Orcas Landing	$26,000 to $27,000	$126,800 to $156,800	
Obstruction Pass Float	$126,300 to $155,300		
Obstruction Pass Ramp			$167,300 to $192,300
West Sound	$171,600 to $192,100		
Odlin Park	$27,250	$135,000 to $160,500	$24,000 to $28,000
	==========	==========	==========
Total	$351,150 to $401,650	$261,800 to $317,300	$191,300 to $220,300

DISCUSSION OF PERMITS REQUIRED

Shown below, by agency, are the regulatory agencies, permits issued, and required permit application materials for the recommended prioritized repairs:

1. San Juan County Community Development & Planning (CD&P):

San Juan County' s CD&P is the Local Agency responsible for issuing Shoreline Development permits. There are two types of Shoreline Development permits: a *Shoreline Exemption Application* and a *Shoreline Substantial Development Permit*, which requires a *State Environmental Policy Act (SEPA) Checklist*:

Shoreline Exemption Application: This local *Shoreline Exemption Application* is required for CD&P's review and approval for normal maintenance and repair, providing the overall footprint does not change. Plans, photos, and a $1,200 fee are required. A SEPA Checklist and a Public Hearing are not required. The following projects will require a *Shoreline Exemption Application:*

Orcas Landing Sheriff's Float and Pile Replacement
Obstruction Pass Float & Pile Replacement (Option 1 or 2)
Obstruction Pass Marine Ramp (Option 2)
West Sound Float and Pile Repairs (Option 1 or 2)
Odlin Park Float (Option 2)

Note: CD&P will require a separate application for each facility because they are not connected.

Shoreline Substantial Development Permit: This application is required for all projects within 200 feet of water and is covered under the following code regulations and procedures: SJCC 18.50.190 SMP Boating Facilities, SJCC 18.80.110 Shoreline Permit Procedures, and the 1971 RCW 90.58 Shoreline Management Act. This application will require a Public Hearing, a fee based on the construction dollar amount, and will take longer to process and schedule. The *Shoreline Substantial Development Permit* application process could take from three to six months to obtain. The following project will require a *Shoreline Substantial Development Permit* and Public Hearing:

Odlin Park Float & Pile Replacement (Option 1 or 3)
Obstruction Pass Marine Ramp (Option 1)*

* May also require a *Clearing & Grading Permit* from CD&P if threshold for excavation exceeds 200 cubic yards.

State Environmental Policy Act (SEPA) Checklist: CD&P will require a SEPA Checklist as part of the *Shoreline Substantial Development Permit* application and will require an underwater *Biological Evaluation*. The following project will require a *State Environmental Policy Act (SEPA) Checklist*:

Odlin Park Float & Pile Replacement (Option 1 or 3)
Obstruction Pass Marine Ramp (Option 1)

If CD&P finds no probable significant adverse environmental impacts, CD&P's Director will approve either the *Shoreline Exemption Application* or the *Shoreline Substantial Development Permit* application and shall issue a *Determination of Nonsignificance (DNS)* per WAC 197-11-340 and send it to the Washington State Department of Ecology (DOE). DOE then notifies the applicant and the Shorelines Hearing Board with a 21 day appeal period from the time that DOE received notification that San Juan County approved the application.

2. Washington State Department of Fish & Wildlife (DFW):

DFW issues the *Hydraulic Project Approval (HPA) Permit* and all four projects will require an HPA. DFW will require a *Joint Aquatic Resource Permit Application (JARPA)*, CD&P's Shoreline Permit, a Preliminary Vegetation Study, plans, and photos. Note that DFW will not require a Preliminary Vegetation Study if the footprint of the float or ramp remains unchanged in terms of location and size. Applications for new HPA's and modifications to existing HPA's submitted after July 10, 2012 will require a $150 application fee.

Orcas Landing Sheriff's Float and Pile Replacement
Obstruction Pass Float & Pile Replacement
Obstruction Pass Marine Ramp
West Sound Float and Pile Repairs
Odlin Park Float & Pile Replacement

3. U.S. Army Corps of Engineers (USACE):

The USACE issues the Corps permit. This will require the preparation and submittal of separate JARPAs for each facility, either a Programmatic ESA Consultation Specific Project information Form (SPIF) or a Regional General Permit (RGP 6) Application, CD&P Shoreline Exemption, Preliminary Vegetation Study, plans, and photos. These are sent to the Seattle District, Corps of Engineers for consultation with other federal agencies and tribes before issuance of a Corps permit under Section 10 Navigable Waters of the U.S. The proposed float and pile work is not subject to Section 404 of the Clean Water Act.

The Corps permit should take three months to obtain providing the proposed work is considered by USACE to be minor, will not have significant individual or cumulative impacts on environmental values, and should not encounter appreciable opposition. There are cases where it takes up to 18 months to obtain a Corps permit.

The types of projects often considered minimally impacting include: minor dredging and construction, maintenance, or replacement of piers, mooring buoys, piles, or floats. Compliance reviews under Section 7 of the Endangered Species Act and Section 106 of the National Historic Preservation Act still apply.

The following projects will require a Corps permit:

Orcas Landing Sheriff's Float and Pile Replacement
Obstruction Pass Float & Pile Replacement
Obstruction Pass Marine Ramp (Option 1 Nationwide Permit 36)
Obstruction Pass Marine Ramp (Option 2 Nationwide Permit 3)
West Sound Float and Pile Repairs
Odlin Park Float & Pile Replacement

4. Washington State Department of Natural Resources (DNR):

DNR will receive notification on the Shoreline Development Permit from CD&P. DNR administers the leases for these facilities, but does not have regulatory authority like the other resource agencies.

The current lease for the Obstruction Pass facility expires December 31, 2012. Therefore, it is important that permit applications for this project be submitted as soon as possible while the lease is still valid. Because after the Obstruction Pass facility lease expires, DNR will require 50% grating in any replacement float. This would mean the existing concrete float could not be reused.

It appears from a review of the existing files that the footprint of each facility is within the existing lease area. Therefore, no amendments of the leases will be required.

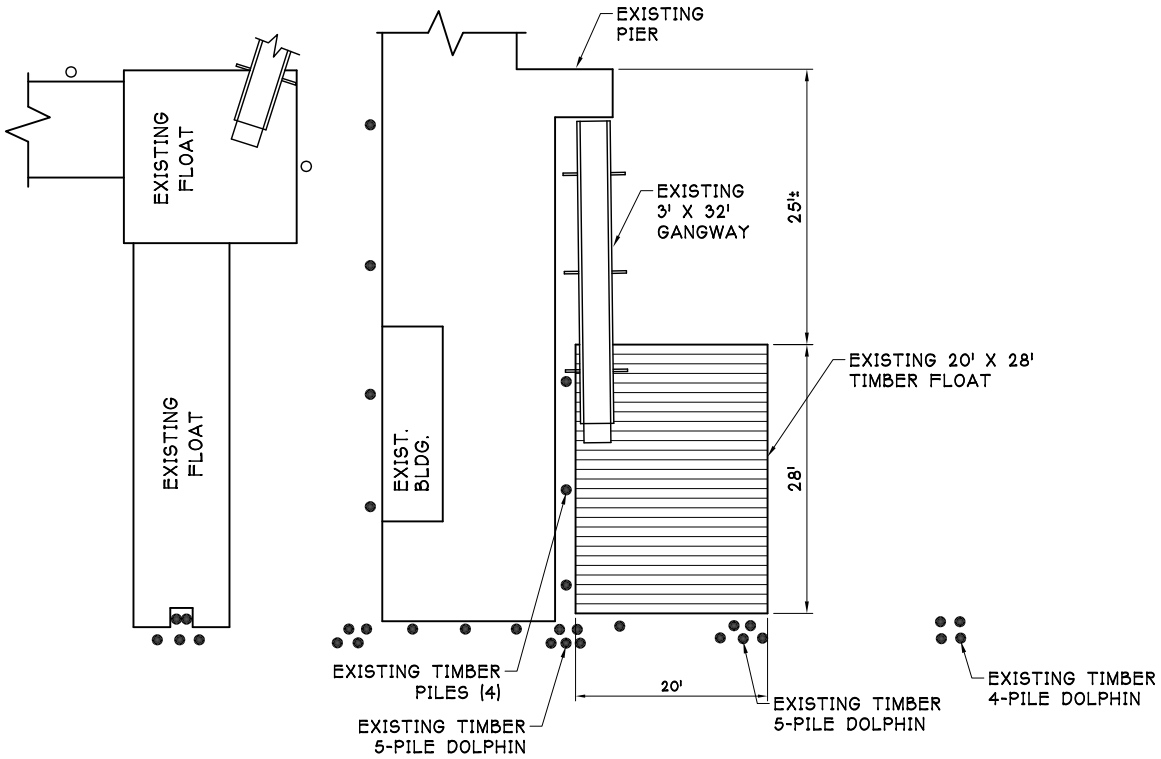
However, from the lease agreement, DNR wishes to be informed of any maintenance. DNR should be sent a letter with a JARPA, plans and photos indicating the intent of the maintenance repairs.

The following shows the DNR lease expiration dates:

LOCATION	Lease No.	Expiration Date
Obstruction Pass Float & Pile Replacement	***20011622***	***December 31, 2012***
West Sound Float and Pile Repairs	***20012862***	***March 1, 2019***
Orcas Landing Sheriff's Float and Pile Replacement	**20-C102276**	***August 31, 2021***
Odlin Float & Pile Replacement	***20-073581***	***Not Completed***
Obstruction Pass Marine Ramp	***20-A11622***	***December 31, 2012***

DNR may conduct a stewardship review of the proposal to ensure that the modifications to the existing facility meet their stewardship goals. DNR may conduct a site visit of the existing facility, may require a copy of all regulatory permits issued, and may require an as built survey be produced upon completion of the project.

SKETCHES OF EXISTING AND PROPOSED PROJECTS



ORCAS LANDING
EXISTING SHERIFF'S FLOAT

0 5 10 15 30 FT.

03 JULY 2012

PURPOSE: PUBLIC DOCK

DATUM: M.L.L.W.

ADJACENT PROPERTY OWNERS:
1)
2)

ORCAS LANDING
FLOAT REPAIR
JUN 2012

SAN JUAN COUNTY
P.O. BOX 729
FRIDAY HARBOR WA 98250

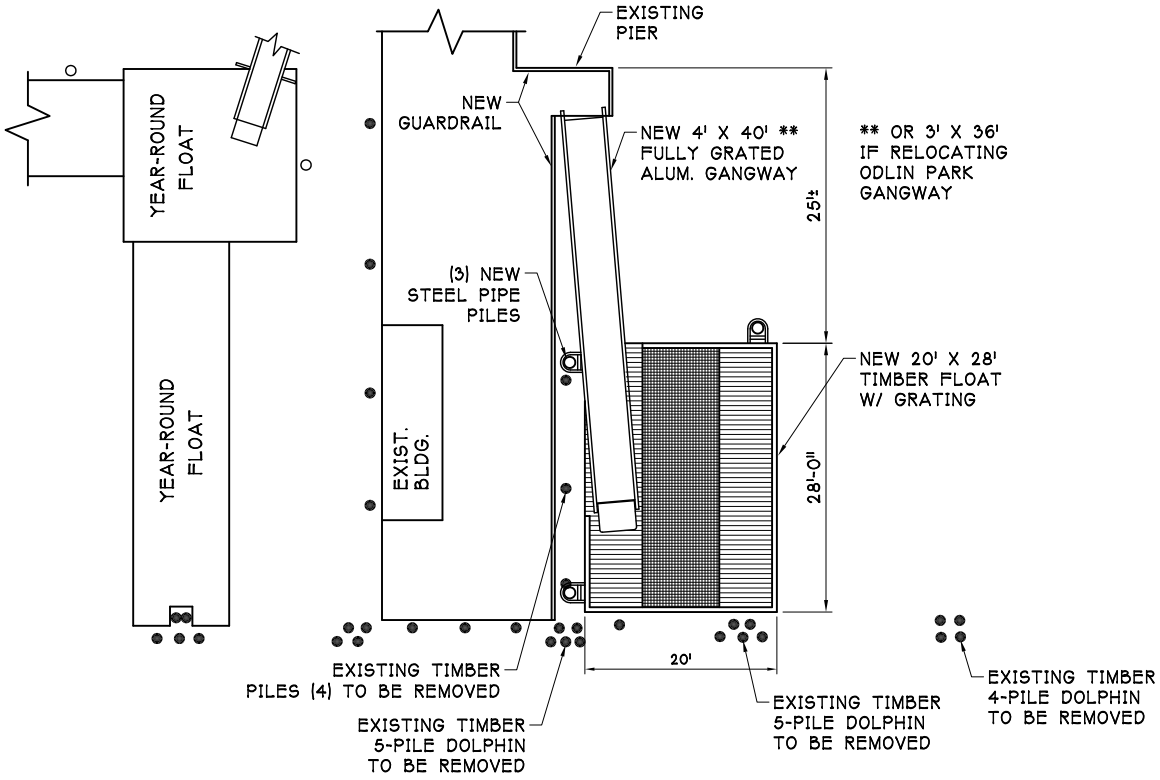
PROPOSED:
NEW GANGWAY, FLOAT AND ANCHOR PILES

IN: HARNEY CHANNEL

AT: SAN JUAN COUNTY, WA
SEC. 21, T36N, R2W, W.M.

APPLICATION BY:
SAN JUAN COUNTY

SHEET X **of** X **DATE:** 06/12
APPLICATION: ??



ORCAS LANDING
PROPOSED SHERIFF'S FLOAT

0 5 10 15 30 FT.

03 JULY 2012

PURPOSE: PUBLIC DOCK

DATUM: M.L.L.W.

ADJACENT PROPERTY OWNERS:
1) SAN JUAN COUNTY
2)

ORCAS LANDING
FLOAT REPAIR
JUN 2012

SAN JUAN COUNTY
P.O. BOX 729
FRIDAY HARBOR WA 98250

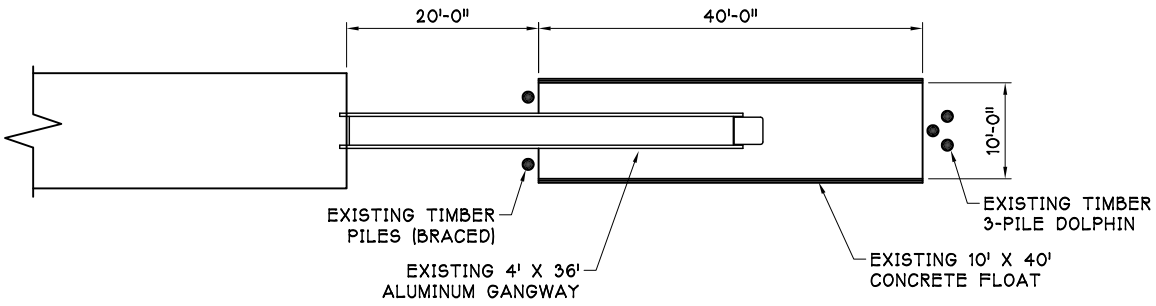
PROPOSED:
NEW GANGWAY, FLOAT AND ANCHOR PILES

IN: HARNEY CHANNEL

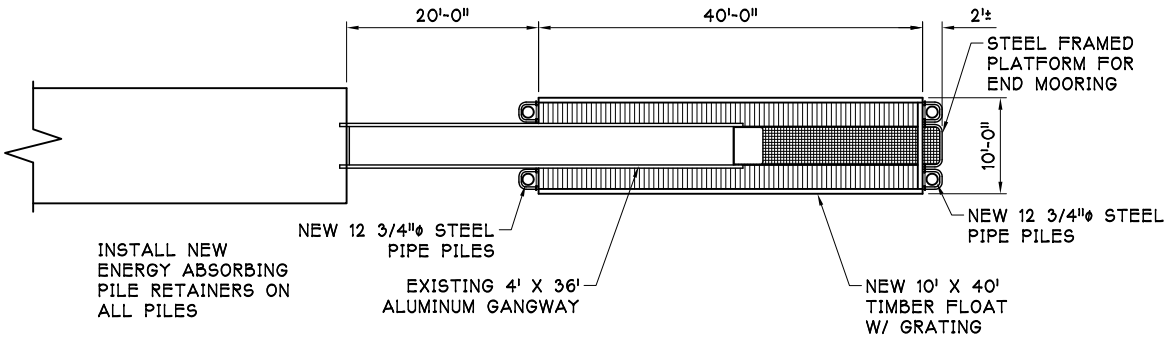
AT: SAN JUAN COUNTY, WA
SEC. 21, T36N, R2W, W.M.

APPLICATION BY:
SAN JUAN COUNTY

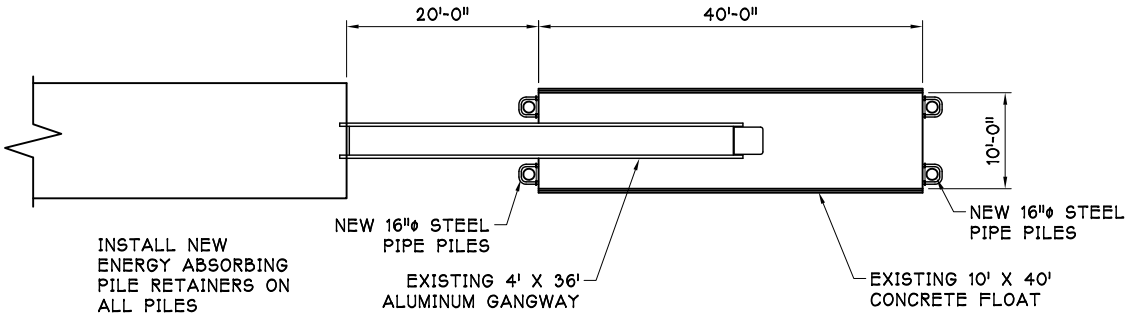
SHEET X **of** X **DATE:** 06/12
APPLICATION: ??



OBSTRUCTION PASS
EXISTING FLOAT



OBSTRUCTION PASS
OPTION 1 (RECOMMENDED)



OBSTRUCTION PASS
OPTION 2

0 5 10 15 30 FT.

03 JULY 2012

PURPOSE: PUBLIC DOCK

DATUM: M.L.L.W.

ADJACENT PROPERTY OWNERS:
1)
2)

OBSTRUCTION PASS
FLOAT REPAIR
JUN 2012

SAN JUAN COUNTY
P.O. BOX 729
FRIDAY HARBOR WA 98250

PROPOSED:
NEW FLOAT AND ANCHOR PILES

IN: OBSTRUCTION PASS

AT: SAN JUAN COUNTY, WA
SEC. 16, T36N, R1W, W.M.

APPLICATION BY:
SAN JUAN COUNTY

SHEET X **of** X **DATE:** 06/12
APPLICATION: ??

OBSTRUCTION PASS RAMP
OPTION 1 (RECOMMENDED)

0 5 10 15 30 FT.

03 JULY 2012

PURPOSE: LAUNCH RAMP

DATUM: M.L.L.W.

ADJACENT PROPERTY OWNERS:
1)
2)

OBSTRUCTION PASS RAMP RELOCATION JUN 2012

SAN JUAN COUNTY
P.O. BOX 729
FRIDAY HARBOR WA 98250

PROPOSED:
NEW LAUNCH RAMP

IN: OBSTRUCTION PASS
AT: SAN JUAN COUNTY, WA
SEC. 16, T36N, R1W, W.M.

APPLICATION BY:
SAN JUAN COUNTY

SHEET X **of** X **DATE:** 06/12
APPLICATION: ??

OBSTRUCTION PASS RAMP OPTION 2

0 5 10 15 30 FT.

03 JULY 2012

PURPOSE: LAUNCH RAMP

DATUM: M.L.L.W.

ADJACENT PROPERTY OWNERS:
1)
2)

OBSTRUCTION PASS RAMP RELOCATION JUN 2012

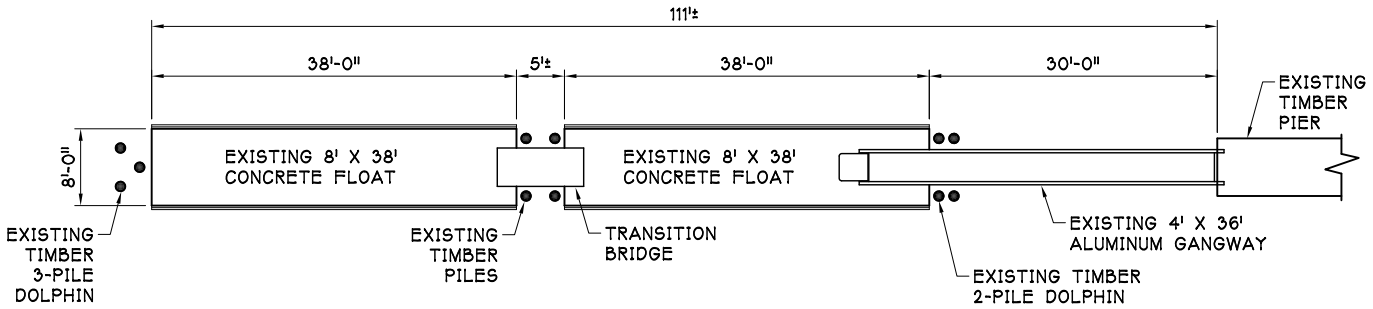
SAN JUAN COUNTY
P.O. BOX 729
FRIDAY HARBOR WA 98250

PROPOSED:
NEW LAUNCH RAMP

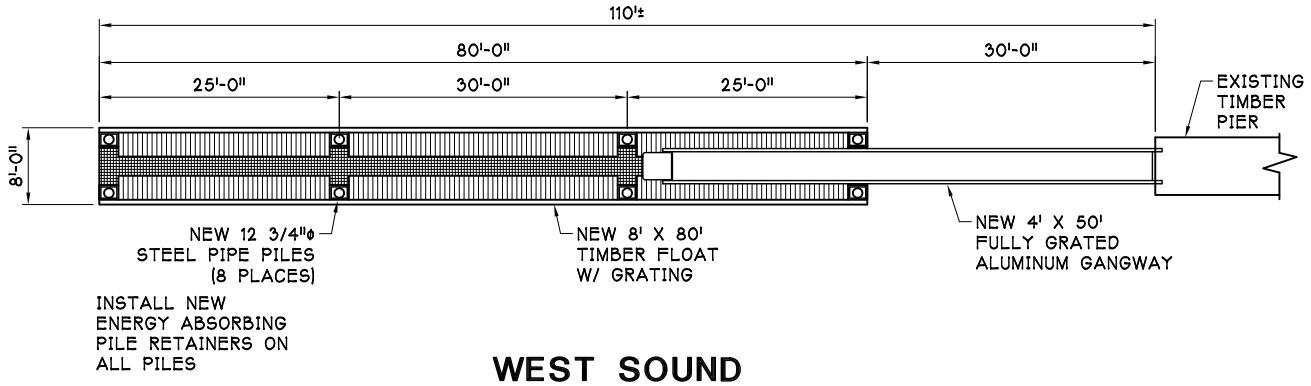
IN: OBSTRUCTION PASS
AT: SAN JUAN COUNTY, WA
SEC. 16, T36N, R1W, W.M.

APPLICATION BY:
SAN JUAN COUNTY

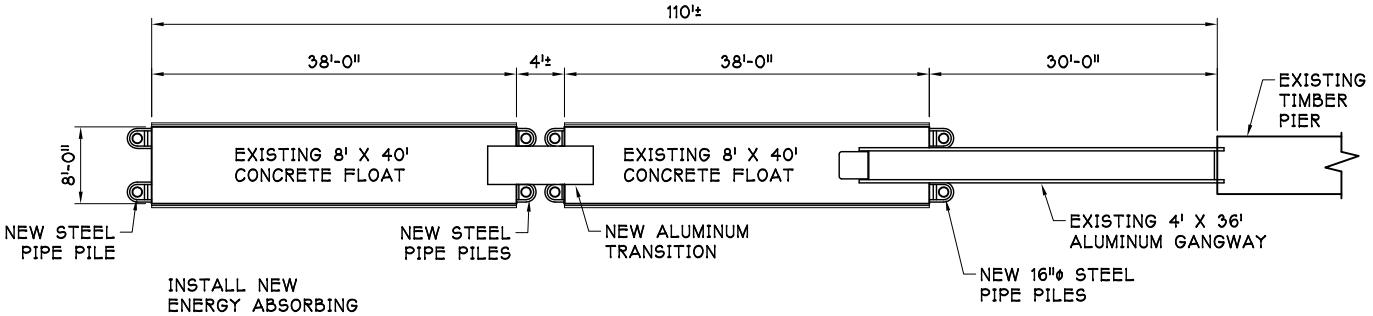
SHEET X **of** X **DATE:** 06/12
APPLICATION: ??



WEST SOUND
EXISTING FLOAT



WEST SOUND
OPTION 1 (RECOMMENDED)



WEST SOUND
OPTION 2

0 5 10 15 30 FT.

03 JULY 2012

PURPOSE: PUBLIC DOCK

DATUM: M.L.L.W.

ADJACENT PROPERTY OWNERS:
1)
2)

WEST SOUND FLOAT REPAIR JUN 2012

SAN JUAN COUNTY
P.O. BOX 729
FRIDAY HARBOR WA 98250

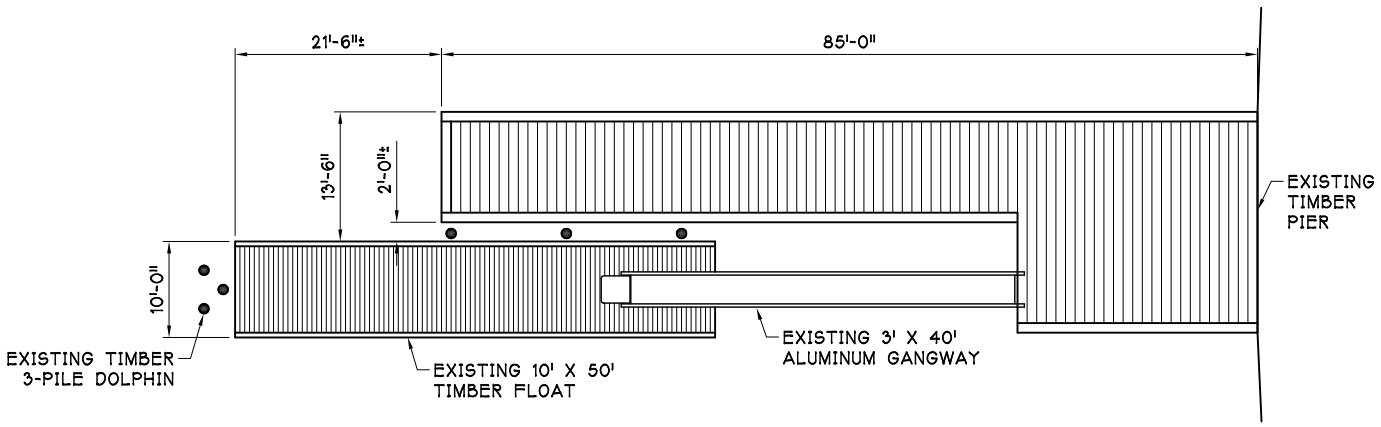
PROPOSED:
NEW GANGWAY, FLOAT AND ANCHOR PILES

IN: WEST SOUND

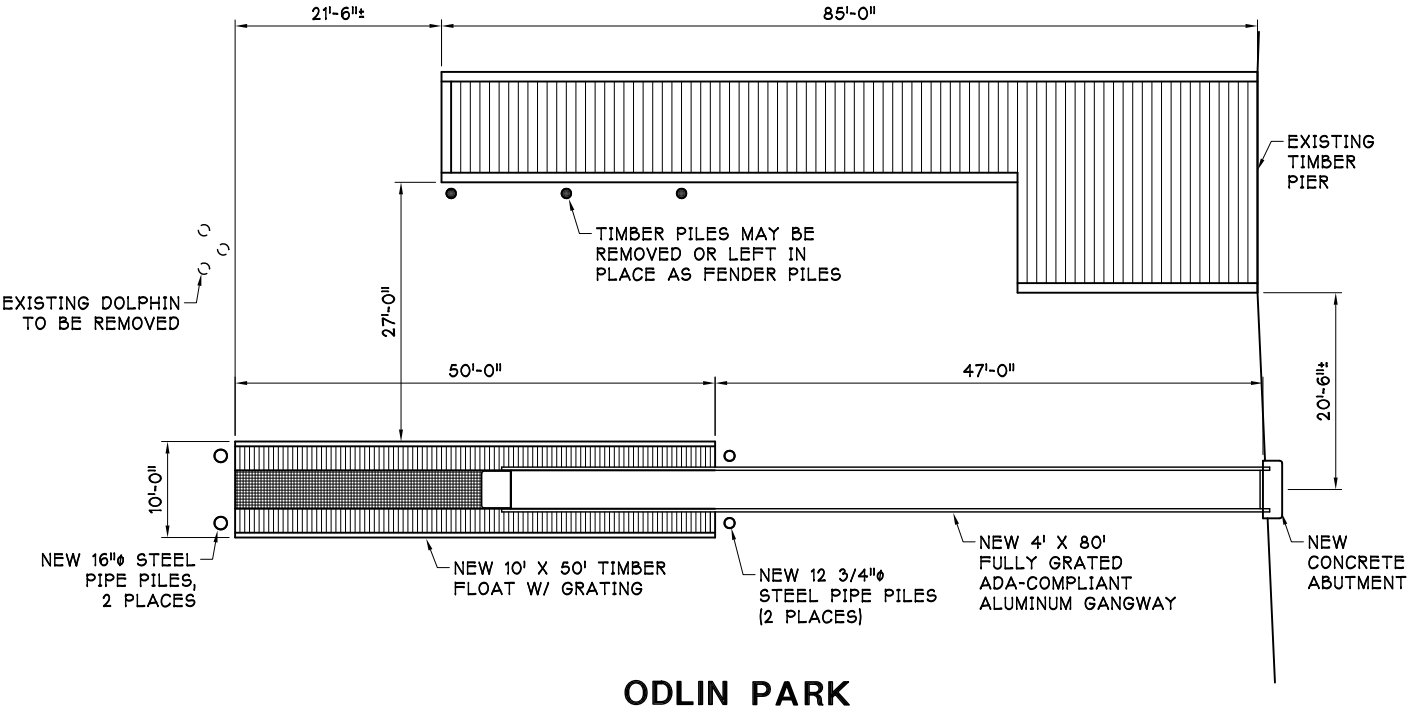
AT: SAN JUAN COUNTY, WA
SEC. 4, T36N, R2W, W.M.

APPLICATION BY:
SAN JUAN COUNTY

SHEET X **of** X **DATE:** 06/12
APPLICATION: ??



ODLIN PARK
EXISTING FLOAT



ODLIN PARK
OPTION 1 (RECOMMENDED)

0 5 10 15 30 FT.

03 JULY 2012

PURPOSE: PUBLIC DOCK

DATUM: M.L.L.W.

ADJACENT PROPERTY OWNERS:
1)
2)

ODLIN PARK
FLOAT REPAIR
JUN 2012

SAN JUAN COUNTY
P.O. BOX 729
FRIDAY HARBOR WA 98250

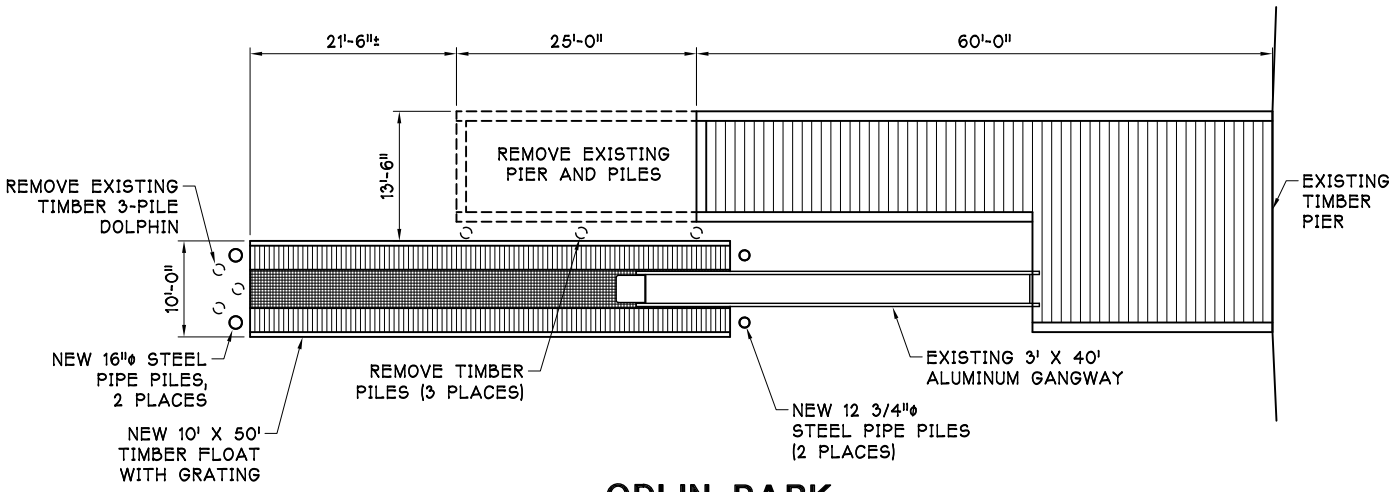
PROPOSED:
NEW ABUTMENT, GANGWAY, FLOAT AND ANCHOR PILES

IN: UPRIGHT CHANNEL

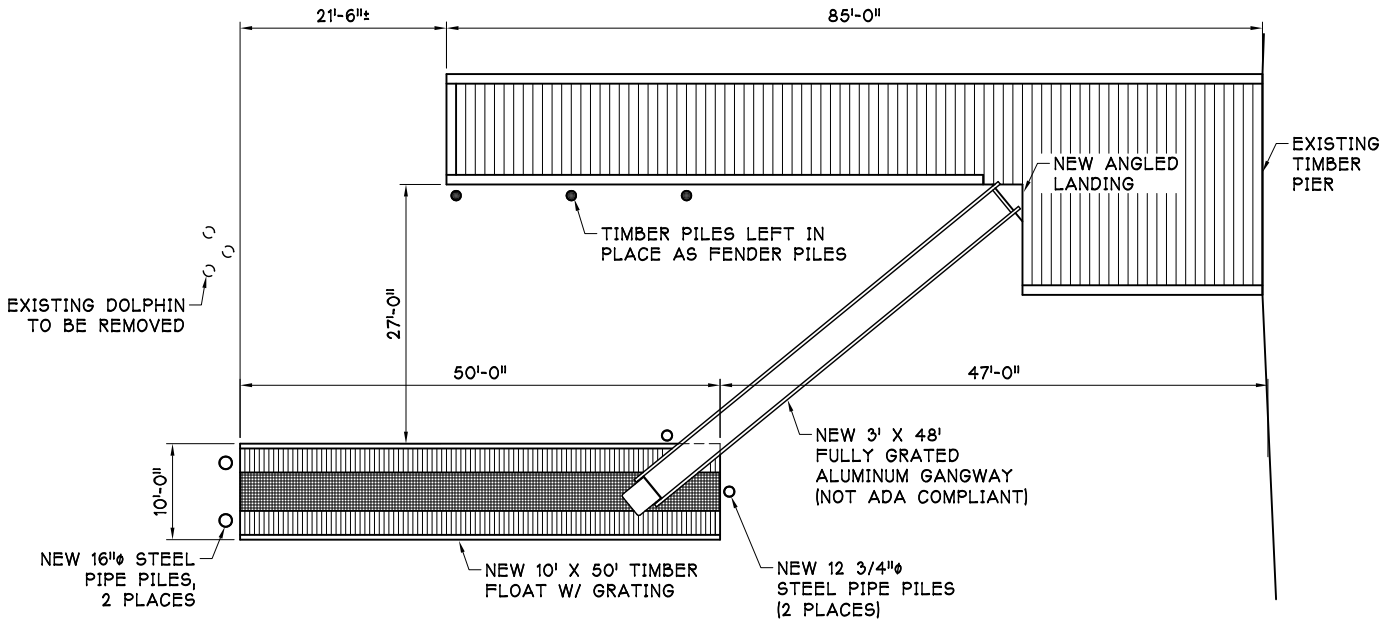
AT: SAN JUAN COUNTY, WA
SEC. 2, T35N, R2W, W.M.

APPLICATION BY:
SAN JUAN COUNTY

SHEET X **of** X **DATE:** 06/12
APPLICATION: ??



ODLIN PARK OPTION 2



ODLIN PARK OPTION 3

0 5 10 15 30 FT.

03 JULY 2012

PURPOSE: PUBLIC DOCK

DATUM: M.L.L.W.

ADJACENT PROPERTY OWNERS:
1)
2)

ODLIN PARK FLOAT REPAIR JUN 2012

SAN JUAN COUNTY
P.O. BOX 729
FRIDAY HARBOR WA 98250

PROPOSED:
NEW ABUTMENT, GANGWAY, FLOAT AND ANCHOR PILES

IN: UPRIGHT CHANNEL

AT: SAN JUAN COUNTY, WA
SEC. 2, T35N, R2W, W.M.

APPLICATION BY:
SAN JUAN COUNTY

SHEET X **of** X **DATE:** 06/12
APPLICATION: ??

APPENDIX A

INSPECTION PHOTOGRAPHS

APPENDIX A - PHOTOGRAPHS
Orcas Landing Sheriff's Dock, Float & Piles

Sheriff's Float & Gangway

Sheriff's Float

Gangway & Timber Pile w/Chain Retainer

Gangway & Float

Electrical Box (note creosote in water)

Gangway w/Utilities

Orcas Landing West Float Pile & Retainers

West Float & Piles

Gangway End at West Float

Steel Pile w/Chain Retainer

Steel Pile w/Chain Retainer

Obstruction Pass Float Piles & Retainers

Dock, Float and Gangway

Gangway

Gangway Guide Strips

End of Dock, Gangway and Float Piles

Single Pile Retainer at Outboard Float End

Pile Retainer at Shoreward Float End

Obstruction Pass Marine Ramp

Marine Ramp Covered with Sand

Water Elevation is El. -1.5' on 4/10/12

Typical Concrete Spall at Steel Connectors

Concrete Log Cracking

End of Ramp is Below El. -1.5 on 4/10/12

Westsound Dock, Float & Piles

Dock, Gangway & Float

Gangway

Gangway

Transition Span Between Floats

Inboard Pile Hoop Retainer

Outboard Pile Hoop Retainer

Odlin Park Dock, Float & Piles

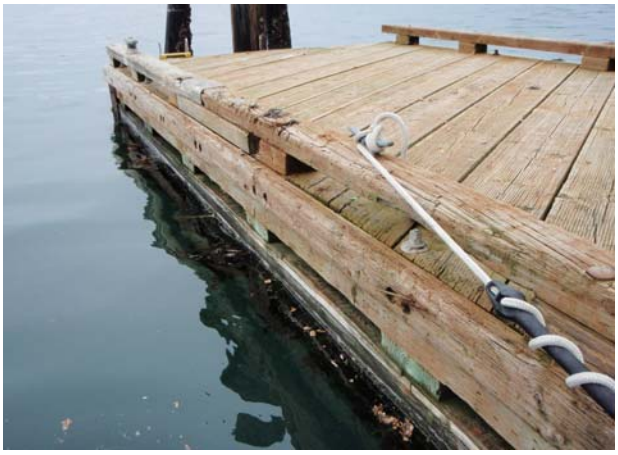
Dock, Gangway & Float

Gangway to Float

Gangway & Timber Dock/Anchor Pile

Three-Pile Dolphin at Outboard Float End

Dock and Float to Pile Retainer
(Note Missing Cross Bracing at Outboard Pile Bent)



Float Rub and Bull Rail

APPENDIX B

2010 WSDOT ENVIRONMENTAL PARAMETERS

APPENDIX B

Section 3 Environmental Conditions

3.1 Wind, Wave Environment

The static and dynamic analyses are based upon wave hindcast results in 1-, 20-, and 100-year return period (1-YRP, 20-YRP, 100-YRP) wind speeds, from both southerly and northerly directions. The assessment of these conditions is reported in Reference 4. As reported therein, wave spectra have been computed in each of these wind conditions to derive wave heights and modal periods at 12 points along the bridge: the midpoints of Pontoons A, C, E, G, I, K, M, O, Q, S, U, and W. The environmental parameters for the six storms are summarized in Table 3-1.

Table 3-1 Environmental parameters in 1-, 20- and 100-YRP storms

Parameter	1-YRP South	20-YRP South	100-YRP South	1-YRP North	20-YRP North	100-YRP North
Wind Speed (mph)	41	73	89	23	54	72
Wind Direction (compass)	192	192	192	12	12	12
Significant Wave Height (ft)	2.6	5.0	6.3	1.4	4.3	6.2
Wave Modal Period (s)	3.1	4.1	4.9	2.5	3.7	4.5

As discussed in Reference 4, the 100-YRP southerly wind, 89 mph, may occur from any direction south of the bridge axis. The available climatalogical data are not sufficient to predict the precise direction. To estimate the worst-case environmental conditions, therefore, wave heights were computed for winds propagating along the Mercer Island channel (compass 150°), perpendicular to the bridge centerline (compass 192°) and from a point near the west side of the I-90 bridge (compass 205°). The most severe waves occur for winds parallel to the Mercer Island channel with a significant wave height of 6.3 ft. For wind perpendicular to the bridge, the hindcast wave height is 6.1 ft. Since the differences between these two wave heights are relatively small, and the dynamic bridge responses are more severe for wave headings near 192°, the 6.3-ft significant wave height and 192° wind and wave direction are selected as the 100-YRP design environmental condition.

Following similar logic, the lower return period southerly storms, 1-YRP and 20-YRP, are defined by the wave heights computed in the 150° wind, but applied at a heading of 192°.

Wave heights were computed for northerly winds from compass headings 0°, 12°, and 25°. Wave heights in the 12° and 25° winds were almost identical, with wave heights in the 0° winds somewhat lower. Following similar reasoning to that outlined above, 12° winds are assumed for all northerly storms.

The computation of the statistical moments from the FEA results, according to Equations 2 and 4, assumes a uniform wave spectrum along the length of the bridge. As documented in Reference 4, significant wave height and wave spectrum vary along the length of the bridge. As noted previously, in each of the characteristic environmental conditions, wave spectra were computed at 12 points along the length of the bridge. To select appropriate spectra for computation of statistical moments, the results for the 100-YRP storms were examined to find wave spectra that were representative of most of the computed spectra and had wave energy concentrated near the 90° heading. On this basis, the spectra at Pontoon M were

APPENDIX C

CALCULATION OF NATURAL PERIODS

CALCULATE NATURAL HORIZONTAL PERIOD OF VIBRATION OF FLOATS

τ = 2π(W/nkg)**0.5 or 2π[(W)(12L^3)/(n*Coef*EI*386)]^0.5

where: τ=Natural Period in seconds
W=bouyant weight in pounds
n=number of piles
k=lateral stiffness of piles
g=386
Coef=Depending on End Fixity (Free-end or Fixed-end)

Compare 12" Timber & Steel Piles at Obstruction Pass, Orcas Island, Concrete Float with Tide at El. +10.0

π	W	L	n	Free-End	E	12" DIA	g	τ(sec.)	
3.1416	54,173	26	5	3	1600000	1017.87	386	2.62	Five 12" Timber Piles
3.1416	54,173	26	4	3	1600000	1017.87	386	2.93	Four 12" Timber Piles Effective
3.1416	54,173	26	3	3	1600000	1017.87	386	3.39	Three 12" Timber Piles Effective
3.1416	54,173	26	4	3	29000000	362	386	1.16	Four 12" Steel Piles w/1/2" wall thickness
3.1416	54,173	26	4	3	29000000	483.75	386	1.00	Four 14" Steel Piles w/1/2" wall thickness
3.1416	54,173	26	4	3	29000000	732	386	0.81	Four 16" Steel Piles w/1/2" wall thickness

Compare 12" Timber & Steel Piles at Obstruction Pass, Orcas Island, Concrete Float with Tide at El. +6.0

				Free-End		12" DIA		τ(sec.)	
3.1416	54,173	22	5	3	1600000	1017.87	386	2.04	Five 12" Timber Piles
3.1416	54,173	22	4	3	1600000	1017.87	386	2.28	Four 12" Timber Piles Effective
3.1416	54,173	22	3	3	1600000	1017.87	386	2.64	Three 12" Timber Piles Effective
3.1416	54,173	22	4	3	29000000	362	386	0.90	Four 12" Steel Piles w/1/2" wall thickness
3.1416	54,173	22	4	3	29000000	483.75	386	0.78	Four 14" Steel Piles w/1/2" wall thickness
3.1416	54,173	22	4	3	29000000	732	386	0.63	Four 16" Steel Piles w/1/2" wall thickness

From Table 3-1, WSDOT SR520 Wind & Wave Analysis, pg. 3-1

	1-YRP	20-YRP	100-YRP	Direction
Wave Modal Period	3.1 sec	4.1 sec	6.3 sec	South
Significant Wave Height	2.6 ft	5.0 ft	6.3 ft	South

where: YRP = year return period

Compare wth Bouyant Weight of a Timber Float 10 Ft. by 40 Ft. at 25 psf

Check Obstruction Pass, Orcas Island, Tide at El. +10.0

						12" DIA		T (sec.)
3.1416	10,000	26	5	3	1600000	1017.87	386	1.13 Five Timber Piles
3.1416	10,000	26	4	3	1600000	1017.87	386	1.26 Four Timber Piles Effective
3.1416	10,000	26	3	3	1600000	1017.87	386	1.46 Three Timber Piles Effective
3.1416	10,000	26	4	3	29000000	362	386	0.50 Four 12" Steel Piles w/1/2" wall thickness
3.1416	10,000	26	4	3	29000000	483.75	386	0.43 Four 14" Steel Piles w/1/2" wall thickness
3.1416	10,000	26	4	3	29000000	732	386	0.35 Four 16" Steel Piles w/1/2" wall thickness

Compare wth Bouyant Weight of a Timber Float 10 Ft. by 40 Ft. at 25 psf

Check Obstruction Pass, Orcas Island, Tide at El. +6.0

						12" DIA		T
3.1416	10,000	22	5	3	1600000	1017.87	386	0.88 Five Timber Piles
3.1416	10,000	22	4	3	1600000	1017.87	386	0.98 Four Timber Piles Effective
3.1416	10,000	22	3	3	1600000	1017.87	386	1.13 Three Timber Piles Effective
3.1416	10,000	22	4	3	29000000	362	386	0.39 Four 12" Steel Piles w/1/2" wall thickness
3.1416	10,000	22	4	3	29000000	483.75	386	0.33 Four 14" Steel Piles w/1/2" wall thickness
3.1416	10,000	22	4	3	29000000	732	386	0.27 Four 16" Steel Piles w/1/2" wall thickness

From Table 3-1, WSDOT SR520 Wind & Wave Analysis, pg. 3-1

	1-YRP	20-YRP	100-YRP	Direction
Wave Modal Period	3.1 sec	4.1 sec	6.3 sec	South
Significant Wave Height	2.6 ft	5.0 ft	6.3 ft	South

where: YRP = year return period

CALCULATE NATURAL HORIZONTAL PERIOD OF VIBRATION OF OUTBOARD FLOAT - WESTSOUND

τ = 2π(W/nkg)**0.5 or $2\pi[(W)(12L^3)/(n*Coef*EI*386)]^{0.5}$

where: τ=Natural Period in seconds
W=bouyant weight in pounds
n=number of piles
k=lateral stiffness of piles
g=386
Coef=Depending on End Fixity (Free-end or Fixed-end)

Compare 12" Timber & Steel Piles at Westsound, Orcas Island, Concrete Float with Tide at El. +10.0

				Free-End		12" DIA		τ(sec.)
3.1416	31,000	34	5	3	1600000	1017.87	386	2.97 Five Timber Piles
3.1416	31,000	34	4	3	1600000	1017.87	386	3.32 Four Timber Piles Effective
3.1416	31,000	34	3	3	1600000	1017.87	386	3.83 Three Timber Piles Effective
3.1416	31,000	34	4	3	29000000	362	386	1.31 Four 12" Steel Piles w/1/2" wall thickness
3.1416	31,000	34	4	3	29000000	483.75	386	1.13 Four 14" Steel Piles w/1/2" wall thickness
3.1416	31,000	34	4	3	29000000	732	386	0.92 Four 16" Steel Piles w/1/2" wall thickness

Compare 12" Timber & Steel Piles at Westsound, Orcas Island, Concrete Float with Tide at El. +6.0

				Free-End		12" DIA		τ(sec)
3.1416	31,000	30	5	3	1600000	1017.87	386	2.46 Five Timber Piles
3.1416	31,000	30	4	3	1600000	1017.87	386	2.75 Four Timber Piles Effective
3.1416	31,000	30	3	3	1600000	1017.87	386	3.18 Three Timber Piles Effective
3.1416	31,000	30	4	3	29000000	362	386	1.08 Four 12" Steel Piles w/1/2" wall thickness
3.1416	31,000	30	4	3	29000000	483.75	386	0.94 Four 14" Steel Piles w/1/2" wall thickness
3.1416	31,000	30	4	3	29000000	732	386	0.76 Four 16" Steel Piles w/1/2" wall thickness

From Table 3-1, WSDOT SR520 Wind & Wave Analysis, pg. 3-1

	1-YRP	20-YRP	100-YRP	Direction
Wave Modal Period	3.1 sec	4.1 sec	6.3 sec	South

Compare wth Bouyant Weight of a Timber Float 8 Ft. by 40 Ft. at 25 psf

Check Westsound Outboard Float, Orcas Island, Tide at El. +10.0

						12" DIA		T (sec.)
3.1416	6,650	34	5	3	1600000	1017.87	386	1.38 Five Timber Piles
3.1416	6,650	34	4	3	1600000	1017.87	386	1.54 Four Timber Piles Effective
3.1416	6,650	34	3	3	1600000	1017.87	386	1.78 Three Timber Piles Effective
3.1416	6,650	34	4	3	29000000	362	386	0.61 Four 12" Steel Piles w/1/2" wall thickness
3.1416	6,650	34	4	3	29000000	483.75	386	0.52 Four 14" Steel Piles w/1/2" wall thickness
3.1416	6,650	34	4	3	29000000	732	386	0.43 Four 16" Steel Piles w/1/2" wall thickness

Compare wth Bouyant Weight of a Timber Float 10 Ft. by 40 Ft. at 25 psf

Check Westsound, Orcas Island, Tide at El. +6.0

						12" DIA		T (sec.)
3.1416	6,650	30	5	3	1600000	1017.87	386	1.14 Five Timber Piles
3.1416	6,650	30	4	3	1600000	1017.87	386	1.27 Four Timber Piles Effective
3.1416	6,650	30	3	3	1600000	1017.87	386	1.47 Three Timber Piles Effective
3.1416	6,650	30	4	3	29000000	362	386	0.50 Four 12" Steel Piles w/1/2" wall thickness
3.1416	6,650	30	4	3	29000000	483.75	386	0.43 Four 14" Steel Piles w/1/2" wall thickness
3.1416	6,650	30	4	3	29000000	732	386	0.35 Four 16" Steel Piles w/1/2" wall thickness

From Table 3-1, WSDOT SR520 Wind & Wave Analysis, pg. 3-1

	1-YRP	20-YRP	100-YRP	Direction
Wave Modal Period	3.1 sec	4.1 sec	6.3 sec	South
Significant Wave Height	2.6 ft	5.0 ft	6.3 ft	South

where: YRP = year return period

CALCULATE NATURAL HORIZONTAL PERIOD OF VIBRATION OF INBOARD FLOAT

τ = 2π(W/nkg)**0.5 or 2π[(W)(12L^3)/(n*Coef*EI*386)]^0.5

where: τ=Natural Period in seconds
W=bouyant weight in pounds
n=number of piles
k=lateral stiffness of piles
g=386
Coef=Depending on End Fixity (Free-end or Fixed-end)

Compare 12" Timber & Steel Piles at Westsound, Orcas Island, Concrete Float with Tide at El. +10.0

				Free-End		12" DIA			T (sec.)
3.1416	31,000	26	6	3	1600000	1017.87	386	1.81	Five Timber Piles
3.1416	31,000	26	5	3	1600000	1017.87	386	1.99	Four Timber Piles Effective
3.1416	31,000	26	4	3	1600000	1017.87	386	2.22	Three Timber Piles Effective
3.1416	31,000	26	4	3	29000000	362	386	0.87	Four 12" Steel Piles w/1/2" wall thickness
3.1416	31,000	26	4	3	29000000	483.75	386	0.76	Four 14" Steel Piles w/1/2" wall thickness
3.1416	31,000	26	4	3	29000000	732	386	0.61	Four 16" Steel Piles w/1/2" wall thickness

Compare 12" Timber & Steel Piles at Westsound, Orcas Island, Concrete Float with Tide at El. +6.0

				Free-End		12" DIA			T (sec.)
3.1416	31,000	22	6	3	1600000	1017.87	386	1.41	Five Timber Piles
3.1416	31,000	22	4	3	1600000	1017.87	386	1.73	Four Timber Piles Effective
3.1416	31,000	22	3	3	1600000	1017.87	386	2.00	Three Timber Piles Effective
3.1416	31,000	22	4	3	29000000	362	386	0.68	Four 12" Steel Piles w/1/2" wall thickness
3.1416	31,000	22	4	3	29000000	483.75	386	0.59	Four 14" Steel Piles w/1/2" wall thickness
3.1416	31,000	22	4	3	29000000	732	386	0.48	Four 16" Steel Piles w/1/2" wall thickness

From Table 3-1, WSDOT SR520 Wind & Wave Analysis, pg. 3-1

	1-YRP	20-YRP	100-YRP	Direction
Wave Modal Period	3.1 sec	4.1 sec	6.3 sec	South
Significant Wave Height	2.6 ft	5.0 ft	6.3 ft	South

where: YRP = year return period

Compare wth Bouyant Weight of a Timber Float 8 Ft. by 40 Ft. at 25 psf

Check Westsound Inboard Float, Orcas Island, Tide at El. +10.0

						12" DIA		T(sec.)
3.1416	6,650	26	5	3	1600000	1017.87	386	0.92 Five Timber Piles
3.1416	6,650	26	4	3	1600000	1017.87	386	1.03 Four Timber Piles Effective
3.1416	6,650	26	3	3	1600000	1017.87	386	1.19 Three Timber Piles Effective
3.1416	6,650	26	4	3	29000000	362	386	0.40 Four 12" Steel Piles w/1/2" wall thickness
3.1416	6,650	26	4	3	29000000	483.75	386	0.35 Four 14" Steel Piles w/1/2" wall thickness
3.1416	6,650	26	4	3	29000000	732	386	0.28 Four 16" Steel Piles w/1/2" wall thickness

Compare wth Bouyant Weight of a Timber Float 10 Ft. by 40 Ft. at 25 psf

Check Westsound, Orcas Island, Tide at El. +6.0

						12" DIA		
3.1416	6,650	22	5	3	1600000	1017.87	386	0.72 Five Timber Piles
3.1416	6,650	22	4	3	1600000	1017.87	386	0.80 Four Timber Piles Effective
3.1416	6,650	22	3	3	1600000	1017.87	386	0.92 Three Timber Piles Effective
3.1416	6,650	22	4	3	29000000	362	386	0.32 Four 12" Steel Piles w/1/2" wall thickness
3.1416	6,650	22	4	3	29000000	483.75	386	0.27 Four 14" Steel Piles w/1/2" wall thickness
3.1416	6,650	22	4	3	29000000	732	386	0.22 Four 16" Steel Piles w/1/2" wall thickness

From Table 3-1, WSDOT SR520 Wind & Wave Analysis, pg. 3-1

	1-YRP	20-YRP	100-YRP	Direction
Wave Modal Period	3.1 sec	4.1 sec	6.3 sec	South
Significant Wave Height	2.6 ft	5.0 ft	6.3 ft	South

where: YRP = year return period

APPENDIX D

COST ESTIMATE SPREADSHEETS

ORCAS LANDING SHERIFF'S FLOAT AND PILE REPLACEMENT PROJECT

PRELIMINARY COST ESTIMATE

6/14/2012

Bid Item No.	Description	Quantity	Unit	Unit Cost	Amount
00010	MOBILIZATION 6%	1	LUMP SUM	$5,028.00	$5,028.00
00020	GANGWAY 3 FT X 36 FT	108	SQUARE FEET	$135.00	$14,580.00
00030	FLOAT REMOVAL AND DISPOSAL 20' x 28'	560	SQUARE FEET	$7.50	$4,200.00
00040	FLOAT REPLACEMENT 20' X 28'	560	SQUARE FEET	$85.00	$47,600.00
00050	PILE REMOVAL	6	EACH	$500.00	$3,000.00
00060	FURNISHING 12.75" x 0.500" GALVANIZED STEEL PILE	200	LINEAR FEET	$65.00	$13,000.00
00070	DRIVING 12.75" x 0.500" GALVANIZED STEEL PILE	4	EACH	$2,000.00	$8,000.00
00080	PILE RESTRAINER ASSEMBLIES & DAMPERS	4	EACH	$2,000.00	$8,000.00
	SUB-TOTAL NOT INCLUDING TAX				$103,408.00
	8% SALES TAX				$8,272.64
	GRAND TOTAL INCLUDING TAX				$111,680.64
				SAY	$113,000.00

Note: Per WA State Revenue Rule 171 Sales Tax for Marine Structures is not included in Unit Costs

ENGINEERING FEE 10%	80	HOURS	$125.00	$10,000.00
SURVEYING SJC PWD	24	HOURS	$55.00	$1,320.00
PERMITS ~ CD&P SHORELINE EXEMPTION	40	HOURS	$100.00	$4,000.00
DIVE SURVEY	1	EACH	$2,000.00	$2,000.00
CD&P PERMIT FEE	1	EACH	$1,200.00	$1,200.00
SUB-TOTAL				$18,520.00

ESTIMATED SJC PWD STAFF TIME ~ REVIEW	20		$55.00	$1,100.00
SJC CONSTRUCTION INSPECTION/ADMINISTRATION	40		$55.00	$2,200.00

$134,820.00

OVERALL PROJECT COST FOR BUDGET PURPOSES **$135,000.00**

OPTION 1: OBSTRUCTION PASS FLOAT AND PILE REPAIR PROJECT ~ SAME FOOTPRINT w/NEW TIMBER FLOAT

PRELIMINARY COST ESTIMATE

6/14/2012

Bid Item No.	Description	Quantity	Unit	Unit Cost	Amount	without pier safety rail Amount
00010	MOBILIZATION 6%	1	LUMP SUM	$5,208.00	$5,208.00	$5,208.00
00020	PILE REMOVAL	5	EACH	$500.00	$2,500.00	$2,500.00
00030	FURNISHING 12.75" x 0.500" GALVANIZED STEEL PILE	220	LINEAR FEET	$65.00	$14,300.00	$14,300.00
00040	DRIVING 12.75" x 0.500" GALVANIZED STEEL PILE	4	EACH	$2,000.00	$8,000.00	$8,000.00
00050	FLOAT REMOVAL AND DISPOSAL 10' x 40'	400	SQUARE FEET	$25.00	$10,000.00	$10,000.00
00060	FLOAT REPLACEMENT	400	SQUARE FEET	$85.00	$34,000.00	$34,000.00
00070	INSTALL PIER SAFETY RAILING	1	EACH	$18,000.00	$18,000.00	$0.00
	SUB-TOTAL NOT INCLUDING TAX				$92,008.00	$74,008.00
	8% SALES TAX				$7,360.64	$5,920.64
	GRAND TOTAL INCLUDING TAX				$99,368.64	$79,928.64
				SAY	$100,000.00	$80,000.00

Note: Per WA State Revenue Rule 171 Sales Tax for Marine Structures is not included in Unit Costs

ENGINEERING FEE 10%	80	HOURS	$125.00	$10,000.00	$8,000.00
SURVEYING	0	DAYS	$0.00	$0.00	$0.00
PERMITS ~ CD&P SHORELINE EXEMPTION	40	HOURS	$100.00	$4,000.00	$2,000.00
DIVE SURVEY	1	EACH	$2,000.00	$2,000.00	$2,000.00
CD&P PERMIT FEE	1	EACH	$1,200.00	$1,200.00	$1,200.00
SUB-TOTAL				$17,200.00	$13,200.00

ESTIMATED SJC PWD STAFF TIME ~ REVIEW	20		$55.00	$1,100.00	$1,100.00
CONSTRUCTION INSPECTION/ADMINISTRATION	40		$100.00	$4,000.00	$4,000.00

	$122,300.00	**$98,300.00**
OVERALL PROJECT COST FOR BUDGET PURPOSES	**$125,000.00**	**$100,000.00**

OPTION 2: OBSTRUCTION PASS PIER AND FLOAT ~ KEEP SAME CONCRETE FLOAT & FOOTPRINT

PRELIMINARY COST ESTIMATE

6/14/2012

Bid Item No.	Description	Quantity	Unit	Unit Cost	Amount	without pier safety rail Amount
00010	MOBILIZATION 6%	1	LUMP SUM	$4,392.00	$4,392.00	$4,392.00
00020	PILE REMOVAL	5	EACH	$500.00	$2,500.00	$2,500.00
00030	FURNISHING 16" x 0.500" GALVANIZED STEEL PILE	220	LINEAR FEET	$85.00	$18,700.00	$18,700.00
00040	DRIVING 16" x 0.500" GALVANIZED STEEL PILE	4	EACH	$4,000.00	$16,000.00	$16,000.00
00050	FABRICATE AND INSTALL PILE HOOP ASSEMBLIES	4	EACH	$2,500.00	$10,000.00	$10,000.00
00060	INSTALL STRUCTURAL DAMPERS/MARINE FENDERS	4	EACH	$2,000.00	$8,000.00	$8,000.00
00060	INSTALL PIER SAFETY RAILING	1	EACH	$18,000.00	$18,000.00	$0.00
	SUB-TOTAL NOT INCLUDING TAX				$77,592.00	$59,592.00
	8% SALES TAX				$6,207.36	$4,767.36
	GRAND TOTAL INCLUDING TAX				$83,799.36	$64,359.36
				SAY	$85,000.00	$65,000.00

Note: Per WA State Revenue Rule 171 Sales Tax for Marine Structures is not included in Unit Costs

ENGINEERING FEE 10%	65	HOURS	$125.00	$8,125.00	$6,500.00
SURVEYING	24	HOURS	$55.00	$1,320.00	$1,320.00
PERMITS ~ CD&P SHORELINE EXEMPTION	40	HOURS	$100.00	$4,000.00	$2,000.00
DIVE SURVEY	1	EACH	$2,000.00	$2,000.00	$2,000.00
CD&P PERMIT FEE	1	EACH	$1,200.00	$1,200.00	$1,200.00
SUB-TOTAL				$16,645.00	$13,020.00

ESTIMATED SJC PWD STAFF TIME ~ REVIEW	20		$55.00	$1,100.00	$1,100.00
CONSTRUCTION INSPECTION/ADMINISTRATION	40		$55.00	$2,200.00	$4,000.00

	$104,945.00	**$83,120.00**
OVERALL PROJECT COST FOR BUDGET PURPOSES	**$105,000.00**	**$85,000.00**

OPTION 1: OBSTRUCTION PASS MARINE RAMP - RELOCATED

PRELIMINARY COST ESTIMATE

6/14/2012

Bid Item No.	Description	Quantity	Unit	Unit Cost	Amount
00010	MOBILIZATION 6%	1	LUMP SUM	$8,490.00	$8,490.00
00020	EARTHWORK & GRADING	1	LUMP SUM	$13,500.00	$13,500.00
00030	REMOVAL & DISPOSAL OF EXISTING CONC PLANKS	1600	SQUARE FEET	$10.00	$16,000.00
00040	FURNISHING & INSTALLING CONCRETE PLANKS	1600	SQUARE FEET	$70.00	$112,000.00
	SUB-TOTAL NOT INCLUDING TAX				$149,990.00
	8% SALES TAX				$11,999.20
	TOTAL INCLUDING TAX				$161,989.20
	CONSTRUCTION TOTAL				$162,000.00

ENGINEERING	40	HOURS	$125.00	$5,000.00
SURVEYING	3	DAYS	$1,000.00	$3,000.00
PERMITS ~ CD&P SHORELINE EXEMPTION	40	HOURS	$100.00	$4,000.00
BIOLOGICAL ASSESSMENT	1	EACH	$2,500.00	$2,500.00
CD&P PERMIT FEE	1	EACH	$4,500.00	$4,500.00
SUB-TOTAL				$19,000.00

ESTIMATED SJC PWD STAFF TIME ~ REVIEW	20		$55.00	$1,100.00
CONSTRUCTION INSPECTION/ADMINISTRATION	40		$55.00	$2,200.00

$184,300.00

OVERALL PROJECT COST FOR BUDGET PURPOSES **$185,000.00**

OPTION 2: OBSTRUCTION PASS MARINE RAMP - REPLACE IN EXISTING FOOTPRINT

PRELIMINARY COST ESTIMATE

6/14/2012

Bid Item No.	Description	Quantity	Unit	Unit Cost	Amount
00010	MOBILIZATION 6%	1	LUMP SUM	$7,680.00	$7,680.00
00020	REMOVAL & DISPOSAL OF EXISTING CONC PLANKS	1600	SQUARE FEET	$10.00	$16,000.00
00030	FURNISHING & INSTALLING CONCRETE PLANKS	1600	SQUARE FEET	$70.00	$112,000.00
	SUB-TOTAL NOT INCLUDING TAX				$135,680.00
	8% SALES TAX				$10,854.40
	TOTAL INCLUDING TAX				$146,534.40
	CONSTRUCTION TOTAL				$147,000.00

ENGINEERING	20	HOURS	$125.00	$2,500.00
SURVEYING	2	DAYS	$1,000.00	$2,000.00
PERMITS ~ CD&P SHORELINE EXEMPTION	25	HOURS	$100.00	$2,500.00
BIOLOGICAL ASSESSMENT	0	EACH	$2,500.00	$0.00
CD&P PERMIT FEE	1	EACH	$1,200.00	$1,200.00
SUB-TOTAL				$8,200.00

ESTIMATED SJC PWD STAFF TIME ~ REVIEW	20		$55.00	$1,100.00
CONSTRUCTION INSPECTION/ADMINISTRATION	40		$55.00	$2,200.00

$158,500.00

OVERALL PROJECT COST FOR BUDGET PURPOSES **$160,000.00**

OPTION 1: WESTSOUND FLOAT AND PILE REPAIR PROJECT ~ SAME FOOTPRINT w/NEW TIMBER FLOAT

PRELIMINARY COST ESTIMATE

6/14/2012

Bid Item No.	Description	Quantity	Unit	Unit Cost	Amount
00010	MOBILIZATION 6%	1	LUMP SUM	$7,230.00	$7,230.00
00020	PILE REMOVAL	11	EACH	$500.00	$5,500.00
00030	FURNISHING 12.75" x 0.500" GALVANIZED STEEL PILE	440	LINEAR FEET	$65.00	$28,600.00
00040	DRIVING 12.75" x 0.500" GALVANIZED STEEL PILE	8	EACH	$2,000.00	$16,000.00
00050	FLOAT REMOVAL AND DISPOSAL 8' x 80'	640	SQUARE FEET	$25.00	$16,000.00
00060	FLOAT REPLACEMENT	640	SQUARE FEET	$85.00	$54,400.00
	SUB-TOTAL NOT INCLUDING TAX				$127,730.00
	8% SALES TAX				$10,218.40
	GRAND TOTAL INCLUDING TAX				$137,948.40
				SAY	$138,000.00

Note: Per WA State Revenue Rule 171 Sales Tax for Marine Structures is not included in Unit Costs

ENGINEERING FEE 10%	110	HOURS	$125.00	$13,750.00
SURVEYING	2	DAYS	$1,000.00	$2,000.00
PERMITS ~ CD&P SHORELINE EXEMPTION	40	HOURS	$100.00	$4,000.00
DIVE SURVEY	1	EACH	$2,000.00	$2,000.00
CD&P PERMIT FEE	1	EACH	$1,200.00	$1,200.00
SUB-TOTAL				$22,950.00

ESTIMATED SJC PWD STAFF TIME ~ REVIEW	20		$55.00	$1,100.00
CONSTRUCTION INSPECTION/ADMINISTRATION	40		$100.00	$4,000.00

$166,050.00

OVERALL PROJECT COST FOR BUDGET PURPOSES **$167,000.00**

OPTION 2 : WESTSOUND FLOAT AND PILE REPLACEMENT ~ SAME CONCRETE FLOAT & FOOTPRINT

PRELIMINARY COST ESTIMATE

6/14/2012

Bid Item No.	Description	Quantity	Unit	Unit Cost	Amount
00010	MOBILIZATION 6%	1	LUMP SUM	$4,026.00	$4,026.00
00020	PILE REMOVAL	9	EACH	$500.00	$4,500.00
00030	FURNISHING 16" x 0.500" GALVANIZED STEEL PILE	360	LINEAR FEET	$85.00	$30,600.00
00040	DRIVING 16" x 0.500" GALVANIZED STEEL PILE	8	EACH	$4,000.00	$32,000.00
00050	PILE RESTRAINER ASSEMBLIES & DAMPERS	8	EACH	$3,000.00	$24,000.00
	SUB-TOTAL NOT INCLUDING TAX				$95,126.00
	8% SALES TAX				$7,610.08
	GRAND TOTAL INCLUDING TAX				$102,736.08
				SAY	$103,000.00

Note: Per WA State Revenue Rule 171 Sales Tax for Marine Structures is not included in Unit Costs

ENGINEERING FEE 10%	80	HOURS	$125.00	$10,000.00
SURVEYING	2	DAYS	$1,000.00	$2,000.00
PERMITS ~ CD&P SHORELINE EXEMPTION	40	HOURS	$100.00	$4,000.00
DIVE SURVEY	1	EACH	$2,000.00	$2,000.00
CD&P PERMIT FEE	1	EACH	$1,200.00	$1,200.00
SUB-TOTAL				$19,200.00

ESTIMATED SJC PWD STAFF TIME ~ REVIEW	20		$55.00	$1,100.00
SJC CONSTRUCTION INSPECTION/ADMINISTRATION	60		$55.00	$3,300.00

$126,600.00

OVERALL PROJECT COST FOR BUDGET PURPOSES **$127,000.00**

OPTION 1: ODLIN FLOAT AND PILE REPLACEMENT PROJECT ~ FLOAT SHIFTED 25 FT SOUTH

PRELIMINARY COST ESTIMATE

6/14/2012

Bid Item No.	Description	Quantity	Unit	Unit Cost	Amount
00010	MOBILIZATION 6%	1	LUMP SUM	$7,848.75	$7,848.75
00020	GANGWAY 4 FT X 80 FT	320	SQUARE FEET	$85.00	$27,200.00
00030	FLOAT REMOVAL AND DISPOSAL 10' x 50'	500	SQUARE FEET	$14.00	$7,000.00
00040	FLOAT REPLACEMENT 10' X 50'	500	SQUARE FEET	$85.00	$42,500.00
00050	ABUTMENT CONSTRUCTION	1	EACH	$10,000.00	$10,000.00
00060	PILE REMOVAL	3	EACH	$500.00	$1,500.00
00070	FURNISHING 16" x 0.500" GALVANIZED STEEL PILE	150	LINEAR FEET	$85.00	$12,750.00
00080	DRIVING 16" x 0.500" GALVANIZED STEEL PILE	2	EACH	$4,000.00	$8,000.00
00090	FURNISHING 12.75" x 0.500" GALVANIZED STEEL PILE	120	LINEAR FEET	$65.00	$7,800.00
00100	DRIVING 12.75" x 0.500" GALVANIZED STEEL PILE	2	EACH	$2,000.00	$4,000.00
	SUB-TOTAL NOT INCLUDING TAX				$128,598.75
	8% SALES TAX				$10,287.90
					$138,886.65
	CONSTRUCTION TOTAL INCLUDING SALES TAX				$139,000.00

Note: Per WA State Revenue Rule 171 Sales Tax for Marine Structures is not included in Unit Costs

ENGINEERING FEE 10%	110	HOURS	$125.00	$13,750.00
SURVEYING SJC PWD	3	DAYS	$1,000.00	$3,000.00
PERMITS ~ CD&P SUBSTANTIAL SHORELINE	40	HOURS	$100.00	$4,000.00
DIVE SURVEY	1	EACH	$2,000.00	$2,000.00
CD&P PERMIT FEE	1	EACH	$4,500.00	$4,500.00
SUB-TOTAL				$27,250.00

ESTIMATED SJC PWD STAFF TIME ~ REVIEW	20		$55.00	$1,100.00
SJC CONSTRUCTION INSPECTION/ADMINISTRATION	80		$55.00	$4,400.00
				$171,750.00

OVERALL PROJECT COST FOR BUDGET PURPOSES **$172,000.00**

OPTION 2: ODLIN FLOAT AND PILE REPLACEMENT PROJECT ~ SAME FLOAT FOOTPRINT & LOCATION

PRELIMINARY COST ESTIMATE

6/14/2012

Bid Item No.	Description	Quantity	Unit	Unit Cost	Amount
00010	MOBILIZATION 6%	1	LUMP SUM	$4,923.00	$4,923.00
00020	PILE REMOVAL	3	EACH	$500.00	$1,500.00
00030	PIER DECK, STRINGER, & PILE BENT REMOVAL	1	EACH	$20,000.00	$20,000.00
00040	FLOAT REMOVAL AND DISPOSAL 10' x 50'	500	SQUARE FEET	$14.00	$7,000.00
00050	FLOAT REPLACEMENT 10' X 50'	500	SQUARE FEET	$85.00	$42,500.00
00060	FURNISHING 16" x 0.500" GALVANIZED STEEL PILE	150	LINEAR FEET	$85.00	$12,750.00
00070	DRIVING 16" x 0.500" GALVANIZED STEEL PILE	2	EACH	$4,000.00	$8,000.00
00080	FURNISHING 12.75" x 0.500" GALVANIZED STEEL PILE	120	LINEAR FEET	$65.00	$7,800.00
00090	DRIVING 12.75" x 0.500" GALVANIZED STEEL PILE	2	EACH	$2,000.00	$4,000.00
	SUB-TOTAL NOT INCLUDING TAX				$108,473.00
	8% SALES TAX				$8,677.84
					$117,150.84
	CONSTRUCTION TOTAL INCLUDING SALES TAX				$118,000.00

Note: Per WA State Revenue Rule 171 Sales Tax for Marine Structures is not included in Unit Costs

ENGINEERING FEE 10%	90	HOURS	$125.00	$11,250.00
SURVEYING SJC PWD	3	DAYS	$1,000.00	$3,000.00
PERMITS	40	HOURS	$100.00	$4,000.00
CD&P PERMIT FEE	1	EACH	$1,200.00	$1,200.00
SUB-TOTAL				$19,450.00

ESTIMATED SJC PWD STAFF TIME ~ REVIEW	20		$55.00	$1,100.00
SJC CONSTRUCTION INSPECTION/ADMINISTRATION	80		$55.00	$4,400.00

$142,950.00

OVERALL PROJECT COST FOR BUDGET PURPOSES **$143,000.00**

OPTION 3: ODLIN FLOAT AND PILE REPLACEMENT PROJECT ~ FLOAT SHIFTED 25 FT SOUTH - ANGLED GANGWAY

PRELIMINARY COST ESTIMATE

6/14/2012

Bid Item No.	Description	Quantity	Unit	Unit Cost	Amount
00010	MOBILIZATION 6%	1	LUMP SUM	$6,226.35	$6,226.35
00020	GANGWAY 3 FT X 48 FT	144	SQUARE FEET	$85.00	$12,240.00
00030	FLOAT REMOVAL AND DISPOSAL 10' x 50'	500	SQUARE FEET	$14.00	$7,000.00
00040	FLOAT REPLACEMENT 10' X 50'	500	SQUARE FEET	$85.00	$42,500.00
00060	PILE REMOVAL	3	EACH	$500.00	$1,500.00
00070	FURNISHING 16" x 0.500" GALVANIZED STEEL PILE	150	LINEAR FEET	$85.00	$12,750.00
00080	DRIVING 16" x 0.500" GALVANIZED STEEL PILE	2	EACH	$4,000.00	$8,000.00
00090	FURNISHING 12.75" x 0.500" GALVANIZED STEEL PILE	120	LINEAR FEET	$65.00	$7,800.00
00100	DRIVING 12.75" x 0.500" GALVANIZED STEEL PILE	2	EACH	$2,000.00	$4,000.00
	SUB-TOTAL NOT INCLUDING TAX				$102,016.35
	8% SALES TAX				$8,161.31
					$110,177.66
	CONSTRUCTION TOTAL INCLUDING SALES TAX				$110,000.00

Note: Per WA State Revenue Rule 171 Sales Tax for Marine Structures is not included in Unit Costs

ENGINEERING FEE 10%	80	HOURS	$125.00	$10,000.00
BATHYMETRY SURVEY	1	EACH	$17,000.00	$17,000.00
SURVEYING SJC PWD	40	HOURS	$55.00	$2,200.00
PERMITS ~ CD&P SUBSTANTIAL SHORELINE	40	HOURS	$100.00	$4,000.00
DIVE SURVEY	1	EACH	$2,000.00	$2,000.00
CD&P PERMIT FEE	1	EACH	$4,500.00	$4,500.00
SUB-TOTAL				$39,700.00

ESTIMATED SJC PWD STAFF TIME ~ REVIEW	20		$55.00	$1,100.00
SJC CONSTRUCTION INSPECTION/ADMINISTRATION	80		$55.00	$4,400.00

$155,200.00

OVERALL PROJECT COST FOR BUDGET PURPOSES **$156,000.00**