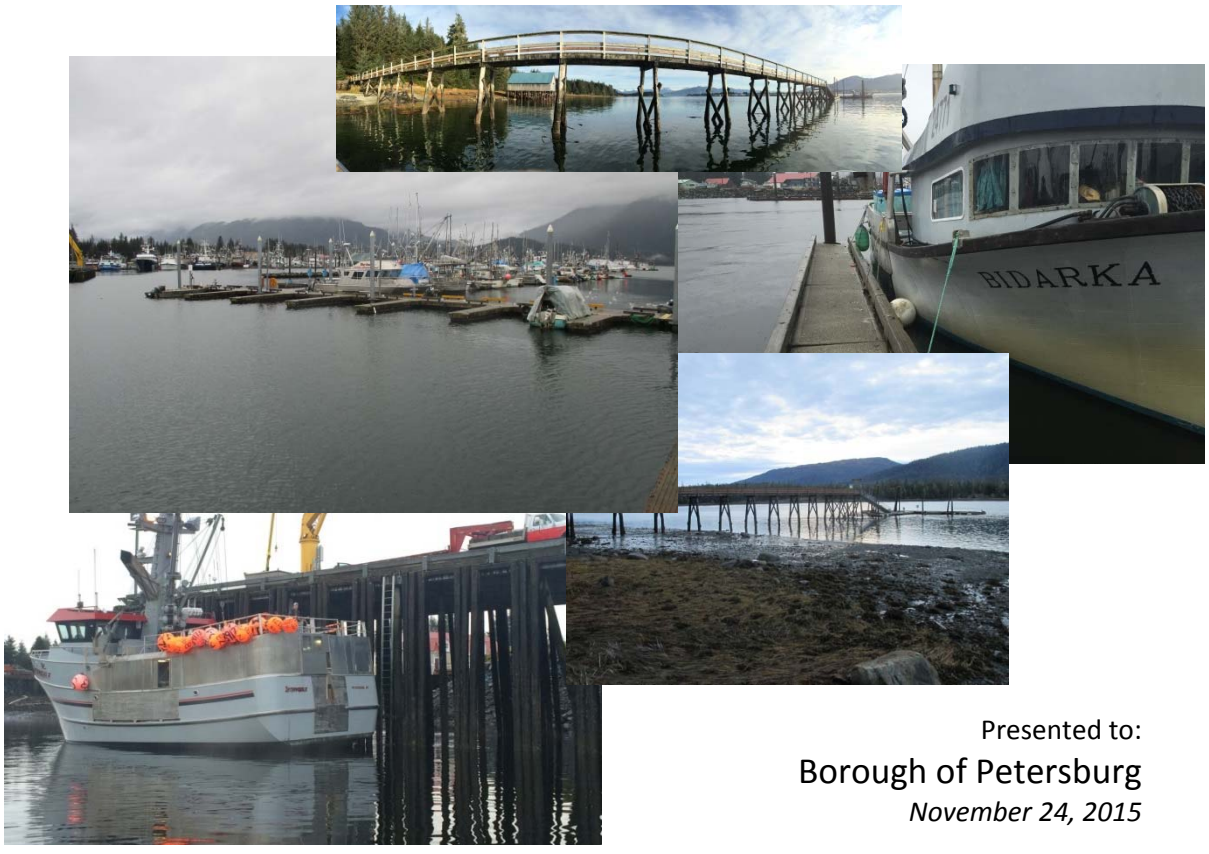
Petersburg Borough

Harbor Facilities

Petersburg, AK

Condition Assessment Report



Presented to:

Borough of Petersburg

November 24, 2015

moffatt & nichol

880 H Street, Suite 208
Anchorage, AK 99501
JN: 8712

Fishing Boat near Petersburg, AK c.1930

Revision Log

Rev No.	Technical Authority	Reviewed By	Approved By	Date	Description
0	Paul Wallis	Charles Balzarini	Paul Wallis	11/18/2015	Issued for Use
1	Paul Wallis	Charles Balzarini	Paul Wallis	11/23/2015	User Comments Reconciliation
2	Paul Wallis	Charles Balzarini	Paul Wallis	11/24/2015	User Comments Reconciliation
3					
4					
5					

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I. EXECUTIVE SUMMARY

INTRODUCTION

The Petersburg Borough Harbors are comprised of three (3) discrete facilities, North, Middle and South Harbors; each of which provides moorage to vessels ranging from small pleasure craft to medium and large commercial fishing vessels. A number of fixed approach docks, with steel and aluminum gangways serve the boating community in accessing systems of floats ranging from concrete to wood-decked. Originating in the 1930's with what is now known as North Harbor, the facilities have grown and changed over the intervening years. Old moorage has been periodically replaced with new when funds became available, occasional maintenance dredging of the various harbors has occurred when the need has arisen, and regular and consistent upkeep has extended the useful life of a number of harbor appurtenances.

In 2014, The Borough of Petersburg retained Moffatt and Nichol (M&N) to assist in strategic master planning of various community assets. These included the waterfront; particularly the three existing harbors. In October of 2015, M&N undertook a thorough condition assessment of these and other facilities along the Borough waterfront. This report summarizes the findings of a field investigation performed by Moffatt and Nichol. It includes a condition assessment of the structures, recommendations for repair and/or replacement, conceptual level repair details, and select order-of-magnitude cost estimates.

As directed by the Borough, the features of the existing construction which were observed included, but were not limited to:

- North, Middle and South Harbors
- Papke Landing
- Kupreanof Landing
- Scow Bay

Moffatt and Nichol conducted a top-side and under-dock inspection of the existing waterfront facilities. Paul Wallis, S.E. and Charles Balzarini, P.E., staff engineers from Moffatt and Nichol's Anchorage, Alaska office, executed the inspection over the period from October 27-29, 2015.

Moffatt & Nichol staff were very well-supported in their efforts by Harbormaster Glorianne Wollen, who provided significant historical background and clarifications, and Port and Harbor Department staffer Ben Hinde, who also provided valuable data on past events as well as waterside transportation for the various dock investigations.

The following synopsis includes a brief overview of the condition of Petersburg's South, Middle, and North Harbor facilities, and the utility/net float, as assessed by Moffatt & Nichol. A detailed condition assessment addressing these facilities as well as the existing crane dock, port dock, and Scow Bay site follow this section.

SOUTH HARBOR

Prior to 1999, the last major renovation of South Harbor was c.1984. Major improvements to the harbor at that time included:

- Construction of approximately 0.84 acres of filled access and parking
- Construction of a 20' x 100' dock access approach and 24' x 120' concrete and steel loading dock with 5,000 lb. hydraulic dock crane, and associated support pile
- Construction of a 12' x 84' float gangway approach and 7'-5" x 65' steel float gangway, and associated support pile
- Construction of 9,880 SF of concrete float, and associated guide pile (new stall floats on mainwalk floats A and D, extension of mainwalk floats B and C, with additional stall floats)
- Demolition of existing timber vessel repair grid and replacement with 200 LF of new medium size vessel repair grid, and steel vehicle grid approach framing
- Extensions of existing potable water line, dry fire line, electrical power and lighting system.

In 1999 extension of mainwalk floats A, B and C occurred, with additional stall floats along each extension, as well as a 12 ft. wide transient float off the end of mainwalk float C.

In 2001 approximately 850 LF of existing timber approach trestle and a timber dock, and approximately 400 LF of an existing fuel dock approach trestle were demolished. Dredging occurred over an area of roughly six acres, at dredge depths ranging from less than seven feet to more than ten feet of material. Designated dredge spoils originating in the vicinity of floats C and D were purposed as nearshore fill for a new earthen approach that extended to the end of the remaining fuel dock approach trestle. A new approach dock was constructed from the corner of the earthen approach to the fuel dock trestle.

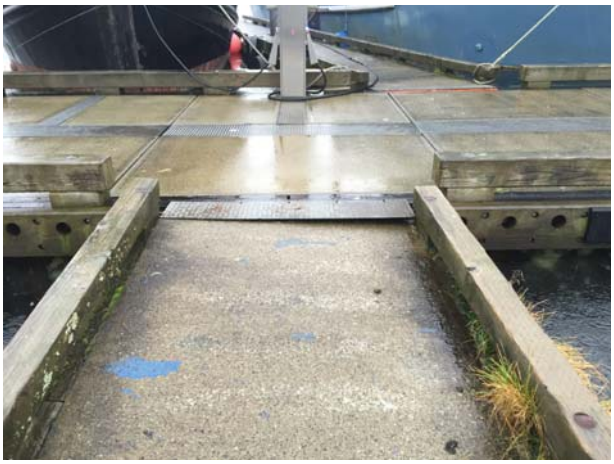
Approximately c.2012-2013 passive cathodic protection, in the form of welded anodes, were added to the existing float guide piles on the 3rd generation of floats. Anodes were installed on the older (c.1984) floats, c.2008.

A new fish cleaning float was added (c.2014) to the end of the existing boat launch boarding float which is adjacent to the ramp near the south end of the existing boat grid.

Areas of concern include (a) existing stall (i.e. "finger") floats; (b) mainwalk float "D"; and (c) the bearing of the existing gangway onto the existing gangway landing float.

Vessel Stall Floats

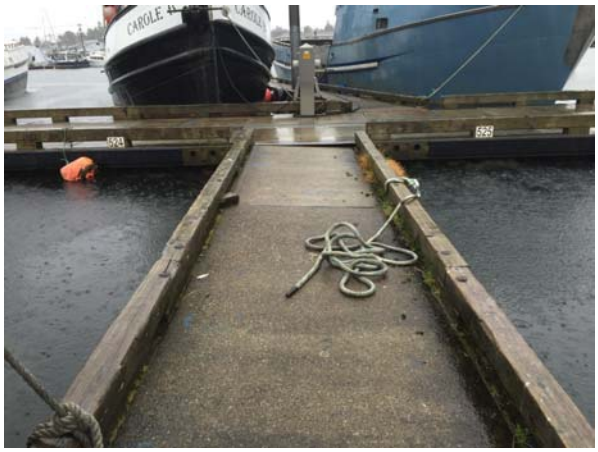
Many of the older existing vessel stall (i.e. "finger") floats have begun to lose freeboard, and some are experiencing significant rotational twist about their longitudinal axis. It is anticipated that replacement of these stall floats may become necessary in the near term.



The average condition of the stall floats is fair to poor, and it is expected that it will not be serviceable beyond another 15 years.

Mainwalk Float "D"

It is thought that mainwalk float "D", being the only unimproved mainwalk from the original construction, will need to be replaced entirely.



The current condition of mainwalk float "D" is fair to poor, and it is expected that it will not be serviceable beyond another 15 years.

Gangway Landing Issues

The seaward end of the existing gangway has experienced long-term issues with binding in it lateral restraint system. In addition, it is possible that this issue has been the cause of damage observed at the boundaries of the existing gangway landing float with other adjacent floats.

It is expected that continued binding of the gangway, as it attempts to slide longitudinally on the deck of the gangway landing float with the changes of tide, will eventually cause significant damage to the landing float and to the adjacent floats and attachment hardware. Given the seriousness of the damage, and the lack of a proven strategy for dealing with this issue to date, it is felt that engineering analysis leading to an immediate design solution would be prudent.

UTILITY/NET FLOAT

The Utility/Net float lies between Middle and South harbors. It was originally constructed as part of the South Harbor Phase II project in 1984. Since then, it has seen heavy use as a net float, and is a critical structure for the local fleet of working vessels.

The current condition of the utility float is poor, and it's expected that it will not be serviceable for its current usage beyond the next 5 years. The float has suffered apparent damage and decay to the timber sills that support the flotation billets. The decking and bullrail are showing signs of wear, and much of the rub board is damaged or recently repaired. Reportedly, portions of the float regularly become submerged when loaded with nets and gear, making it un-suitable for the intended purpose in its current condition. The float may be replaced with a heavy duty concrete or timber replacement float, and the guide pile can be re-used.

MIDDLE HARBOR

Prior to 2005, the last major renovation of Middle Harbor was c.1975. At which time the skiff float in the adjacent North Harbor was extended to relieve a grounding issue at low tides, and the area around the existing floats in Middle Harbor proper was dredged to improve accessibility to the eastern (roughly) half of the mainwalk floats and headwalk float.

In 2005 the existing headwalk float, both mainwalk floats, and all stall (i.e. "finger") floats were removed along with all existing pile. Also demolished were an existing gangway, the seaward 17 LF of existing timber approach dock, and associated support piles. A new gangway and float system was installed in a layout similar to that which had been demolished.

In 2015 the seaward 60 LF section of the 10' wide mainwalk float no. 1 was demolished and replaced in kind due to damage incurred from a vessel strike.

Approximately c.2012 the bulkhead at the landward end of the existing timber approach trestle suffered a partial failure. Field-expedient repairs to the bulkhead, to prevent continued loss of backfill, were executed by the harbor department.

The remaining existing element of construction of immediate concern is the timber approach trestle. It is expected that at some point this structure will need to be either upgraded, or replaced altogether.

The current condition of the timber approach trestle is Good to Fair, and it is expected that it will not be serviceable beyond another 20 years. The replacement system could be constructed similarly to the current arrangement, except utilizing structural steel pipe pile and approach framing. The existing gangway structure would be re-used.

NORTH HARBOR

Prior to 2013, the last major renovation of North Harbor was c.1965, when more than 1,700 lineal feet (LF) of log float was removed and replaced with more than 17,000 square feet (SF) of (then) modern polystyrene floats.

In 2013 the existing headwalk float, both mainwalk floats, all stall (i.e. "finger") floats, and the transient float were removed, along with all existing timber pile. Also demolished were an existing steel gangway, 215 LF of existing timber deck, and 37 LF of existing catwalk adjacent to the harbor office. Four (4) existing boat grid sleepers and their associated support piles were also demolished.

A new approach dock, gangway and float system were installed in a layout that increases the average north dock berth length. The remaining existing elements of construction of immediate concern are (a) the balance of the existing timber boat grid sleepers and associated support piles, one group north of the new approach dock and one group south; (b) the existing timber catwalk above the southern group of existing boat grid; (c) an existing approach dock, gangway and skiff float;, (d) a repurposed troller float located at the end of the skiff float; and (e) an existing timber launch ramp adjacent to the skiff float.

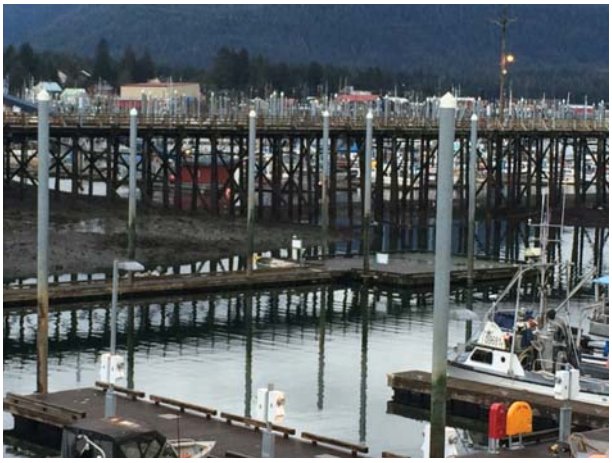
Timber Boat Grid and Catwalk

It is expected that the northern group of timber boat grid sleepers and associated pile will eventually be replaced by an upgraded boat grid. Our understanding at this time is that this grid sees fairly consistent use by harbor patrons. On the other hand, the southern group of timber boat grid sleepers, along with the existing timber catwalk above them will likely not be replaced upon demolition.

The current condition of the northern group of sleepers ranges from fair to poor, and it is expected that they will not be serviceable beyond another 5-10 years. The replacement of the northern group is expected to consist of a similar number of grid beams at similar spacing, with structural steel pipe pile and hot-rolled structural steel sleeper shapes.

Approach Dock, Gangway, Skiff Float and Troller Float

It is expected that the existing approach dock, gangway, skiff float and troller float will eventually be replaced.



The current condition of this system is fair, and it is expected that it will not be serviceable beyond another 10-15 years. The replacement of the system with a similar arrangement, will include necessary dredging, retention structure, and structural steel pipe pile and approach framing, an ADA accessible gangway, and modern concrete or timber float units.

Timber Launch Ramp

It is expected that the existing timber launch ramp will be demolished and not replaced.

The current condition of the ramp is POOR, and it is expected that it will not be serviceable beyond another 5 years without significant repairs or maintenance.

II. DETAILED CONDITION ASSESSMENT

SOUTH HARBOR

1. INTRODUCTION

From the standpoint of original construction, South Harbor is the youngest original construction in contemporary times. South Harbor originated well after Middle Harbor and North Harbor. Presently comprised of one hundred and seven stall floats off the mainwalks, with another thirty-seven stall floats off the headwalk, it is much larger in number-of-vessel capacity than either Middle Harbor or North Harbor. The largest vessel size accommodated in North Harbor is comparable to the largest vessel accommodated by South Harbor, but larger than that accommodated by Middle Harbor.

a. History

South Harbor was designed by the Alaska Department of Transportation & Public Facilities (ADOT&PF) Southeast Region Harbor Design and Construction. In June 1983 sealed design drawings were produced for the project's Phase II. The general contractor, Tamico, Inc. began construction in April of 1984 and completed work in September of 1985.

The scope of Phase II included, but was not limited to:

- Construction of a 16' x 76' prestressed concrete approach structure and 7'-5" x 65' steel gangway, and associated support pile
- Construction of approximately 39,216 SF of concrete float, and associated guide pile
- Construction of approximately 2,400 SF of timber "special use" float, and associated guide pile
- Construction of eight (8) dolphin structures
- Removal and relocation of four (4) existing stall floats and associated guild pile from the 1970's era constructed Middle Harbor
- Construction of potable water lines, dry fire line, electrical power and lighting systems

In July 1984 sealed design drawings were produced for Phase III of the project. Tamico Inc. began construction in October and finished in September of 1986.

The scope of Phase III included, but was not limited to:

- Construction of approximately 0.84 acres of filled access and parking
- Construction of a 20' x 100' dock access approach and 24' x 120' concrete and steel loading dock with 5-ton hydraulic dock crane, and associated support pile. This is known as the Crane Dock. In 1991, an additional crane was purchased and installed on the existing dock.
- Construction of a 12' x 84' float gangway approach and 7'-5" x 65' steel float gangway, and associated support pile
- Construction of 9,880 SF of concrete float, and associated guide pile (new stall floats on mainwalk floats A and D, extension of mainwalk floats B and C, with additional stall floats)
- Demolition of existing timber vessel repair grid and replacement with 200 LF of new medium size vessel repair grid, and steel vehicle grid approach framing
- Extensions of existing potable water lines, dry fire line, electrical power and lighting systems

Beginning at least as early as 1999, plans were formulated to again expand the South Harbor. This expansion appears to have been executed by implementation of a number of discrete design packages of limited, and progressive scope.

In July 2000 unsealed design drawings were issued for Phase 1 of the "South Harbor Expansion". This project was subtitled "Boat Launch and Parking Improvements". No clear scope was discernible from the only available drawing sheet. However, it appears that this the project during which (a) the existing boat grid access catwalk and elevated walkway were demolished and replaced with an expanded vehicle access area; and (b) the existing launch ramp and loading float were replaced in a modified configuration.

In March 1999 unsealed design drawings were issued for Phase II of the "South Harbor Expansion". This project, subtitled "Float Improvements", included further extension of mainwalk floats A, B and C, with additional stall floats along each extension, as well as a 12 ft. wide transient float off the end of mainwalk float C.

In June 2001 unsealed design drawings were issued for Phase II of the "South Harbor Expansion". This project was subtitled "Dredging and Dock Demolition" and included demolition of approximately 850 LF of existing timber approach trestle and timber dock, and demolition of approximately 400 LF of an existing fuel dock approach trestle. Dredging occurred over an area of roughly six acres, at dredge depths ranging from less than seven feet to more than ten feet of material. Designated dredge spoils originating in the vicinity of floats C and D were purposed as nearshore fill for a new earthen approach, which extended to the end of the remaining fuel dock approach trestle. Other dredge spoil was disposed of at sea, in Frederick Sound. A new approach dock was constructed from the corner of the earthen approach to the fuel dock trestle.

Phase III of the South Harbor expansion, entitled, "Float Improvements" was issued in 2002. Phase IV of the South Harbor Expansion was entitled, "Float Utilities and Float Maintenance".

In approximately 2013 the crane dock approach was expanded, with structural steel subframing supporting precast concrete deck panels; similar to the existing approach construction. Very limited construction information (sheet 4 of 21) was available regarding this expansion.

In the 2012-2013 time frame, it has been suggested that passive cathodic protection, in the form of welded anodes, was added to the 3rd generation vessel float piles in the South Harbor. Anodes were reportedly added to the original (c.1984) floats c.2008. No specific documentation pertaining to this installation was made available.

In the 2014 time frame, a new fish cleaning float was added to the existing launch ramp boarding float, which is adjacent to the ramp near the south end of the existing boat grid. The 2014 project manual, indicates this float was constructed as a replacement for the original c.2001 fish cleaning float.

In the 2013-2014 time frame, it has been suggested that a section of transient float salvaged from the North Harbor demolition project was repurposed as a gillnet float, located adjacent to the existing launch float and ramp. No specific documentation pertaining to this installation was made available.

Over a period of approximately ten years, a small section of float salvaged from the South Harbor demolition was repurposed as a staging float at one end of the existing timber "special use" float; which was installed during Phase II of the original South Harbor project. Lashed to the timber float from time to time, and in various configurations, it is not expected that this repurposed float section will be utilized in such a role upon eventual replacement of the timber float.

b. Description

The following paragraphs are intended to provide a general overall description of the construction of the existing facility components observed in the South Harbor.

Mooring Float System:

South Harbor vessel mooring float system sections are typically solid polystyrene encased in mild steel reinforced cast-concrete. Some float sections include utility trenches in the top, while others are fully rectangular in cross section.

Mainwalk floats A and B are comprised of nominal 8' x 8' float sections with an overall depth of 34" without trench and 36" with trench, and a stated design freeboard of 13". Mainwalk float C is comprised of nominal 8' x 10' float sections with an overall depth of 34" and a stated design freeboard of 13". Mainwallk D is comprised of 8' x 12' float sections with an overall depth of 35". Typical stall floats vary from between 3' and 5' (nominal) width, between 10' and 12' (nominal) length, and between 30" and 33" in overall depth, with a stated design freeboard of 13".

First generation floats (i.e. Phase II, c.1983) included timber wales and bumpers are attached to the water-board side of each float with horizontal through-rods at regular intervals. Raised continuous timber tie-down rails supported at blocking at regular intervals are attached to the timber wales with vertical through-rods located at the blocking locations. Second generation floats (i.e. those added during Phase III, c.1984) and third generation floats (i.e. those added during Expansion Phase II, c.1999) added to the existing mainwalk, and their respective stall floats were generally constructed to match the existing. The principal difference in the third generation was that rather than the polystyrene core being fully encapsulated in mild steel reinforced concrete, the bottom of the float was covered with a fleece-backed rubber membrane that was glued to the foam.

Stall floats were added to the south side of headwalk floats E and F, and to the south side of the extension added to the east end of headwalk float F, during Phase III (c.1984). These were of similar construction to the other stall floats, but were 2'-7" x 9'-11 ½" sections with an overall depth of approximately 20". Rather than tie-down rails, a pair of heavy-duty cleats were provided at the end of each of these floats. The bullrail at the transient float at the end of mainwalk float C is of steel pipe configuration.

Approaches, Gangways:

The approach at the western entrance to the South Harbor floats is comprised of prestressed, precast concrete of double-T sections, spanning across bent frames with steel pipe pile driven to forty-ton bearing capacity, and topped with hot-rolled wide flange steel cap beams. The double-tee stems bear on elastomeric pads at the cap beam top flange, and are secured to the cap by means of double-angle

connections. The double-angles are welded three sides to the cap beam flange, and through-bolted at the double-tee stem. The cap beam is stiffened on both sides of the web with a vertical place, located at the approximate centerline of each of the stems.

The gangway approach at the eastern entrance to the harbor (i.e. adjacent to the crane dock) is comprised of flat, mild steel reinforced precast concrete deck panels supported by hot-rolled wide flange beam caps over steel pipe piles. The caps are longitudinal to the approach (i.e. one along each edge), and are fabricated with the center of three spans elevated above the adjacent spans; which slope up to it one each end.

The gangways at both the western and eastern entrances to south harbor are 7’ x 65’ (nominal) of structural steel channel and angle construction, with steel pipe railing and framing to support a light covering. The original roof covering appears to have been 18 oz vinyl-coated nylon secured with rope to grommets every 6” o.c. Since the original construction the fabric covering has been replaced with a semi-permanent framed roof of dimensioned lumber and cold-formed metal decking construction. The new roof appears to have been mechanically attached to the original fabric support framing.

The bottom end of the gangway at the western entrance appears to have been retrofitted with a fabricated sliding shoe of similar (but not exact) configuration as that of the bottom end of the gangway at the eastern entrance to the harbor. The original construction of the prior appears to have not included a shoe, while the drawings for the latter do show a shoe present in that design.

Utility/Net Float:

The “special use float”, as it was originally designated, now referred to variously as the utility float or net float, is a 150’ long x 16’ (out-to-out) timber float which is held on station by six (6) steel pipe guide piles. The overall float is constructed of discrete float units of 25’ in length, which are spliced together at the interior and exterior stringers.

Each discrete float unit is supported on a pair of built-up polystyrene floatation units. Each unit is comprised of (8) – 10”x 20”x9’-0” polystyrene planks. Each assembled flotation unit is bounded by (full size) 2x10 framing around all four sides. Additional flotation planks are provided at each end of the fully assembled float.

The float framing is 4x6 (nom.) interior stringer framing, with 6x8 (nom.) exterior stringers, typical. The float is decked with milled 2x10 (nom.) planks. A continuous 8x8 (nom.) tie-down rail, supported on 4x8 (nom.) blocking at 6’-3” o.c. (typ.) is provided around the perimeter of the float.

Boat Grid:

The boat grid beams are shop-fabricated, built-up closed plate sections comprised of (2) – 3/4"x10” webs at 4” on either side of the section centerline, and 1”x14” top and bottom flanges, all joined with full-length, 3/4" fillet welds. The grid beams are topped with 4”x14” (full size) Ekki timber sleeper planks, bolted to the top flange of the beam section. Plank walkways sized4x12 (nom. dressed) extend the full length of the grid, spanning parallel to shore, between the ends of the grid beams, on both the seaward and the landward sides. On the seaward side, the walkway planks are supported directly on

the grid beam. On the landward side, the planks are supported by a steel L6x8x1/2 outlooker welded to the web of the grid beam.

The grid beams are supported on two (2) – 12 3/4" (O.D.) steel pipe piles at 10' o.c., with 3/4" steel plate caps; one seaward and one landward at 10' o.c. The grid beam is also tied to the shoreward fender piles, which also vertically support a portion of the vehicle drive area above the grid, adjacent to the parking lot. Additionally, the fender piles are laterally supported by 6" (nom. dia.) schedule 80 steel pipes battered shoreward from the top of the fender pile. The batter pipe terminates at a pinned connection to a 12" (nom.) steel pipe pile, driven at a similar batter.

Gillnet Float:

This existing timber float, which is located adjacent to the west end of the existing boarding float and fish cleaning float, is a10'x87' section of salvaged transient vessel float, repurposed from the North Harbor transient float after demolition and reconstruction of that facility. It appears to be of similar construction as the utility/net float. The gillnet float is held on station by two steel pipe guide piles, which are approximately thirty feet on center, and located off-center of the float length midpoint by approximately fifteen feet. The design documents bill the float as a temporary structure.

Launch Ramp, Boarding Float and Fish Cleaning Float

No detailed documentary information regarding the launch ramp, boarding float and end float has been made available, though the project appears to have been authorized by the ADF&G in 2000. The ramp and approach appears to be a cast concrete pavement on ground extending slightly into the tidal range, which transitions to precast concrete plank sections. The boarding float appears to be of timber-encapsulated polystyrene construction, with an FRP panel deck, in units approximately eight feet in width and sixteen feet in length. The fish cleaning float features aluminum tables with water service that are used for fish cleaning. The float is of timber construction, with an FRP panel deck, steel pipe bullrails, and the floatation units are HDPE flotation tubs. The float is restrained by (4) 12-3/4" diameter steel pipe piles.

Crane Dock:

The existing crane dock consists of precast concrete deck panel sections bearing over structural steel subframing, supported by vertical and battered steel pipe piles. The perimeter of the dock, proper and a small portion of east side of the approach are protected by timber fender piles with timber chocking between piles. The Crane dock underwent significant renovations in c.2014. The renovation work primarily consisted of widening the approach to a clear width of 34'-1". New Access ladders and (6) new fender piles were also installed. Both of the crane certifications were current as of November 2015. Reportedly, the smaller 2.5 ton crane was recently rebuilt to pass the most recent round of certifications.

2. DETAILED ASSESSMENT

Mooring Float System:

The older portions of the existing float system are in overall fair condition. The facility receives regular maintenance and care which may extend the useful life. Despite diligent maintenance, it can be expected that the thru rods, wales, and the concrete modules themselves will continue to wear out and fail, eventually necessitating replacement as a single or phased construction project, or piece by piece as part of an aggressive maintenance program. Typically, these types of failures can be handled by maintenance staff until they become frequent, necessitating a full on construction project.

The existing fingers may be revitalized somewhat by installing leveling flotation, patching spalls in the decking, and replacing bullrails. Replacing the original compliant hinges with a more rigid hinge structure may help reduce the severity of the list in the fingers.

The newer portions of the float system, installed in the early 2000s, likely has 25-35 years of useful life remaining before it starts requiring a significant maintenance effort or replacement. These portions of the float system were inspected in less detail than the older portions due to their age and their state of good repair.

The topside inspection revealed that the visible portion of the galvanized piling is in good condition with only minor coating damage from general wear and tear. The galvanizing and sacrificial anodes reportedly installed on the piling c.2008, and should still be adequately protecting the piling from severe corrosion or section loss. A formal or unformal underwater inspection should take place to survey and inspect the anodes and coating to ascertain their remaining life.

The utilities and safety appurtenances installed in approximately 2003 or 2004 appear to be functional. They were not operated or inspected in great detail, but no significant defects were observed, beyond minor coating loss and corrosion typical for on float appurtenances of this age.

Safety ladders and Americans with Disability Act (ADA) access requirements should be strongly considered when considering the useful life of this facility and planned renovations. Safety ladders are of particular concern due to the risk of human life in the event of an accident involving harbor users, or visitors not familiar with the harbor facility or cold waters. As Alaska's harbors modernize, they are required to meet the requirements of the ADA's access requirements. These include accessible approaches, 80' long minimum gangways, an accessible route on the floats, and wheelchair accessible finger floats.

It is understood that the replacement of the South Harbor float system will likely occur in phases. D-Float will likely be the first phase since it consists only of older float units. The remaining older sections of the float will likely be replaced in phases as funding becomes available. Installation of an ADA compliant gangway should be considered at the time when Float D is replaced.

Dredging is a major concern for access to the float system. Reportedly, vessels have been occasionally grounding in their stalls, and there is a shoal to the North of Float D that impedes channel access. The Skiff float stalls are also experiencing shoaling problems (Photo 56, 57), and it's possible for vessels to ground in their slips, or have restricted access during low tides. Figure 1 shows mudline elevations at

various locations of concern throughout the harbor, based on soundings taken during the inspection. In addition to supporting the pursuit of funding for dredging, these elevations can be used to establish a baseline, allowing the sedimentation of the basin to be tracked over time. This may be useful in anticipating the timeframe for which dredging will be required.

Float A

Float A is generally in fair condition (Photo 28). It has been subjected to periodic upgrades and maintenance over the years. The older portion (1983-84) has experienced wear consistent with its age while the portion installed in 2003-2004 is still in good sound condition (Photo 34).

The older main walk floats sit with a slight list to the North. The list varies from 1-2" across the float, becoming more pronounced at the transformer location (Photo 30). The deck does not have any significant damage beyond normal wear and tear, but a few spalls appear to have been patched and repaired. There are small lips between portions of the concrete modules. These lips are more pronounced at transformer locations, and are indicative of worn thru-rods and wales, common to floats of this vintage. Bullrails on the main floats are in good condition with localized minor damage, and typical light moss vegetation. Damage was noted at the connection between A-float and the headwalk float. (Photo 29) It was noted that a thru-rod on the headwalk float had been pulled through due to forces acting on the connection. This may be caused by extra loads imparted into the floats by the gangway and mis-aligned piles near the float intersection pulling the floats apart during extreme tides. This is reportedly a semi-regular occurrence, and will be repaired by harbor staff. The newer sections of Float A are in good condition with no apparent damage beyond minor wear and tear that should be expected from floats in service for approximately 10 years.

The older finger floats are generally in fair condition. The piano style hinges are less compliant to torsion than other hinge styles found throughout the harbor. This helps to control listing of the fingers somewhat where they connect to the main float, and there are reduced trip hazards at the transition area. Despite the rigid connection a lists of up to 7 inches were recorded on several fingers while many listed in the neighborhood of 1-3" (Photo 32). Finger floats were also observed to have minor cracks and spalls in the deck, with localized areas of significant spalling, exposing reinforcing steel and un-coated flotation (Photo 31).

The newer finger floats show little sign of damage. The steel bullrails have some coating loss and minor corrosion over approximately 10% of their surface area on average. Listing of these newer fingers was not apparent.

Float B

Float B is generally in fair condition. It has been subjected to periodic upgrades and maintenance over the years. The older portion (1983-84) has experienced wear consistent with its age while the 03/04 section of the float is still in good condition.

The older main walk floats sit without an apparent list and appear to be in fair condition (Photo 23). The deck did not have any apparent damage beyond normal wear and tear. There are small lips between portions of the concrete modules. These lips are more pronounced at transformer locations and are indicative of worn thru-rods and wales, common to floats of this vintage. Bullrails on the main floats are

in good condition with localized minor damage with typical light moss vegetation. The newer sections of Float B are in good condition with no apparent damage beyond minor wear and tear that should be expected from floats in service for approximately 10 years.

The older finger floats are generally in fair condition. The piano style hinges are less compliant to torsion than other hinge styles found throughout the harbor. This helps to control listing of the fingers somewhat where they connect to the main float, and there are reduced trip hazards at the transition area. Despite the rigid connection lists and loss of freeboard of up to 7 inches were recorded on several fingers while many listed in the neighborhood of 2" (Photo 25, 27). Finger floats were also observed to have only minor cracks and spalls in the deck, areas with more significant spalling appear to have been patched and repaired. In at least one case, a finger float piano hinge (Photo 26) appeared severely stressed possibly due to vessel impact, or large twisting forces.

The newer stall floats show little sign of damage. The steel bullrails have some coating loss and minor corrosion over approximately 10% of their surface area on average. Listing of these newer fingers was not apparent.

Float C

Float C is generally in fair condition. It has been subjected to periodic upgrades and maintenance over the years. The older portion (1983-84) has experienced wear consistent with its age. The older fingers in particular are showing their age. The 2003/2004 section of the float is still in good condition.

The older main walk floats sit without an apparent list and appear to be in fair condition (Photo 13). The deck did have minor damage consisting of minor spalls and cracks. There are small lips between portions of the concrete modules (Photo 18). These lips are more pronounced at transformer locations, and are indicative of worn thru-rods and wales, common to floats of this vintage. The bullrails on the main floats are in good condition with localized minor damage with typical light moss vegetation. The newer sections of Float C are in good condition with no apparent damage beyond minor wear and tear that should be expected from floats in service for approximately 10 years.

The connection between Float C and the headwalk float has damage to the hinge assemblies (Photo 12). The bent hinge and plates should be replaced.

The older finger floats on Float C range from fair to poor condition. These fingers are experiencing localized damage to the deck and bullrail from years of use. Some fingers have large spalls in the deck (Photo 15) that have exposed the reinforcing steel and floatation billets. Many fingers are listing (Photo 14, 16, and 17), on the order of 2-3 inches, with some listing as much as 5-7 inches.

Float D

The main walk of Float D is in fair condition with minor to moderate damage typical (Photo 7). The deck is in good shape with occasional small spalls and cracks. Small lips were observed between some concrete modules, especially where heavy loads such as stepdown transformers are located. The lips between modules are indicative of wear between the thru-rods and wales. The utility chases tend to exacerbate the lips somewhat, where the steel edge could be bent by heavy loads or snowplowing equipment.

The bullrail on each side of the main walk was found to be in good condition, with only minor defects. Light Moss and marine growth was noted on much of the bullrail small abrasions, nicks and general wear are consistent with the age of the bullrail.

The main walk floats with a freeboard averaging between 13" and 14". A slight list to the north was recorded, varying from 1-2" along the length of the float.

The fingers on Float D range from fair to poor condition. Many of the fingers sit with an East-West list of 2" or more (Photo 9, 10). Due to the listing, the rigid transition plates between the fingers and the main walk sit unevenly, creating a trip hazard. Many of the hinges show signs of stress due to general wear and tear, and accommodating the twist. The hinges are constructed using a rubber fender component, which allows them to remain relatively compliant to the twist. The concrete decks have periodic damage in the form of small spalls and cracks, as well as occasional large spalls exposing reinforcing and the flotation billets (Photo 8). Moss and marine growth occurs on the bullrails, which while generally sound, have increased wear and tear over the bullrails on the main walk this includes minor cracks, splits, and wear from line handling. The blocking for the bullrails were also occasionally damaged or twisted out of alignment with the bullrail. Generally, more exposed fingers to the East and the North are more heavily damaged due to the size of the vessels moored and their more exposed location.

Headwalk

The headwallk float is in fair condition (Photo 5). The concrete deck is generally sound with few cracks or spalls. The float is generally sits level, except for at the ends where the gangways rest. The cantilevered finger floats (Photo 6) are used to moor small skiffs and pleasure vessels. These fingers are in good condition with most sitting level in the water, and with only minor damage from normal wear and tear to the rub boards and cleats. Some fingers have moss and other vegetation growing between the gap in the wailer and the concrete float. The head walk float is generally in better condition than the other floats because it is in a more protected location in the harbor, and it only accommodates smaller vessels.

<u>Approaches, Gangways:</u>

Both approach structures are in good condition, with no signs of structural damage.

The North approach is in good condition. The concrete deck and steel framing appear sound with little signs of wear or deterioration. The guardrail and handrails are showing loss of their galvanized coating, and are beginning to see surface rust. The guardrail and handrail show surface rust on 25% and 75% of their surface areas, respectively. The utility platform adjacent to the gangway appears to have been

added more recently than construction of the original approach. This platform appears to be in good condition structurally, however it has a buildup of moss on its deck and the electrical components.

The North approach features a hump mid-span to allow small vessels to travel underneath it. When the float system and gangway are eventually replaced, this hump does not appear to allow for ADA Accessibility to the gangway or float system. It will likely need to be modified as part of a float replacement project.

It is recommended that the guardrail and handrails be painted or spray-metalized to extend their useful life. Currently the rusting appears to be superficial and has not significantly impacted the integrity of the steel. Moss should be removed from the utility platform.

The south gangway is in good condition (Photo 2). It has no obvious signs of damage, or coating failure. The FRP grating decking is in good condition. The location where the gangway lands on the float appears to be subject to significant stresses, causing the gangway tracks to shear their mounting bolts. Steel bracing added to better connect the tracks to the float appear stressed, and reportedly have to be re-welded on a regular basis, especially after large tidal fluctuations.

The North gangway appears to be in good condition. The steel structure, decking, transitions, and hinges appear to be in good working order.

Both gangways are less than 80’ in length, and become very steep at low tides. Despite their good condition, both of these structures should be replaced with new gangways that are 80’ long, minimum.

Utility/Net Float:

The utility/net float (Photo 36) is in in poor condition. The deck and bullrail are covered in slippery moss, and there is grass growing in some of the cracks near the bullrail. The bullrail is intact but heavily kinked and worn along its length (Photo 38). . The rub board was recently replaced but is missing near the northeast corner from apparent damage (Photo 39). The float sits fairly level however, it was reported that portions of it sink when loaded with nets. Many of the existing timber sills, that support the flotation, appear to be split and rotten (Photo 37). This is a serious issue. As they continue to degrade, the float will lose freeboard and the un-coated floatation billets may break free, causing the float to be un-stable. The guide piles appear to be structurally sound, though the galvanized coating appears to be deteriorating, and light surface rust is visible.

Based on its heavy use and its condition, it is recommended that the existing float be replaced in the next 5 years. The existing float appears to be constructed similar to standard mooring floats, which are not well suited for use as net floats. A heavy duty timber or concrete float with a high live load capacity is recommended at this location. Installation of sacrificial anodes on the guide piling is recommended if they are to be re-used for the replacement float.

Boat Grid:

The boat grid (Photo 44) is in overall good condition, with some timber components requiring immediate attention. The steel piles and grounding beam frames are in good condition, but are experiencing minor to moderate corrosion (Photo 48, 49). The timber bearing surface, mounted to the steel frames, is in fair shape. It should be expected that the timber bearing surfaces will see damage over the years and need to be replaced on a regular basis. The timber walkway on either side of the grid is in poor condition (Photo 46). The deck boards are spongy and the north end is degrading to the point of being unsafe. These boards should be replaced.

Gillnet Float:

The gillnet float (Photo 40) is in fair condition. It is constructed using salvaged floats and piling from the 2014 North Harbor Float Replacement Project. The float appears to be in fair condition, featuring an intentional gap in the bullrail on the end of the float. The lifespan of this float can be estimated as 5-15 years, depending on use. It does not appear to see the same heavy usage as the utility/net float, which should prolong its life. The bullrail and decking appear worn, but serviceable, and the float does not sit with a substantial list. If this float is desired to remain in service, it is recommended that it be replaced along with the South Harbor float system. Alternatively, carefully selected float modules removed from South Harbor during its renovation could provide a suitable replacement for this float.

Launch Ramp and Boarding Float

The boat launch ramp, boarding float (Photo 41), and fish cleaning float (Photo 43) are in good condition. With no signs of damage beyond normal wear and tear. These structures were constructed relatively recently and appear to have at least 25-30 years of useful life left. It was noted by harbor staff, that the screws holding the FRP (?) deck panels on the boarding float do occasionally pull through and screws with larger heads are installed. This may be mitigated with the use of washers, or larger flat head screws.

Crane Dock:

The crane dock (Photo 50) is in good condition, having undergone recent widening, fender pile replacement, and sacrificial anode installation (Photo 54). The structure appears to have 35+ years of useful life remaining with continued maintenance.

The deck appears to be in good condition with only minor cracks and spalls visible in the older panel sections. The handrails on the dock's approach are experiencing approximately 50% coating loss (Photo 50) and are showing minor surface rust. The steel bullrail/guardrail is showing coating loss and surface rust to a lesser degree, likely due to normal wear and tear and snow removal operations. The dock mounted cranes appear to be in good working condition and their certifications are current. There are no obvious signs of stress at the crane bases or in the concrete deck panels where they attach. The fender pile system is in overall fair condition with many of the fender piling showing repair efforts at their heads. The older fender piling and chocking will likely require replacement in the next 15 years.

The dock's steel framing (Photo 53) beneath the deck panels appears to be in good condition. The galvanizing is bright, with very few localized patches of minor corrosion in the form of surface rust on the steel. The steel framing does not exhibit visual signs of damage or overstress.

Corrosion of the steel pipe piles (Photo 55) is likely the most serious issue faced by this structure. The recent installation of a sacrificial anode cathodic protection system will help ensure the dock's useful life. Despite the anodes, a portion of the piling are experiencing minor to moderate levels of corrosion in the intertidal zone. Due to going from submerged to dry during the tidal cycle, this area is only somewhat protected by the cathodic protection system. To ensure the useful life of the dock, it is recommended that the cathodic protection system be inspected regularly to ensure the anodes are intact and functioning, and coating damage in the intertidal zone should be repaired. Galvanized coating repair can be accomplished by a high performance coating system, or a spray metalizing coating, which offers similar protection to hot dip galvanizing.

There are concerns regarding shoaling at both the front and back (Photo 58, 59) face of the crane dock. During the inspection, soundings were performed at regular intervals along the dock faces. In addition to the relevant depth information provided by these soundings, they may be used as a baseline to track changes in mudline at the face of the dock. Figure 2 shows the results of the soundings.

MIDDLE HARBOR

1. INTRODUCTION

From the standpoint of original construction, Middle Harbor is the second-oldest original construction in contemporary times. Middle Harbor originated after North Harbor, but before South Harbor. Presently comprised of fifty six stall floats off the mainwalks, with another seven stall floats off the headwalk, it is comparable in number-of-vessel capacity to North Harbor, but much smaller than South Harbor. Additionally, the largest vessel size accommodated in Middle Harbor is smaller than the largest accommodated by either North or South Harbors.

a. History

Middle Harbor was originally designed by the State of Alaska Department of Public Works, Division of Water and Harbors. Middle Harbor construction was completed in 1970.

The scope of the original new harbor construction included, but was not limited to:

- Construction of a new 12’ x 134’ timber approach structure
- Fabrication of a new 6’ x 50’ steel gangway
- Construction of approximately 9,668 SF of new concrete floats, and associated guide pile as a base contract provision
- Construction of an additional 5,040 SF of new concrete float, and associated guild pile as a contract additive alternate
- Installation of a fire protection and a water system as a contract additive alternate
- Repair certain elements of existing construction in the adjacent North Harbor, principally float and decking replacement, as a contract additive alternate

Based on the as-built drawings dated April 10, 1970, all additive alternates were included in the final construction.

In 1978 the State of Alaska Department of Transportation & Public Facilities, Division of Harbor Design and Construction undertook improvement of Middle Harbor. The project included the maintenance dredging of approximately 6,500 cubic yards of marine sediment. Also included in the contract scope was the removal of the existing 10’ x 62.5’ skiff float and associated guide piles in the adjacent North Harbor, and its replacement with a new 8’ x 287.5’ timber float and associated guide pile. The as-built drawings dated September, 1978 include no detailed design information for the float; only 6’ sectional float details which appear to have been marked as “not applicable”.

In 2005 a complete demolition and replacement of the vessel float system was undertaken. Additionally the existing gangway was removed and replaced with an 80’ long aluminum gangway. The existing approach trestle was reduced in length, from the seaward end, by one bent spacing, at that time, and modified to accept the new gangway.

The base bid headwalk float was 10’ x 210’ length overall (LOA), with seven (7) – 3’x18’ stall floats. The base bid northern mainwalk float (no. 1) was 10’ x 530’ LOA, with twenty-four (24) – 4’x26’ stall floats. The base bid southern mainwalk float (no. 2) was 10’ x 379’ LOA, with twenty (20) – 4’x32’ stall floats.

Two additive alternates ("B" and "C") were included, to extend the base bid mainwalk no. 1 float by 56 LF and 112 LF, with an additional four (4) and eight (8) stall floats, respectively. Both additive alternates appear to have been constructed at the time of the project.

In the 2012-2013 time frame, the timber bulkhead at the shoreward end of the existing approach trestle suffered a partial failure, allowing the sloughing of soil from the landward side of the approach. The harbormaster made prompt and sufficient repairs to the bulkhead.

In 2015 a repair project was undertaken to replace the seaward end section of mainwalk float no. 1 in kind; which had been severely damaged by a vessel strike. The stall floats, and all applicable appurtenances were salvaged, and later replaced on the new section of mainwalk float.

b. Description

The following paragraphs are intended to provide a general, overall description of the construction of the existing facility components observed in the Middle Harbor.

Mooring Float System:

The Middle Harbor vessel mooring float system sections are typically billets of expanded polystyrene (EPS), probably coated with polyurethane, supporting timber and glued laminated framing, and 2x6 (nominal) plank decking. The EPS billets are contained by glued laminated timber side boards. The side boards for the headwalk and mainwalk floats are 5 1/8" x 19 1/2" sections, with 2x12 (nominal) rub strips. The side boards for the typical stall floats are 3 1/8" x 19 1/2" sections, with 3x12 (nominal) rub strips.

The headwalk and mainwalk floats include 4" x 18" utility trenches recessed into the top side of the billets, at the centerline of the float width, and sectional 6x6 (nominal) bullrails on 5" dia. UHMW bullrail scuppers, typical along each edge. The stall floats include a sub-deck plank extending the length of the float, continuous across the stingers, with the deck boards spanning continuously across it.

High-density polyethylene automatically ballasting drums are positioned at certain locations along the headwalk and mainwalk floats. Even in the absence of torsion bars or any other positive torsional stiffening device, the passive action of automatic ballasting units may tend to dampen harmonic motion due to wave action and other short-period dynamic loading; mitigating unexpected movements of the float. The stall floats, which are cantilevered from the headwalk and mainwalk floats, vary in width from 3' to 4', and which vary in length from 18' to 32', and include no positive torsional control devices or passive ballasting units.

Approach, Gangway:

The approach to the Middle Harbor floats is a timber trestle constructed of seven (7) – two- pile bents at 17’ o.c., constructed of 12” (nominal) dia. timber pile, with 12x12 (nominal) timber pile caps, supporting six (6) 4x14 (nominal) interior timber stringers, and 6x14 (nominal) exterior stringers, overlain with a 10’-8”’ wide walking surface of 3x12 (nominal) timber decking.

Cross-bracing between bent piles is single tier 3x8 (nominal), with the last two bent spaces braced in the longitudinal direction of trestle, on each side, as well. 4x6 (nominal) posts, 4’-6” long (from bottom of stringer) at 8’-6” centers support a 2x6 (nominal) girt with a 2x6 (nominal) hand rail in the flat position. Although not included on the original construction drawings, field observation indicates the presence of a continuous intermediate 2x6 (nominal) rail on each side of the trestle. A continuous, dapped 8x8 (nominal) wheel guard, supported on 3x8x 12” long scupper blocks at 6’-4” o.c., is provided along each edge of the deck, adjacent to the rail posts.

The gangway is an 80’ long x 7’ (nominal) aluminum space frame assembly, with cold-formed ribbed aluminum roofing. The horizontal trusses at the top and bottom of the space frame are parallel chord Warren type with struts. The vertical trusses at the left and right-hand faces are both parallel chord Warrant types without struts, with two (2) skirt tubes supporting aluminum siding near the roof, each side, typical.

2. DETAILED ASSESSMENT

Mooring Float System:

The Middle Harbor Float system (Photo 1) is in good condition, consistent with a float system that has been installed for 10 years. It is anticipated that replacement of these floats will be required for at least the next 30+ years.

The timber deck and bullrail on the main floats and headwalk appear to be in good condition with minimal wear and the floats sit without an apparent list. The finger floats (Photo 2) sit level without apparent listing or damage and appear to be in good condition. The piano hinges, light poles, power pedestal bases, life ring/fire extinguisher cabinets bases, pile hoops (Photo 7) and other galvanized steel appurtenances do show some minor coating loss and corrosion over 5-10% of their surface area.

The recently replaced section of Float B was just being installed at the time of inspection and appears to be in brand new condition, except for re-used steel hardware such as pile hoops and appurtenances, which show minor corrosion.

It was noted that the connection (Photo 3) between the gangway landing float and headwalk float appears to have loose bolts at the hinges. These bolts connect the two hinge halves, and wave action has caused the fiber nuts to slowly loosen. It is recommended that these be tightened in the near future and checked periodically. Due to the amount of threads on the bolts, hinge failure is not eminent.

The Middle Harbor floats should continue to see regular maintenance to extend its useful life. Localized areas of steel coating failure may be cleaned and painted with “cold galv” to extend their useful life. There is no cathodic protection system in the middle harbor. Submerged portions of the galvanized

piling should be inspected to determine their condition, and remaining design life. It is recommended that a cathodic protection system be installed on all piling within the next 5 years at most.

It is recommended that safety upgrades for the float system be considered. Installation of a fire protection system and safety ladders on the floats is recommended.

The Middle Harbor float system has dredging concerns between the headwalk float and shore. It is difficult to access some of the finger floats during low tides, and some vessels may ground. Based on soundings, the mudline elevation at the gangway landing float is approximately -7' (MLLW=0). Figure 2 shows additional mudline elevations based on soundings, which may be used to assist with future dredging plans. Absent actual survey data, it may also be used as a baseline to track changes in the mudline elevation over time.

Approaches, Gangways:

The 80' aluminum gangway (Photo 4) appears to be ADA compliant, and is in good condition with no defects noted. The transition plates were lifted at each end, the hinges and sliding surfaces were inspected.

The existing timber approach (Photo 8, 11) is in fair condition overall. It will require repairs to some pile caps and the diagonal pile bracing, or replacement with a steel pile supported structure. The timber deck, handrail, and stringers appear to be in good condition, and are experiencing only minor moss/vegetation growth, which should be removed periodically.

The pile cap nearest the gangway is split vertically through its center with a ¼" wide crack (Photo 9). The 3rd bent from shore has a similar crack on its south side. The approach appears to be missing several of the timber diagonal braces that brace the piles. The timber piling appear to be solid, but were not cored to determine their internal integrity. It is recommended that the cracked timber pile caps be repaired or replaced. The missing diagonal bracing should also be replaced as it contributes to the stability of the structure. If the repairs are made, and the structure continues to see maintenance, its useful life is estimated to be between 15 – 20 years.

NORTH HARBOR

1. INTRODUCTION

From the standpoint of original construction, North Harbor is the oldest original construction in contemporary times. North Harbor originated before either Middle Harbor or South Harbor. Presently comprised of fifty-eight stall floats off the mainwalks, with another six stall floats off the headwalk, it is comparable in number-of-vessel capacity to Middle Harbor, but much smaller than South Harbor. The largest vessel size accommodated in North Harbor is comparable to the largest accommodated by South Harbor, but larger than that accommodated by Middle Harbor.

a. History

The original construction of North Harbor is thought to have been as early as c.1937. The earliest available drawing record provided to us, however, for the North Harbor was a single "as-built" sheet (seal present, but no executing signature or seal date) dated April, 1960; but with a hand-written note of "Revised 3-29-60, OK by Cort Howard – Phone". The work summary listed on that sheet indicates:

> *"Major units of this project shall include construction & installation of 674 L.F. of 10' wide Styrofoam float, driving of 950 L.F. of float piling & 180 L.F. of stall piling & pulling of 13 piling."*

It appears from this drawing that at least one headwalk float, two mainwalk floats and a transient float already existed at the time; this work being a general expansion of those facilities.

In 1965 more than 1,700 lineal feet (LF) of log float was removed and replaced with more than 17,000 square feet (SF) of (then) modern polystyrene floats. At that time the 14' x 58' main approach trestle was also re-decked, and new handrails added. New 6' x 62.5' timber approach trestle, including a new 6' x 50' steel gangway, was also constructed on the south edge of the harbor, leading to a new 10' x 245' skiff float, which was repurposed log float from the demolition of the North Harbor. By additive alternate, the boat grid approach catwalk appears to have been refurbished at that time, as well. By change order, a new timber ramp approach and concrete slab launch ramp were also constructed, adjacent to the new skiff float location.

In 1974 the northern mainwalk float and all of its stall floats were removed and replaced with new concrete floats. Some 48 new and salvaged pile (approximately 18 from some 40 pulled pile) were driven for the project. Apparently at this time, the intention was that the existing skiff float (constructed of previously repurposed log float, c.1965) was to be removed and replaced with "the best 225' of removed [timber] float". It is uncertain whether or not the full 225' of timber float was ever repurposed as planned. The drawings seem to show several abandoned log skiff float piles, and an existing length 10' x 62.5'. Also, later Middle Harbor improvement drawings (c.1978 as-builts) show a float of this same width and length being replaced with a new 8' x 287' length of skiff float. Although referenced in these Middle Harbor drawings, no detailed information concerning the construction of these floats is included.

The 1974 improvement project drawing set was also combined with the drawings for the reconstruction of the approach trestle and float at Papke Landing, south of Petersburg. The existing gangway appears to have been reused at that time.

In the 2002-2004 time frame a concrete transient float was added to the end of what is now mainwalk float no. 1. The 2013 drawings indicate that under that contract, this transient float was present at that time, was removed, and was then reinstalled in a new position. This float presently serves as a mooring stating for the Alaska Department of Fish and Game (ADF&G) vessel *Kestrel*.

In 2013, the existing headwalk float, both mainwalk floats, all stall (i.e. "finger") floats and the transient float were removed, along with all existing timber pile. Also demolished was an existing steel gangway, 215 LF of existing timber deck, and 37 LF of existing catwalk adjacent to the harbor office, as well as four (4) existing boat grid sleepers and their associated support piles. A new approach dock, gangway and float system was installed in a layout similar to that which had been demolished.

The 2013 construction drawings also indicate that a portion of the existing skiff float was to be removed, leaving only 136 LF of float in place. However, field measurements indicate that at present the skiff float measures some 171' from end to end (i.e. not including the troller float length).

The remaining existing elements of construction of immediate concern are (a) the balance of the existing timber boat grid sleepers and associated support piles, one group north of the new approach dock, one group south; (b) the existing timber catwalk above the southern group of existing boat grid; (c) an existing approach dock, gangway and skiff float; (d) a repurposed troller float located at the end of the skiff float; and (e) an existing timber launch ramp adjacent to the skiff float.

b. Description

The following paragraphs are intended to provide a general, overall description of the construction of the existing facility components observed in the North Harbor.

Timber Approach Dock and Gangway:

The approach dock to the vessel float facility is comprised of steel pile and cap beams supporting glued laminated stringer beams, and timber decking. The perimeter of the dock is enclosed by a steel pipe guard rail mounted on a 12" square timber bullrail.

The gangway is an 80' long x 7' (nominal) aluminum space frame assembly, with cold-formed ribbed aluminum roofing. The horizontal trusses at the top and bottom of the space frame are parallel chord Warren type with struts. The vertical trusses at the left and right-hand faces are both parallel chord Warrant types without struts, with five (5) skirt tubes supporting aluminum siding high and low, each side, typical.

Vessel Float System:

North Harbor vessel mooring float system sections are typically factory-fabricated flotation "tub" type units, constructed of extruded polystyrene (EPS) encased in a 0.175" wall high-density polyethylene lining, and supplementary billets of EPS coated with polyurethane, supporting timber framing. The tubs

appear to be bolted on, while the billets are strapped to the float substructure by means of polypropylene straps.

Some of the tub type flotation units include flow holes to accommodate automatic ballasting. These ballast units have a wall thickness of 0.375". Floats between 3' and 6' wide, and between 18' and 50' in length include a torsion bar. The presence of automatic ballasting and torsion bars may tend to dampen harmonic motion due to wave action and other short-period dynamic loading; mitigating unexpected movements of the float.

The headwalk float is comprised of individual 10' wide float units of between 42' and 68' (nominal) in length. Mainwalk floats 1 and 2 are comprised of 10' wide float units of between 42' and 78' (nominal) in length.

Typical stall floats vary from between 3' and 8' (nominal) width, between 18' and 75' (nominal) length. Stall floats greater than 50' in length have a pair of guide piles at the seaward end. Stall floats less than 42' in length are cantilevered from the mainwalk float (i.e. no seaward guild piles).

Float sections larger 6' and larger in width include sections of bull-rail constructed of glued laminated material ranging from 5.125"x 6" to 6.75"x 6" in cross section, mounted on 5" dia. UHMW scupper blocks at about four feet on center.

Stall floats are connected to the mainwalk floats by means of a "piano" type hinge, using 4" dia. XS steel pipe material, with large-diameter rubber bushings inserted, through which a 7/8" dia. x 1'-10" long steel rod is inserted, from each side of the stall float.

Some float sections include precut holes and cable trays/chases in the timber framing to accommodate runs of electrical wiring.

The ADF&G float appears to be of monolithic concrete construction, with encapsulated polystyrene, and supplemental HDPE pipe floatation at each end to level the float. The float is approximately 17 ft wide x 141' long, out-to-out dimensions. The float is kept on station by three (3) – 24" dia. steel pipe pile bents, which are oriented perpendicular to its length, are spaced at approximately sixty feet o.c., and approximately equal spacing (10' +/-) from each end of the float.

Boat Grid:

The boat grid beams are 12x12 (nominal) timber sections at 8' to 11' o.c. Each beam is supported by three (3) (nominal) 12" dia. timber pile. No walking surface between timber beams is present at either the shoreward or seaward sides of the grid. Piles are between 7' and 8.5' o.c., with the grid beams overhanging the outer piles by approximately 1.25' and 3.5', on the landward and seaward ends of the beam, respectively.

The tidal grid is served by an existing timber catwalk structure which features fender piles at about every other grid beam location, and a pair of dimensioned lumber access ladders. The ladders, which are constructed of dimensioned lumber rails and rungs, are of much more recent vintage than the balance of the catwalk structure.

Launch Ramp

The timber portion of the existing launch ramp is graded to match the precast concrete plank-on-grade section, which forms the seaward end of the ramp. The timber portion is constructed of three (3) pile bents of 12" (nominal) dia. timber, with 12x12 (nominal) timber pile caps, supporting two (2) 6x14 (nominal) exterior stringers, and eight (8) 4x14 (nominal) interior timber stringers, which are overlain by 16' wide drive surface of 3" (nominal) timber decking. An 8x8 (nominal) wheel guard extends down both edges of the timber ramp. The first two bents from the shoreward end of the timber ramp are cross-braced by a pair of 3x8 (nominal) timber sections.

The timber ramp appears to comprise seven (7) clear spans of roughly similar spacing, totaling approximately 120' of the overall ramp length, and the concrete plank portion approximately 80'. The stated design grade of the ramp is 11%. The higher grade on the landward side of the ramp is retained by an existing timber and steel soldier pile wall. The concrete portion of the ramp is curve horizontally away from the retaining wall.

Skiff Float and Troller Float

The approach to the skiff float is a timber trestle constructed of (3) – two- pile bents at 17' o.c., constructed of 10" (nominal) dia. timber pile, with 10x10 (nominal) timber pile caps, supporting three (3) 4x10 (nominal) timber stringers, and overlain with a 6' wide walking surface of 2x12 (nominal) timber decking. The trestle design included single tier 3x8 (nominal) timber cross-bracing between bents, typical both sides, tow-tier 3x8 (nominal) timber cross-bracing between the piles in each bent, typical.

The existing skiff float appears to be timber and polystyrene billet type, but are otherwise of indeterminate construction (i.e. no definitive construction documentation). The guide piles are steel pipe type. A brief synopsis providing additional detail regarding the history of the skiff float, based on available construction documentation dating from 1965, is as follows:

- In 1965 a length of existing log float was installed at the new approach and gangway in the south side of North Harbor. This is what the drawings reference below (65158) show.
- By the time Middle Harbor is constructed (1970, see contract drawings 3-71190) this log float still appears (see sheet 2 of 9).
- Sometime between 1970 and the North Harbor repairs in 1974-76 (see contract drawings 3-76158) the skiff float seems to have been reduced to a 10' x 62'5' section (see sheet 2 of 10).
- Then, in 1978, during the Middle Harbor improvements (see contract drawings 3-78190) the existing 10' x 62.5' float section, as well as several abandoned guide piles (ostensibly timber) were demolished. A new 8' x 287.5' timber skiff float and several new pile (ostensibly timber) were installed.

  NOTE: The drawings for this contract (three pages, total) DO NOT CONTAIN ANY DETAILED DESIGN INFORMATION FOR THIS FLOAT, DESPITE REFERENCING SUCH INFORMATION.

- In the 2005 Middle Harbor renovation drawings, the 287.5' timber skiff float can still be seen in the south portion of the adjacent North Harbor (see sheet 1.03; 3 of 45).
- During the 2013 North Harbor renovations, the timber skiff float was again reduced in length, down to 136.5 ft. +/- (see 'as-built' sheet 1.03; 3 of 87). Also, at this time the timer piles were replaced with steel pipe piles; but lacking any external cathodic protection (i.e. anodes).
- Oddly, by the time of the 2015 Middle Harbor Float Repairs, the skiff float seems to have grown quite longer, again (see sheet 1.02; 2 of 3).

  NOTE: During the site visit, the field-measured length of the existing 8' wide skiff float, only (i.e. end to end, NOT including the troller float length) was measured at approximately 171'. The reason for this discrepancy between the last documented length (136.5', 2013 drawings, referenced above) and the field measurement of 171' CANNOT BE ACCOUNTED FOR, BASED ON PRESENTLY AVAILABLE DOCUMENTATION.

A continuous 6x6 (nominal) tie-off rail extends down each side of the skiff float, from the gangway landing end to the troller float end. The skiff float is held on station by six (6) steel pipe guide piles at approximately equal spacing along its length.

The troller float, which appears to be of similar construction as the skiff float, is likewise built up of sections of float of otherwise indeterminate construction, and which also appear to be have been repurposed from past harbor demolition work. Field measurement of the existing troller float indicates a length of approximately 40.5' and a width of approximately 37' (both out-to-out dimensions).

A tie-off rail of 6x6 (nominal) material extends continuously around the waterside portion of the float perimeter. The tie-off rail is supported on (nominal) 4x8 blocking 2' in length, at approximately 10' o.c. The troller float is held on station by three (3) steel pipe piles; two located approximately 15' from the back corners, along the sides, and one along the back edge, near the connection of the skiff float.

2. DETAILED ASSESSMENT

Overview:

The Main float system was recently replaced in 2014. This assessment focuses on the older facilities remaining in the harbor, including the ADF&G / Kestrel float, the grid, the launch ramp, and the skiff/troller floats.

Approaches, Gangways:

The 80' Aluminum gangway (Photo 1) appears to be ADA compliant, and is in good condition with no defects noted. The transition plates were lifted at each end, the hinges and sliding surfaces were inspected.

The existing timber approach is in good condition overall. No defects or damage was observed.

Vessel Float System:

The North Harbor Float system (Photo 2) is in good condition, consistent with a float system that has been installed for 1 year. It is anticipated that replacement of these floats will not be required for at least the next 35+ years. These float were not inspected in detail due to their recent construction.

The timber deck and bullrail on the main floats and headwalk appear to be in good condition with minimal wear, and the floats sit without any apparent list. The finger floats sit level without apparent listing or damage, and appear to be in good condition. The piano hinges, light poles, power pedestal bases, life ring/fire extinguisher cabinet bases, and other galvanized steel appurtenances show bright galvanizing and good condition on the coating.

The on-float utilities were not tested or operated, but appear to be in good condition.

The north harbor float system should continue to see regular maintenance to maintain its useful life. Localized areas of galvanized steel coating failure could be cleaned and painted with “cold galv” or hot-sticked when damage occurs to extend their useful life.

ADF&G / Kestrel Float:

The concrete float located at the end of Float 1(Photo 3, 4) appears to be in overall good condition. The heavy nature of the float, and the Kestrel currently berthed there act as somewhat of a floating wave attenuator, dampening the short period wind waves before they impact portions of the inner harbor floats. The concrete float showed no apparent signs of damage. The concrete deck, steel tie down rail, pile hoops, and utilities appeared to be in good condition.

The concrete float appears to see a lot of bird activity. It is recommended that the float be pressure washed regularly and vegetation be prevented from growing.

The 24” steel piling and cap are showing coating loss and surface rust (Photo 5). It appears that they have had some coating repair work done in the past. The damaged coating and rust should be cleaned and re-coated. A cathodic protection system is recommended for the 24” piling. Figure 4 indicates some soundings and freeboard values measured at the ADF&G float.

Boat Grid:

The boat grid is in overall fair condition (Photo 6, 7), with some grid beams and support piling in poor condition.

The catwalk is in overall fair condition (Photo 13). The timber deck and handrail are weathered, but appear sound. Many of the fender pile tops are showing signs of rot and decay, and should be repaired. Vegetation should be removed, and the pile tops should be repaired.

The grid beams are in overall fair condition. Many have splits, damage, and rots on their seaward edges (Photo 8, 16). This damage tends to be localized to the ends of the grid beams, which do not actively support vessels when they rest on the grid. Many of the beams show heavy wear and abrasion where vessel keels rest on the beams. The damage does not appear to compromise the whole section of the beam.

The timber piling appear to be mostly in good condition. Several were noted to be hollow at their heads (Photo 14, 15), where the grid beams bear. These piling should be replaced. Additional piling may be rotted or hollow on the inside. It would be beneficial to take periodic borings of the bearing and fender piling to determine if others are rotted.

The timber retaining wall adjacent to the grid is generally in fair to poor condition. The wall section south of the harbor master's office is rotten and should be replaced. One of the sections has blown out, allowing armor rock to fall between the grid beams. The retaining wall to the North of the harbor master's office is generally in better condition, but it is being undermined (Photo 11), and the lower board is rotted and should be replaced. The northern most section of wall has been damaged (Photo 12), and needs the timbers replaced.

The timber ladders serving each of the grids appear to be in good condition, however they are constructed out of timber, and may be dangerous. The ladders were not used during the inspection, but they appear slippery, and the timbers may be more difficult to grab than a conventional rung. Steel ladders with rebar rungs may be more suitable and safer for accessing the grid.

Timber Launch Ramp

The timber launch ramp (Photo 17) is nearing the end of its useful life span. In general the higher elevations of the ramp are in fair condition, while the lower half is in poor condition. The timber deck is beginning to get soft with rot at the lower elevations and split/ broken deck boards are prevalent (Photo 22, 23). The existing guardrail is in fair condition (Photo 18, 23), but is showing signs of rot and decay, and should eventually be replaced.

The structural framing (Photo 20, 21) is in fair to poor condition. The stringers appear to be in relatively good condition, though they are showing some signs of decay, including light marine growth. Many of the pile caps have fine splits and cracks.

The timber bearing piles are a cause for concern. Many of their tops are heavily split (Photo 19), and some of the pile to cap connection hardware is damaged. At the very least, the launch ramp should not be accessed by large vehicles/vessels, including snow removal equipment.

The concrete planks below the timber portion of the ramp are partially covered by sediment and marine growth and are probably not suitable for use at low tides until they are cleared off. It was reported that the concrete planks were discovered during dredging the last round of dredging, and had previously been completely covered. It appears the edge of the concrete planks is undermined adjacent to the dredge area, at the lower elevations. This portion of the ramp does not appear to be used, so it may be beneficial to remove these planks during or before future dredging operations so they don't become obstacles for future work.

Skiff Float and Troller Float

The approach to the skiff float appears to be in good condition with normal wear and tear (Photo 27, 30). The decking and handrail are weathered, but appear to seem to be solid. There are vertical cracks in some of the pile cap ends, up to ¼" wide. The stringers spanning between pile caps appear to be in good condition with no damage, and plenty of creosote. The timber piles are in good condition, though the

Southernmost pile at the gangway location has a minor split (Photo 28). It appears that the mid-span piles were subjected to borings during a previous inspection. These bored locations were not plugged. They should be doweled or filled with epoxy to prevent rot from occurring inside the pile. The cross bracing at the last two pile bents should be replaced (Photo 28), the boards range from rotten and split, to missing or broken.

The gangway is in good structural condition. It is showing coating loss on the handrail, and surface rust. The gangway should be replaced, as it is not ADA accessible, nor is it entirely safe to use (Photo 26, 28, and 29). The short 50' gangway sits at a very steep 2:1 slope at low tides and is both too steep and potentially slippery for pedestrian access. There is also a significant gap (Photo 31) between the gangway and approach at low tides. This is a trip hazard at best, and a small child could potentially fall through the gap. The gangway has also reportedly got stuck on the float and bound up at an extreme low tide. If it happens again, it could damage the float, gangway, and approach, or possibly cause injury. It is recommended that the 50' gangway be replaced with an 80' long ADA accessible unit.

The skiff float (Photo 32) is in fair condition. The decking is weathered and cracked (Photo 35), but still solid. The bullrail is in fair to poor condition (Photo 34, 35), it is heavily weathered and many sections are cracked. Vegetation is growing in the cracks. The bullrail is still suitable for securing skiffs and small craft, but should eventually be replaced. The float sits with a slight 2" list to the North. The framing below deck appears to be in fair condition. The sills do not appear split or damaged, and the flotation appears to be intact. The age and overall condition of the float, make it likely that it will not be serviceable beyond the next 10 years.

This float should be replaced with new timber or concrete float units and a new 80' long ADA compliant gangway should be installed. At a minimum, safety appurtenances such as fire extinguishers, life rings, and safety ladders should be installed. It may be possible to effectively increase the water depth at the float by moving it out approximately 30', at the time a new longer gangway is installed.

The float guide piling (Photo 36) are in good condition, with some coating loss and surface rust at the lower elevations. It is recommended that these piling have cathodic protection installed if they are to be salvaged for use for the replacement floats. It was noted that the existing pile hoops do not have UHMW sliding surfaces between the hoop and the pile. Steel on steel wear, could cause the galvanized coating on the piles to become damaged, and corrosion to occur.

Soundings indicate the float grounds at the gangway landing at low tides. The mudline elevation near the gangway (MLLW = 0), appears to be at approximately 0 on the Northeast corner of the float, and -2 on the southeast corner. Sounding nears the middle of the float indicated a mudline elevation of -11 to -12'. Sloughing is evident adjacent to the timber boat launch ramp. It appears the relatively steep dredged slope was not stabilized with armor rock or other material, and is attempting to return to its natural slope. It should be expected that the area adjacent to and under the skiff float, will continue to fill in, and the slope will continue to de-stabilize. This area should be dredged, and the side slopes of the dredge prism should be stabilized to reduce the frequency of maintenance dredging, and the implications of erosion.

The Troller float appears to be in good condition. The deck, bullrail, and transition to the skiff float are in good condition and were reportedly recently installed. They are showing some light moss growth, which

should be periodically removed. The float sits without an apparent list and appears to be in good condition for its age. Depending on usage and maintenance, it can be expected that the troller float has 15 or more years of remaining useful life.

The external pile collars are experiencing localized corrosion, and it appears the plastic sliding surface has been tied on. These pile collars should be painted with cold-galv to prevent further corrosion. It may be desirable to replace them with new fabrications, featuring permanently attached plastic sliding surface, if the tied on plastic comes loose, the pile collar may damage the coating on the steel piling. The steel piles appear to be in good condition from the topside. It is recommended that a cathodic protection system be installed to protect the piling from corrosion.

Despite the relatively good condition of the float, it may be desirable to replace it when the skiff float is replaced, so the work can be completed as one contiguous project. If the skiff float is moved to deeper water, and this float is retained, it will likewise need to be moved out. Figure 3 indicates some soundings and freeboard values measured at the skiff float.

PAPKE'S LANDING

1. INTRODUCTION

Presently a State of Alaska asset, managed by the Alaska Department of Transportation and Public Facilities (ADOT&PF), Papke Landing is a long approach, gangway and floating dock facility serving small transient watercraft. A well-used facility, Papke Landing is popular among local residents and visitors, alike.

It is anticipated that this facility, and the underlying land will eventually become the property of the Petersburg Borough.

a. History

Originally constructed in 1961 by the State of Alaska Department of Public Works, Division of Water and Harbors, Papke Landing was originally designated the Petersburg Approach and Floats Project No. W6205.

In 1975, Papke Landing underwent a major renovation, as part of Division's simultaneous repair and upgrade effort at North Harbor, under Project No. 4-76174.

It is uncertain whether any interim inspections have taking place prior to this visual condition assessment.

b. Description

The following paragraphs are intended to provide a general, overall description of the construction of the existing facility components observed at Papke Landing.

Approach:

The approach (Photo 2) to the Papke Landing float is a timber trestle constructed of fifteen (15) – two-pile bents at 17' o.c., constructed of 10" (nominal) dia. timber pile, with 10x10 (nominal) timber pile caps, supporting two (2) 4x10 (nominal) interior timber stringers, and 6x10 (nominal) exterior stringers, overlain with a 6'-0"' wide walking surface of 2x12 (nominal) timber decking.

Cross-bracing between bent piles is single tier 3x8 (nominal), with the last two bent spaces braced in the longitudinal direction of trestle, on each side, as well. 4x4 (nominal) posts, 4'-0" long (from bottom of stringer) at 8'-0" centers support a 2x4 (nominal) girt with a 2x6 (nominal) hand rail in the flat position. Two (2) - intermediate 2x6 (nominal) girt rails extend continuously on each side of the trestle, about equally spaced from the deck to the handrail. No continuous toe or kicker plate, or wheel guard is present.

Gangway:

The gangway is an nominally 5' wide by 50' long steel open framed truss type, with 2" nom. dia. pipe top chord, a 6" x 2" channel bottom chord, and a 1-7/8" nom. dia. pipe web in a basic Howe configuration. Three 1" nom. dia. railing pipes extend continuous along each side, at roughly equal spacing between deck and top chord. The gangway is decked for its full width with welded steel grating with long, open, raised serrations perpendicular to the direction of travel. The decking is modular, six (6) sections wide.

Two sections on one side of the gangway have L3x3x3/16 tread angles at 16" o.c. laid corner up and attached to the welded grating.

At the top end of the gangway, the bottom chord channel is hinged-connected to the end of the approach trestle with a link assembly. A hinged, radiused, smooth grating transition plate provides access from gangway to trestle deck. At the bottom end of the gangway, the bottom flange of the channel is filleted to a radius, and slides in an upturned 3" x 1-1/4" guide channel mounted to the float. A hinged, flat, smooth grating transition plate from gangway to float deck.

Float:

The main float is a nominal 10' wide by 100' long timber float with rows of four (4) – 10" thick x 20" wide x 9' long polystyrene planks, grouped at approximately 12'-6" o.c. The planks support 6x6 (nominal) top sills at 6'-0" o.c. The top sills are bolted through the planks to 3x6 (nominal) bottom sills. The floatation planks are bounded on the outboard edges with 2x10 (nominal) siding.

The top sill framing supports two (2) – 4x6 (nominal) interior stringers and 6x8 (nominal) flatwise exterior stringers, which are overlain with 2x12 (nominal) decking. The outboard faces of the float framing are protected by 2x12 (nominal) bumper boards, and an 8x8 (nominal) tie-off rail on 3x8 (nominal) blocking is provided along all outboard edges of the float.

The gangway float is a nominal 10' wide by 63' long timber float, positioned perpendicular to, and approximately centered on the main float. It is of substantially similar construction.

The main float is held on station by four (4) – 12" (average) dia. timber guide piles along the shoreward edge of the float; two on either side of the gangway float. The outer guide piles are laterally supported from the top by two additional timber piles which batter toward shore. The inner guide piles are laterally unsupported at the top.

The landward end of the gangway float is held on station by a 12" (nominal) dia. timber guide pile situated on one side. The top of the guide pile is laterally supported away from the edge of the gangway float by two additional timber batter piles.

2. DETAILED ASSESSMENT

Approaches, Gangways:

The timber approach is in good condition (Photo 2). It was reportedly re-decked and new handrails were installed in 2013. The handrail and decking appear to be constructed using off the shelf dimensional treated lumber. Treatments used in this type of lumber are typically ACQ or similar, which do not have the same long term design life as those typically specified in marine applications. It can be expected that the new timber decking will be good for 10 years or so.

The piling, cap, and stringers (Photo 3) are heavily creosoted, and appear to be in good condition. It appears these timber components have approximately 20 years of useful life remaining before requiring significant repairs.

The steel gangway is in good condition (Photo 5), with only minor locations of coating loss and surface rust. The gangway is approximately 50' long, making it very steep at low tides, and not suitable for ADA access. It is recommended that the gangway be replaced as part of any significant rehabilitation to the approach or floating dock.

Timber Float:

The timber float (Photo 4) is in poor condition, and it appears to be at or near its useful life. The decking is mostly in fair condition with many boards being highly weathered. About 10 % of the boards are spongy and deflect significantly when walked on (Photo 8). The bullrail has locations of rot and decay, frequent structural cracks and splits, and severe wear (Photo 6, 7). Several of the blocking are missing, and many bolts are loose or compromised (Photo 24). The bullrail is no longer sound, and may not be capable of adequately securing vessels. The rub strips are in poor condition, showing signs of heavy wear or missing completely. They are pulled up at the joints, and show cracks and abrasion damage.

The fasteners in general appear to retain most of their section, however, the galvanizing is completely gone and corrosion is moderate with some showing heavy scaling (Photo 11, 12).

The existing timber piling appear to be in fair condition above the waterline, though rot and vegetation are apparent at the pile tops. It also appears the pile hoops have worn flat spots into the piling, reducing their sections (Photo 9). It is recommended that the piling be pulled and replaced at the same time as the float.

The flotation on the northeast corner of the float is heavily damaged (Photo 10). It appears outermost sill was damaged and the floatation is somewhat loose. More of this type of damage can be anticipated at more locations, as some of the other sills appear rotted and split.

It is recommended that the float be replaced with a heavy duty concrete, timber, or steel pontoon unit. The location is exposed, and heavy currents likely bring ice and other debris in contact with this float. The float does not appear to be on the verge of breaking loose, but it has reached its useful life. Without repair or replacement, it is not expected to be safely useable beyond the next 5 years.

The float reportedly grounds at negative tides. Soundings show the shoreward end of the gangway float is at approximately -1' elevation (MLLW) and the middle of the outer face is at -5.5'. This shows that the gangway landing float grounds at low tide, and the outer face of the dock may not be useable by medium size vessels at extreme low tides. If the float is replaced, it should be moved offshore to deeper water to increase its functionality. If the float was moved out approximately 30', an ADA compliant 80' gangway could be installed, without substantial modification to the approach geometry.

A renovation/replacement project at this location should include safety features such as life rings, fire extinguishers, and safety ladders, and an accessible gangway at a minimum.

Figure 5 indicates some soundings and freeboard values measured at the Papke Landing float.

KUPREANOF LANDING

1. INTRODUCTION

Presently a State of Alaska asset, managed by the Alaska Department of Transportation and Public Facilities (ADOT&PF), Kupreaonf Landing is a long approach, gangway and floating dock facility serving small transient watercraft. A well-used facility, Kupreanof Landing provides local residents and visitors, alike access to this area north of, and across the strait from the town of Petersburg, proper.

It is anticipated that this facility, and the underlying land will eventually become the property of the Petersburg Borough.

a. History

Originally constructed c.1961 by the State of Alaska Department of Public Works, Division of Water and Harbors, Kupreanof Landing was originally designated the West Petersburg Approach and Floats Project No. W6216.

In 1971, the Kupreanof Landing floats saw a significant repair effort, with several sill members and flotation billets being replaced in the process.

In 1980, Kupreanof Landing an even more comprehensive repair and upgrade effort was undertaken by the Division, this time under the West Petersburg Float Repair Project No. K30154. During this project the timber floats were again repaired, flotation units were replaced, and new steel internal pile collars and other appurtenances were installed. At the approach trestle, the decking was replaced with new 2x10 (nominal) material, new handrail, handrail posts and girts were installed, and new cross-bracing was installed between bents 3 and 4. Perhaps most significant of all, the existing bowstring type timber gangway was replaced with a new steel gangway.

In August 2011 an underwater and topside inspection was made of the existing piles, under ADOT&PF Project No. 80803/BR-NBIS (65) and Project No. 80801/BR-NBIS (64).

Some work appears to have been completed since the last repair project, but for which we do not presently have documentation. At the approach trestle, an additional continuous guard rail appears to have been added to each side. Also, at the floats at least two (2) timber guide piles have been replaced with steel pipe guide piles.

b. Description

The following paragraphs are intended to provide a general, overall description of the construction of the existing facility components observed at Kupreanof Landing.

Approach:

The approach to the Kupreanof Landing float is a timber trestle constructed of sixteen (16) – two- pile bents at 17’ o.c., constructed of 10” (nominal) dia. timber pile, with 10x10 (nominal) timber pile caps, supporting two (2) 3x10 (nominal) interior timber stringers, and 6x10 (nominal) exterior stringers, overlain with a 6’-0”’ wide walking surface of 2x12 (nominal) timber decking.

Cross-bracing between bent piles is single tier 3x8 (nominal), with the last two bent spaces braced in the longitudinal direction of trestle, on each side, as well. 4x4 (nominal) posts, 4'-4" long (from bottom of stringer) at 8'-0" centers support a 2x4 (nominal) girt with a 2x6 (nominal) hand rail in the flat position. Two (2) - intermediate 2x6 (nominal) girt rails extend continuously on each side of the trestle. The top of the higher of these railings is approximately 16" below the bottom of the handrail girt. The lower girt is approximately centered between the middle girt and the decking below. No continuous toe or kicker plate, or wheel guard is present.

Gangway:

The gangway is an nominally 6' wide by 50' long steel open framed truss type, with 1-1/2" nom. dia. pipe top chord, a C6x10.5 channel bottom chord, and a 1-1/4" nom. dia. pipe web in a basic Howe configuration. Two (2) – 1x4 (nominal) timber girts extend continuous along each side, at roughly equal spacing between deck and top chord. The gangway is decked along half its width with welded steel grating with long, open, raised serrations perpendicular to the direction of travel. The decking is a single module wide. L3x3x3/16 tread angles laid corner up at 16"o.c. are attached to the welded grating. The other half of the gangway width is decked with 2x12 (nominal) lumber, secured with carriage bolts.

At the top end of the gangway, the bottom chord channel is hinged-connected to the end of the approach trestle with a link assembly. A hinged, radiused, smooth grating transition plate provides access from gangway to trestle deck. At the bottom end of the gangway, the bottom flange of the channel is filleted to a radius, and slides inside a pair of guide angles mounted to the float. A hinged, flat, smooth grating transition plate from gangway to float deck.

Float:

The main float is a nominal 10' wide by 95' long timber float with rows of four (4) – 10" thick x 20" wide x 9'-2" long polystyrene planks, grouped at approximately 12'-0" o.c. The planks support 6x6 (nominal) top sills at 6'-0" o.c. The top sills are bolted through the planks to 3x6 (nominal) bottom sills. The floatation planks are bounded on the outboard edges with 2x10 (nominal) siding.

The top sill framing supports two (2) – 4x6 (nominal) interior stringers and 6x8 (nominal) flatwise exterior stringers, which are overlain with 2x12 (nominal) decking. The outboard faces of the float framing are protected by 2x12 (nominal) bumper boards, and an 8x8 (nominal) tie-off rail on 3x8 (nominal) blocking is provided along all outboard edges of the float.

The gangway float is a nominal 10' wide by 47' long timber float, positioned perpendicular to, and approximately centered on the main float. It is of substantially similar construction.

The main float is held on station by four (3) – 12" (average) dia. timber guide piles and one (1) steel pipe pile along the shoreward edge of the float; two on either side of the gangway float. One of the outer guide piles is laterally supported from the top by two additional timber piles which batter toward shore. The inner guide piles and the other outer pile are laterally unsupported at the top.

The landward end of the gangway float is held on station by one timber guide pile and one steel pipe guide pile, both situated on the same side of the float, the prior in the seaward position, and the latter in the landward position. The top of these guide piles are laterally unsupported.

2. DETAILED ASSESSMENT

Approaches, Gangways:

The timber approach (Photo 2) is in fair condition, with several issues requiring attention. The deck is in good shape, and is reportedly power washed annually. The handrails appear to be newer construction, but show a fair amount of movement / deflection when leaned on. It is unlikely these handrails could safely support more than 1 or 2 people per post spacing. Cracks were noticed in the handrail posts at most connections to the stringer (Photo 4).

The stringers and pile caps appear to be in mostly good shape (Photo 3). Some of the pile caps have vertical cracks up to ¼" wide through their centers (Photo 6). The stringers are largely protected from the elements and appear to be in good condition. The 3rd pile bent from shore is leaning at approximately 10 degrees from vertical, towards the water.

The timber bearing piles appear to be in good condition at first, however multiple piles were found to have hollow areas near the MLLW (0') water line (Photo 5). Only several of these locations were inspected in detail due to tide levels. In 2 cases, over 50% of the cross section was void. A 2011 Underwater inspection report, commissioned by the State of Alaska, found 12 of the approach piles to have large splits, hollow areas, or softness in the intertidal zone. The above referenced underwater inspection report was prepared for ADOT&PF Bridge Section, Project # 80803/BR-NBIS(65) & 80801/BR-NBIS(64)

It is recommended that the soft and hollow piling be repaired or replaced. Given the age, condition, and location of the structure, a total in kind replacement may be a better long term solution than repairing only the damaged piling.

The steel gangway is in good condition (Photo 7), with only minor locations of coating loss and surface rust. The gangway is approximately 50' long, making it very steep at low tides, and not suitable for ADA access. It is recommended that the gangway be replaced with an 80' ADA accessible unit, as part of any significant rehabilitation to the approach structure or floating dock.

Timber Float:

The timber float is in fair to poor condition, and it appears to nearing its useful life. The float lists on the order of 5" to the West (Photo 8). The decking is mostly in fair condition with many boards being weathered, but all appear sound. There is light vegetation between the boards, which should be pressure washed or mechanically removed.

The bullrail shows heavy wear and weathering (Photo 12), but appears mostly structurally sound. One location of significant structural rot and damage was observed where the main float intersects the gangway landing float, to the south (Photo 9). This section of bullrail should be replaced.

Corrosion in the form of surface rust is evident on many of the fasteners, though they appear to retain most of their sections. The hinge pins between the gangway float and the main float are heavily corroded and worn (Photo 10). They should be replaced. Failure of the hinge(s) will allow differential movement between the two float systems, but each float section is still secured in place with guide piling.

The flotation on the southeast corner of the float is heavily damaged. It appears outermost sill was split and the floatation is has been displaced (Photo 11). This type of damage can be anticipated at more locations, as some of the other sills appear rotted and split.

The existing timber and steel piling appear to be in good condition from the topside, though the southern – middle pile has a slight lean. A review of the 2011 underwater inspection report shows the guide piling are not in good shape, as observed from the topside. The underwater inspection report reveals heavy corrosion below the waterline on the steel piling, and no anodes. Two of the timber guide piling were found to be hollow near the mudline, and two of the piling had no damage noted. All of the guide piling should be replaced as part of a float replacement project.

It is recommended that the float be replaced with a heavy duty concrete, timber, or steel pontoon unit. The location is exposed, and heavy currents likely bring ice and other debris in contact with this float. The float does not appear to be on the verge of breaking loose, but it has reached its useful life. Without repair or replacement, it is not expected to be safely useable beyond the next 5 years. The float guide piling represent a serious issue if they continue to decay and corrode. These piling should be replaced.

A renovation/replacement project at this location should include safety features such as life rings, fire extinguishers, and safety ladders, and an accessible gangway at a minimum.

The float reportedly grounds at negative tides. Soundings show the west end of the gangway float is at approximately -1’ elevation (MLLW) and the NW and SW corners of the float are at -2 and -3 respectively. This shows that the more protected shoreward side of the float is not suitable for vessel mooring when the tide is expected to be low. If the float is replaced, it should be moved offshore to deeper water to increase its functionality. If the float was moved out approximately 30’, and ADA compliant 80’ gangway could be installed, without substantial modification to the approach geometry. Figure 6 indicates some soundings and freeboard values measured at the Kupreanof float.

OTHER FACILITIES

Moffatt and Nichol did not perform detailed condition assessments of the facilities found in this section. These facilities were visited, and a walkthrough revealed no major defects. It is recommended that these facilities receive periodic inspections at intervals recommended by their original designers. Reference photographs for each of the facility visited can be found in the appendix.

Port Dock / Petro Dock

The Port Dock consists of a 26’ wide concrete decked pile supported dock running perpendicular to the shoreline. A 141’ timber decked dock on timber pile, runs marginally, from the end of the concrete portion of the dock. The Port dock is used for unloading heavy and large loads, as well as loading and unloading passengers from larger cruise vessels that occasionally visit Petersburg.

The Port Dock is used to provide access to the Petro marine fuel float, a USCG Float, and the USFS Floats. A detailed condition assessment of the Port Dock was not performed.

Drive – Down Float

The drive down dock was recently constructed prior to this inspection, c.2014. The dock is constructed on the end of an earthen embankment. An pile supported approach dock and steel transfer bridge allows vehicles to access the drive down float for loading and un-loading activities. This new facility serves the commercial fishing fleet and other users by allowing vehicle to vessel access. Reportedly, the construction of the drive down dock has eased congestion on the crane dock, which was previously used as the primary heavy loading and unloading point for vessels. A detailed condition assessment of the drive down float was not performed.

Scow Bay

The Scow Bay area features a large parking area and potential for upland vessel storage. There is a shallow sloped boat launch ramp, reportedly ~ 5^{o} slope that was formerly used for amphibious aircraft. The shallow angle is reportedly good for use with keel supported hydraulic trailers. An old rubble mound approach / breakwater extends out to deeper water. The side slopes of the approach are armored, but it is experiencing some erosion. Scow bay also has an informal and un-secured stockpile of harbor materials including structural steel, steel pipe piles, timber float elements, and HDPE flotation units. A detailed condition assessment of this site was not performed.

Refer to Appendix E for an aerial site view and photo log of the walk-down. For additional information regarding this location, please refer to discussion in section 2 of the Petersburg Borough Waterfront Master Plan, latest revision date.

Banana Point, Blaquiere Point

The facilities at Banana Point, Olsen's Log Dump, and Blaquiere point were not visited during the condition assessment.

Appendix A

Referenced Photos:

South Harbor

Middle Harbor

North Harbor

Papke's landing

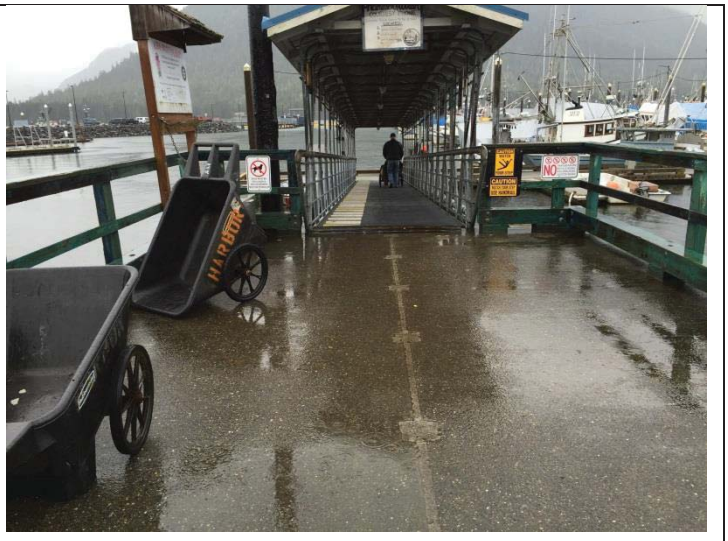
Kupreanof

SOUTH HARBOR

Referenced Photos

SOUTH HARBOR PHOTOS

1. South Harbor Float System



2. South Harbor South Gangway

3. South Gangway Shoe Binds in Tracks

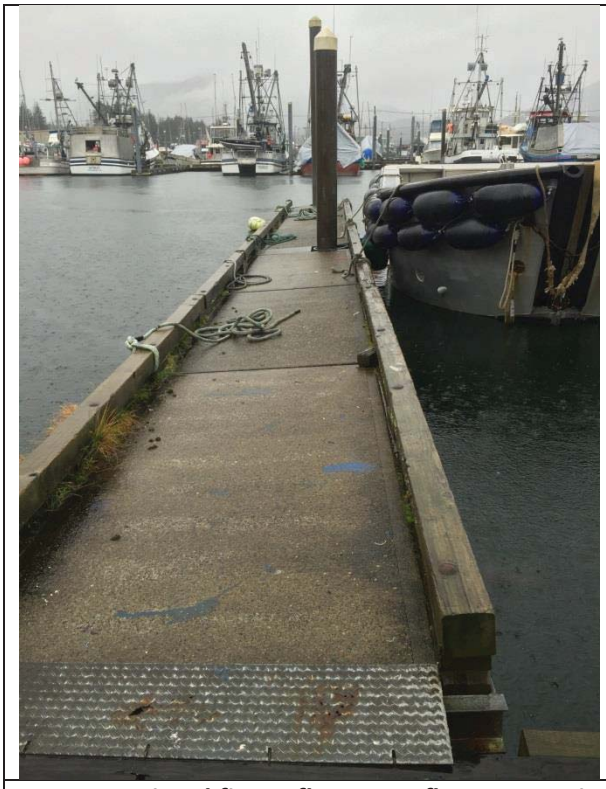
4. Steel straps used to hold gangway tracks

5. Headwalk Float, typical condition

6. Typical skiff float at Headwalk float

7. D Float typical condition

8. D float finger with cracked/spalled concrete and flotation loss.



9. **Twisted finger float on D float, note trip hazard at transition plate**

10. **Twisted finger float on D float, note spall repair and displacement at concrete module joints.**

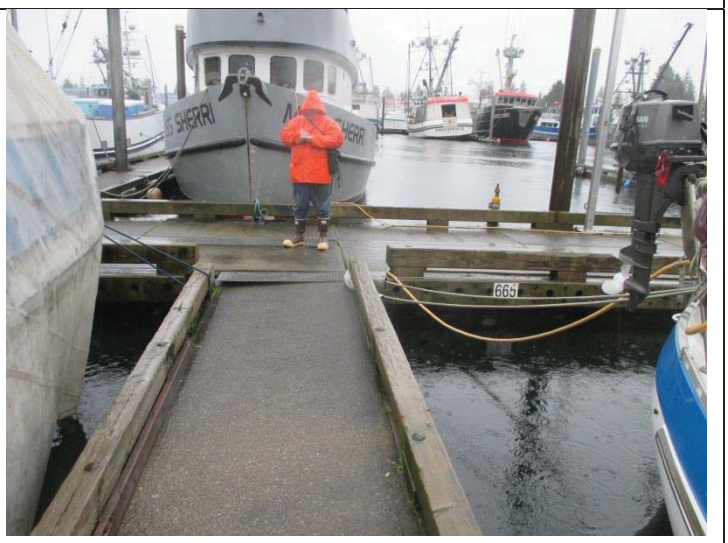
11. **Headwalk – C Float intersection, Note lip.**

12. **Bent Hinge/Plate at Headwalk – C float intersection.**

13. Typical C Float

14. Twisted C Float Finger, not displacement between concrete modules.

15. Heavily cracked/spalled C Float finger



16. Twisted C float finger with trip hazard at transition plate

17. Compliant Hinge at C Float finger, note slight buckling of rubber fender material.

18. Lip between concrete modules at transformer locations

19. Typical New C Float section, note deteriorated weather conditions.

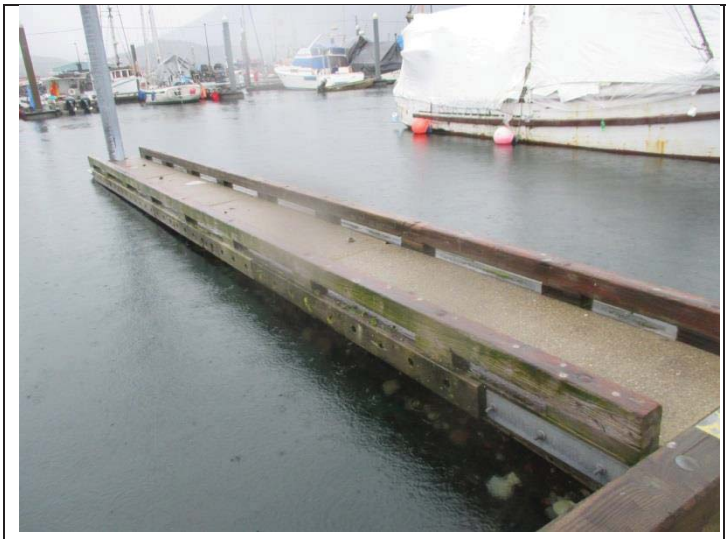
20. Typical Newer C Float finger.

21. Heavy duty float at the end of C float

22. B float to Headwalk float intersection

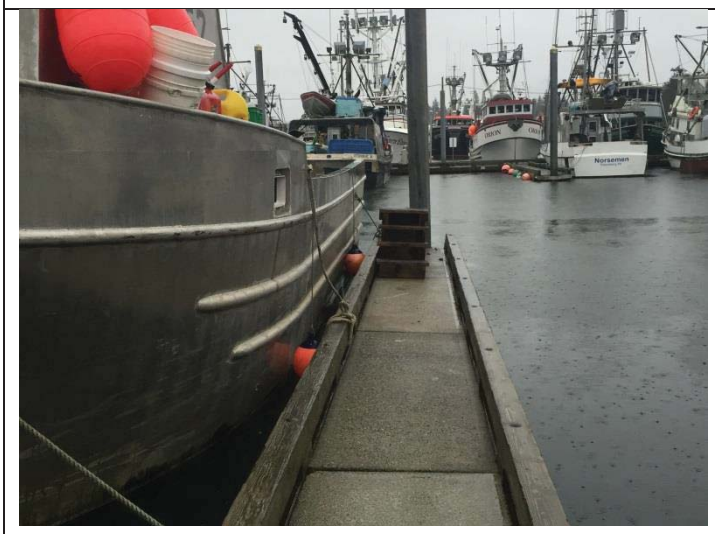
23. Typical B Float

24. Small spall on B Float



25. Loss of freeboard on B Float finger

26. Stressed Finger Float piano hinge



27. Twisted B Float finger note displacement between concrete modules

28. Typical A Float

29. Damaged Thru - Rods at A Float to Headwalk Intersection

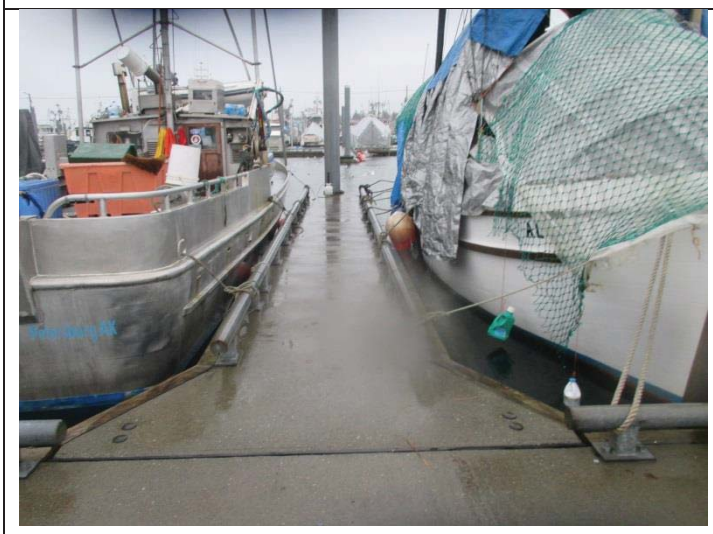
30. Lip Between Concrete Modules on A Float

31. Spalled Concrete on A float Finger

32. Twisted A float finger

33. Spall Repair on A float

34. A Float, Newer main float sections

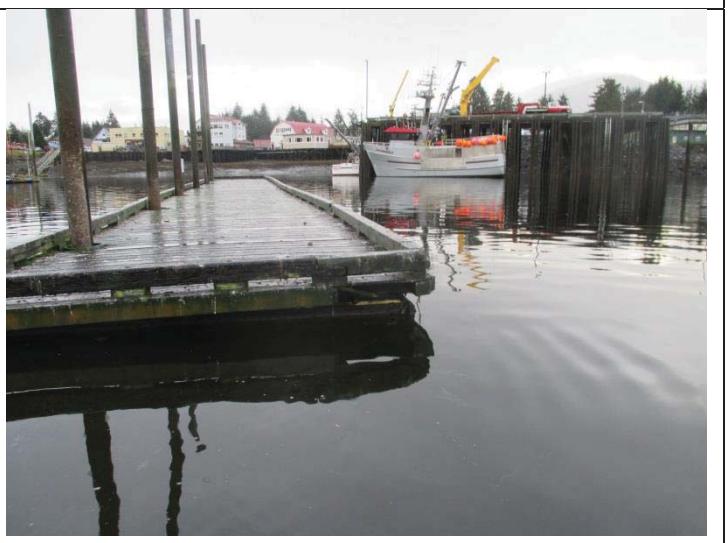


35. A Float, typical newer finger float

36. Utility / Net Float, Note Birds.

37. Utility Float, Split Timber Sill, Note Vegetation.

38. Utility Float, Kinked Bullrail



39. Utility Float, Damaged / Missing Rub Strip

40. Gillnet Float

41. South Harbor Boat Launch Ramp and Boarding Float

42. Hinge at Boarding float

43. Fish Cleaning Float

44. South Harbor Tidal Grid

45. Typical Grid Configuration

46. Rotted/Damaged Timber Walking Plank

47. Typical Fender Pile, Bracing, Dock configuration at Grid.

	
48. Corrosion on Fender Pile Bracing	**49. Corrosion on Grid Bearing Piles and Grid Caps**

50. Crane Dock

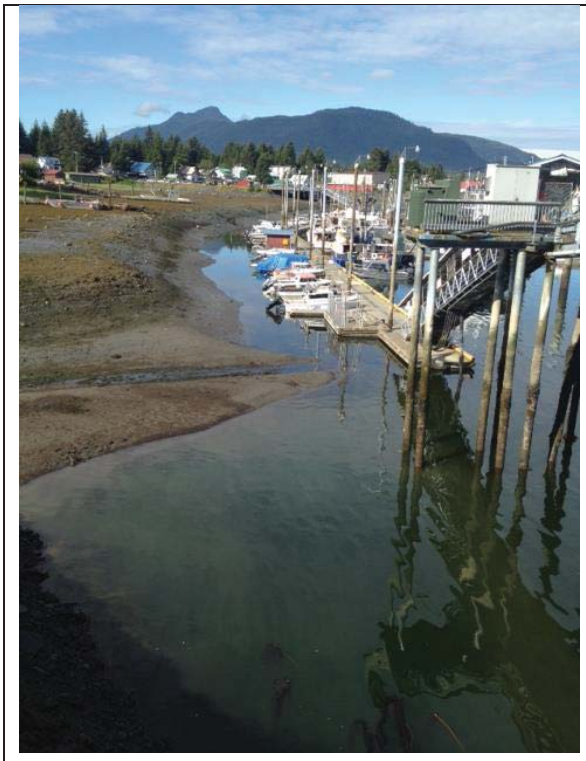
51. Typical Fender Piling at Crane Dock

52. Northwest corner Fender Piling

53. Typical Crane Dock Framing

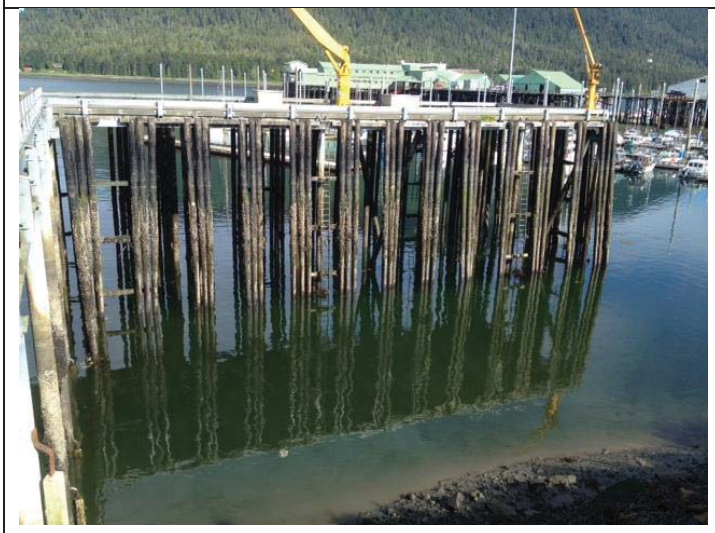
54. Crane Dock Anodes

55. Typical Crane Dock Piling, Note Localized Corrosion in intertidal zone.

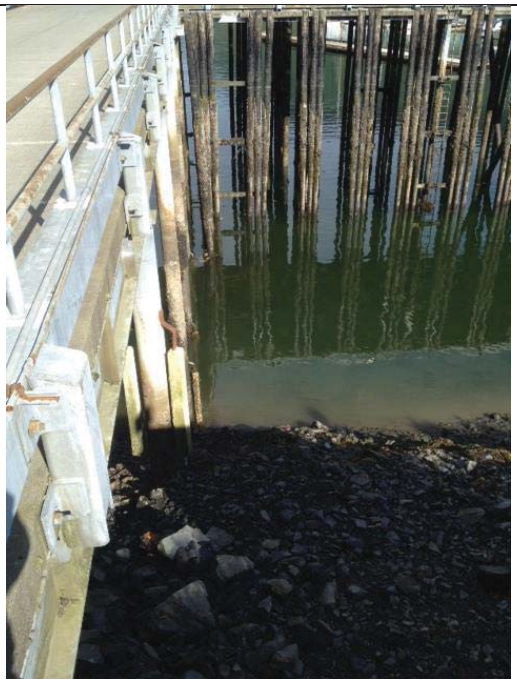


56. South Harbor Floats at a Low Tide

57. South Harbor Floats at a Low Tide



58. Back Side of Crane Dock at a Low Tide



59. Back side of Crane Dock at a low tide

MIDDLE HARBOR

Referenced Photos

MIDDLE HARBOR PHOTOS

1. **Typical Middle Harbor Float System**

2. **Typical Middle Harbor Cantilever Stall Float**

3. **Loose Nut at Gangway to Main Float Connection**

4. **Middle Harbor Gangway**

5. **Middle Harbor at Low Tide. Note Area Adjacent to Gangway Landing**

6. **Middle Harbor at Low Tide. Slip Access is Limited.**

7. **Corrosion on Pile Hoop at Replacement Floats**

8. **Middle Harbor Approach**

9. Approach Configuration. Note Cracked Pile Cap

10. Approach Backwall

11. Approach topside

12. Gangway to Approach Connection.

NORTH HARBOR

Referenced Photos

North Harbor Photos

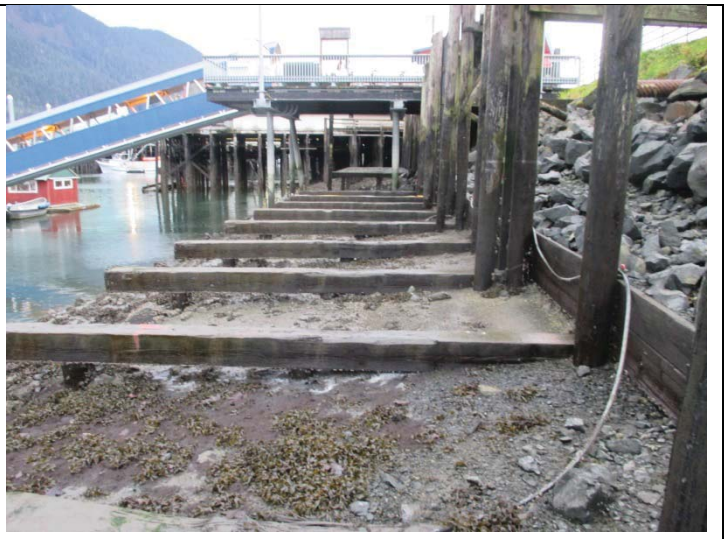
1. **North Harbor Approach / Gangway**

2. **Typical North Harbor Float**

3. **Transition to ADF&G Kestrel Float**

4. **Typical ADF&G Kestrel Float.**

5. Corroded guide pile.



6. Grid, South of Approach, Looking North

7. Grid, North of Approach, Looking North

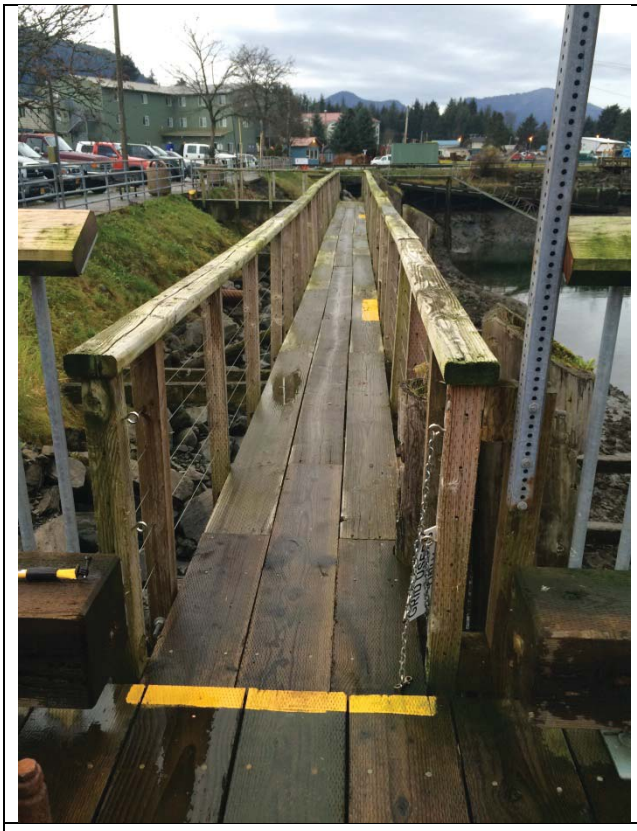
8. Damaged Grid Beam End

9. Blow out at Timber Retaining Wall, South of Approach.

10. Hollow Fender Pile

11. Undermining Retaining Wall, North of Approach.

12. Looking South Towards Approach. Note Removed Grid Beam and Damaged Retaining Wall .



13. Grid Catwalk

14. Hollow Grid Bearing Pile

15. Hollow Grid Bearing Pile.

16. Heavily Damaged Grid Beam End .

17. Timber Launch Ramp

18. Timber Launch Ramp From the Bottom

19. Split Launch Ramp Bearing Pile.

20. Broken Bracing and Damaged Pile to Cap Connection .

	
21. Typical Launch Ramp Framing	**22. Split / Rotted Launch Ramp Decking**

23. Worn/ Damaged Decking and Retaining Wall. Note damage to bullrail.

24. Concrete Planks, Buried and Partially Undermined.

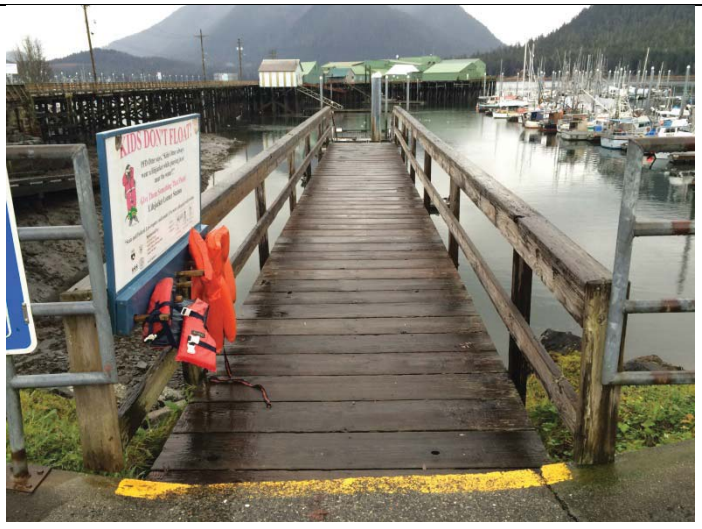
25. Erosion Between Launch Ramp and Skiff Float.

26. Skiff Float at a Low Tide.

27. Skiff Float Approach.

28. Broken Bracing at Skiff Float Approach, Note Split at Pile Top (Left) .

29. Skiff Float , Steep Gangway



30. Skiff Float Approach

31. Gap at top of Gangway at Skiff Float.

32. Typical Skiff Float Looking Towards Shore

33. Transition from Skiff Float to Troller Float

34. Rotted and Split Timber Bullrail

35. Split Decking on Skiff Float.

36. Steel Pipe Pile at Skiff Float

37. Skiff Float viewed from Troller Float

PAPKE'S LANDING

Referenced Photos

Papke's Landing Photos

1. **Papke's Landing**

2. **Papke's Approach, Topside**

3. **Papke's Approach, Typical Framing**

4. **Papke's Float**

5. Papke's Gangway

6. Papke's Worn Bullrail and Decking.

7. Papke's Worn, Broken Bullrail

8. Papke's Float Decking

9. Wear on guide pile, note vegetation

10. Damage to Flotation and Sill

11. Damage sill and bolt, note corrosion.

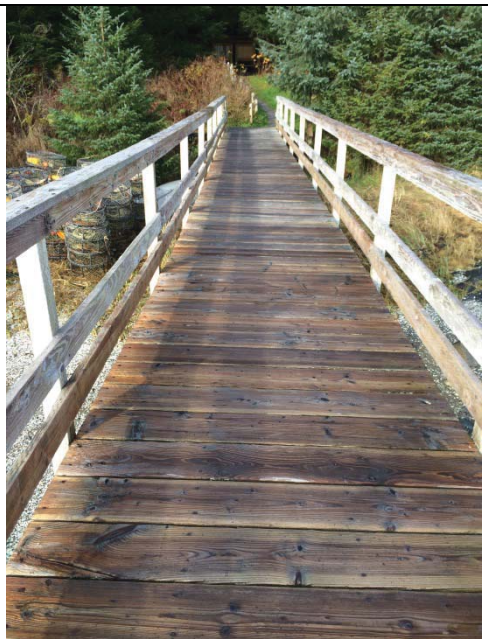
12. Damaged/ Loose bolt, note corrosion

KUPREANOF

Referenced Photos

Kupreanof Photos

1. **Kupreanof Float and Approach**



2. **Approach Top Side**

3. **Approach Framing**

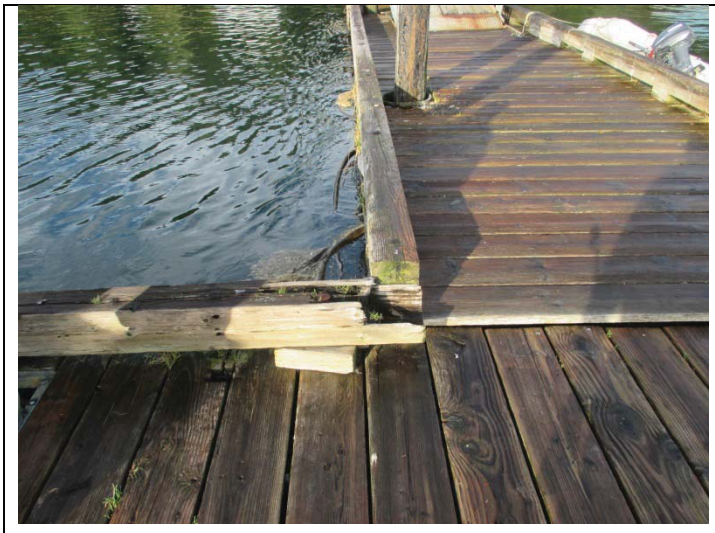
4. **Typical Crack at Handrail Post**

5. Hollow Approach Bearing Pile

6. Cracked Pile Cap

7. Float and Gangway

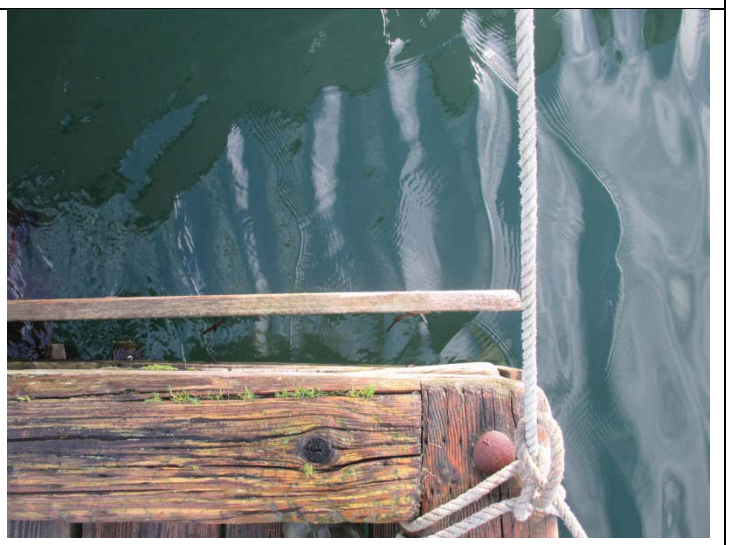
8. Listing Float, note crooked pile



9. Damaged bullrail and lip at float intersection

10. Worn and Corroded hinge components

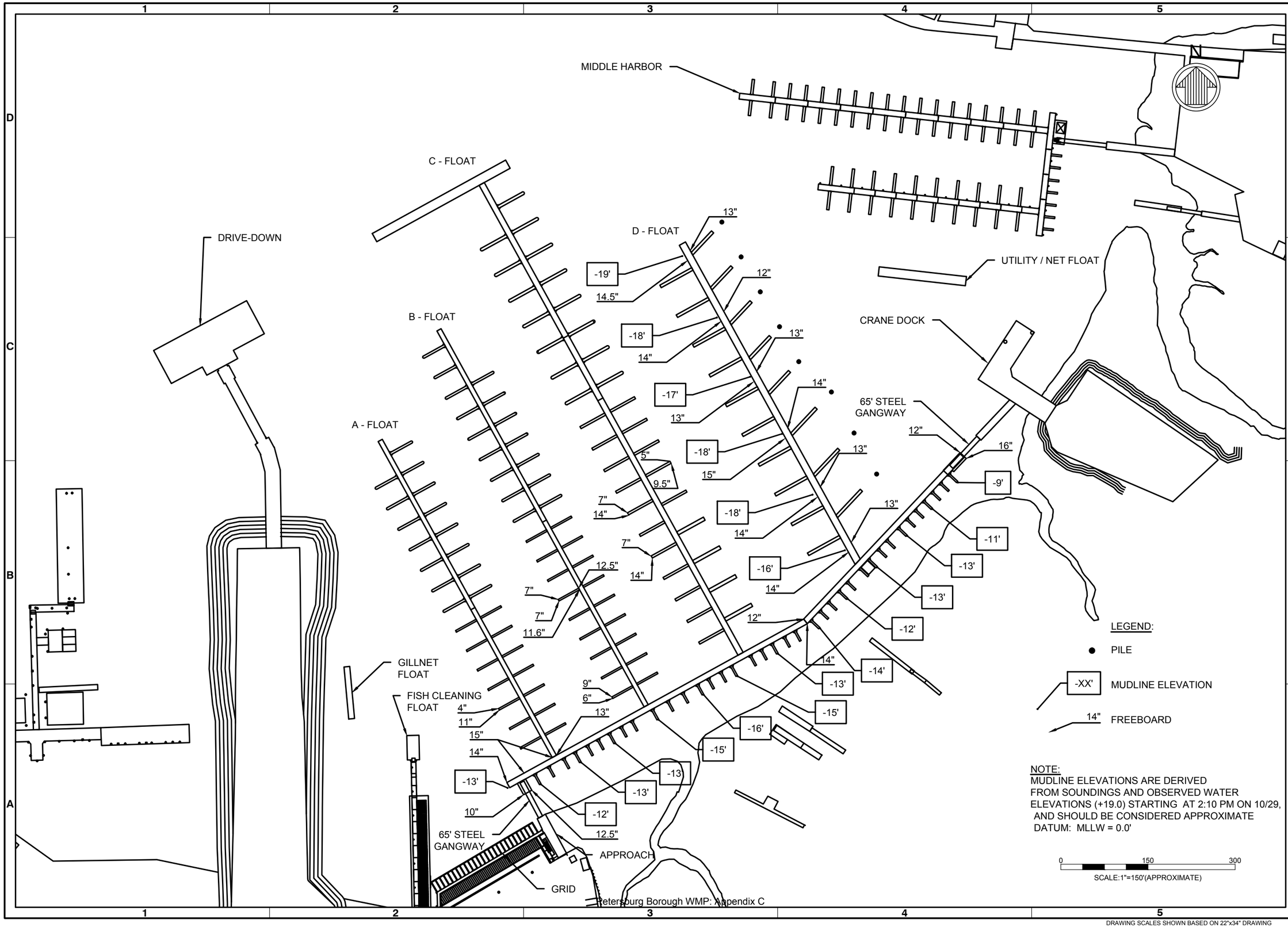
11. Broken Sill, Note missing flotation



12. Worn Bullrail and Damaged Rub Board

Appendix B

Figures:



PETERSBURG
HARBOR FACILITIES CONDITION ASSESSMENT

SOUTH HARBOR

Mark	Description	Date	Appr.
–			

Designed by:	Date: 07-27-2015	Rev. –	
Dwn by:	Cad by:	M&N Project No. 8712	Drawing code:
Reviewed by:	Submitted by: MOFFATT & NICHOL	Drawing Scale: Plot scale: 1:1 (0 SHEET)	

880 H STREET, SUITE 208
ANCHORAGE, AK 99501
(907)677-7500
moffatt & nichol

SEAL

Sheet Reference Number:
FIGURE 1
Sheet 1 of 1

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

LEGEND:

- PILE
- -XX' MUDLINE ELEVATION
- 14" FREEBOARD

NOTE:
MUDLINE ELEVATIONS ARE DERIVED FROM SOUNDINGS AND OBSERVED WATER ELEVATIONS AT THE TIME OF INSPECTION AND SHOULD BE CONSIDERED APPROXIMATE
DATUM: MLLW = 0.0'

PLAN SCALE IS APPROXIMATE:

0 75 120
1"=75

FLOAT NO. 1

-30.5' -31.0' -30.5' -26.6' -27.6'

22" 17" -26.0' -26.0' 17" -25.0' 16" -25.0' 19"

FLOAT NO. 2

-26.8' -26.7' -26.0' 17" 15.5" -28.6' 17" 17" 19" 16" 18" 16" 18" -28.2' -30.5'

MIDDLE HARBOR FLOAT SOUNDINGS:
3:50-4:12 PM, 10/28/2015

TIMBER APPROACH

80' ALUMINUM GANGWAY

FISH AND GAME FLOAT

SOUTH HARBOR FLOATS

UTILITY / NET FLOAT

CRANE DOCK SOUNDINGS:
4:50-5:10 PM, 10/28/2015

-35.2' -36.5' -37.4' -36.6' -36.6' -35.2' -35.7' -35.0'

CRANE DOCK

Petersburg Borough WMP: Appendix C

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

PETERSBURG
HARBOR FACILITIES CONDITION ASSESSMENT

MIDDLE HARBOR

880 H STREET, SUITE 208
ANCHORAGE, AK 99501
(907)677-7500

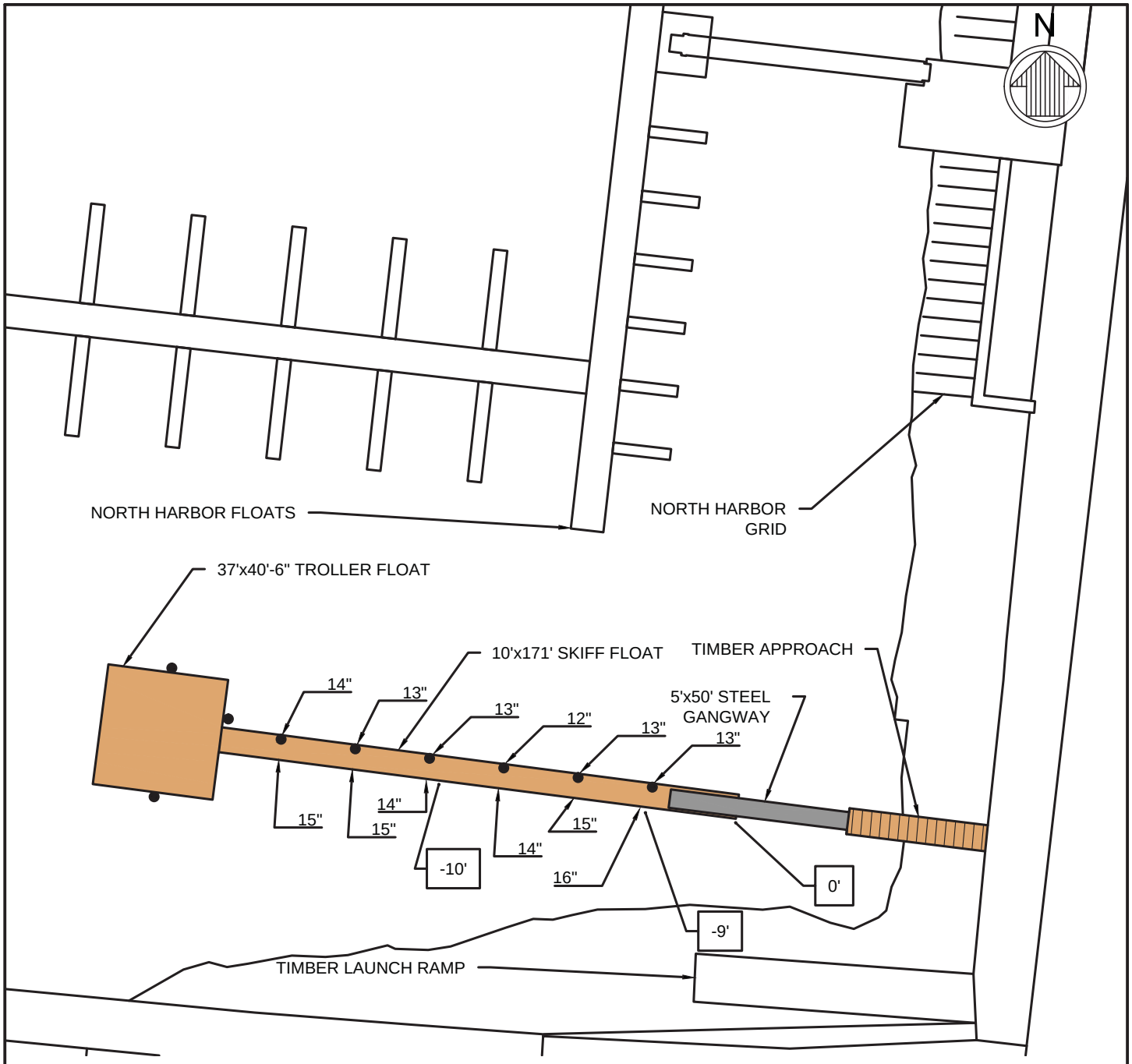
moffatt & nichol

Rev. –
Date: 07-27-2015
M&N Project No. 8712
Drawing code:
Drawing Scale: Plot scale: 1:1 (D SHEET)
Designed by:
Dwn by: Chd by:
Reviewed by:
Submitted by: MOFFATT & NICHOL

SEAL

Sheet Reference Number:
FIGURE 2
Sheet 1 of 1

File: P:\8712 Petersburg Comp Plan\CADD\Figures_v6_pbw_111715; Plotted: 11/18/2015 10:15 AM by BALZARINI, CHARLES; Saved: 11/18/2015 8:15 AM by CBALZARINI



LEGEND:

- PILE
- -XX' MUDLINE ELEVATION
- 14" FREEBOARD

NOTE:
MUDLINE ELEVATIONS ARE DERIVED FROM SOUNDINGS AND OBSERVED WATER ELEVATIONS (+19.0') AT 1:20 PM 10/28, AND SHOULD BE CONSIDERED APPROXIMATE
DATUM: MLLW = 0.0'

moffatt & nichol

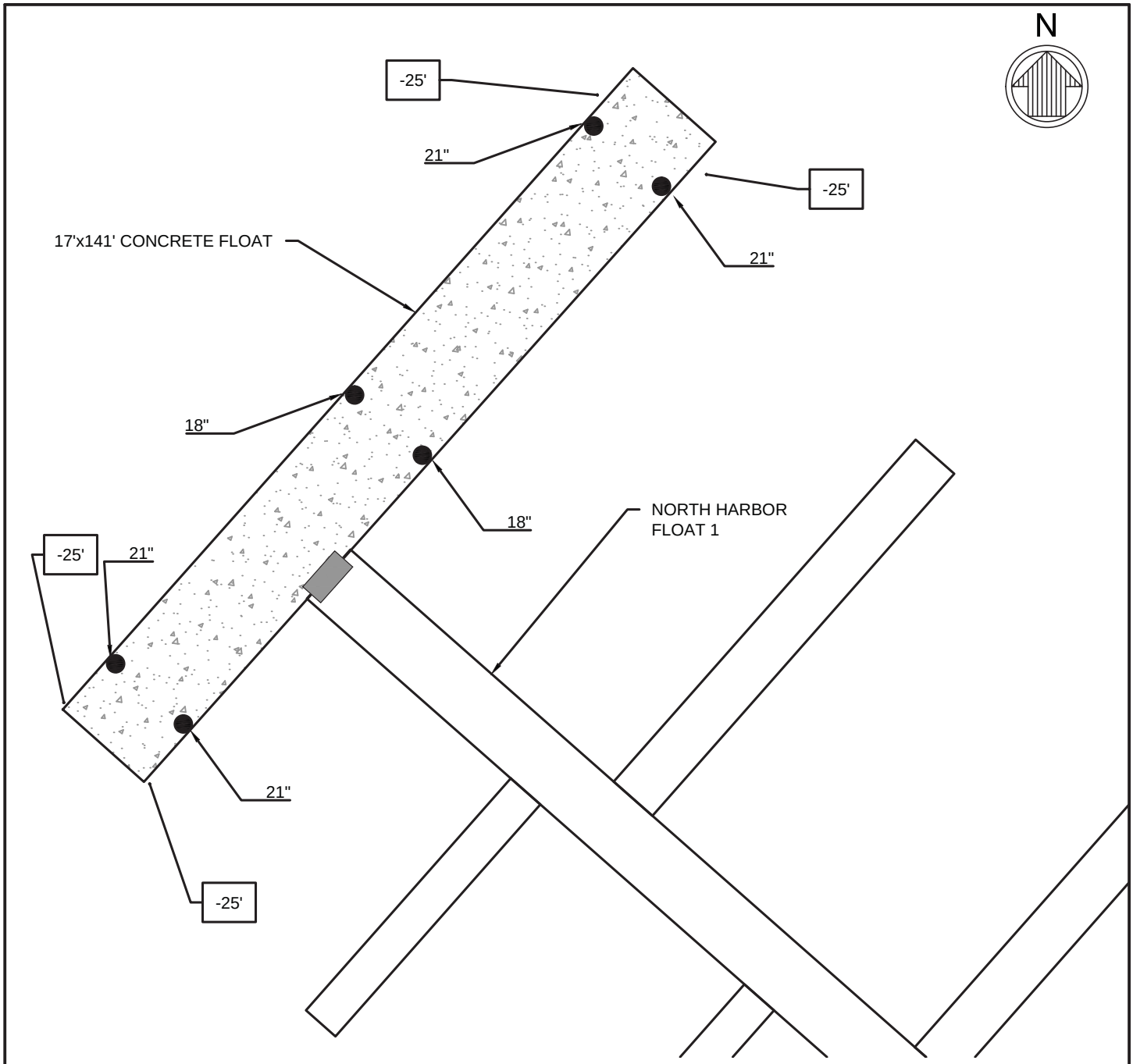
SKIFF AND TROLLER FLOATS

0 50 100

FIGURE 3

PREPARED FOR: PETERSBURG BOROUGH

DATE: 11/17/15



LEGEND:

- PILE
- -XX' MUDLINE ELEVATION
- 14" FREEBOARD

NOTE:
MUDLINE ELEVATIONS ARE DERIVED FROM SOUNDINGS AND OBSERVED WATER ELEVATIONS (+20.0') AT 2:00 PM 10/28, AND SHOULD BE CONSIDERED APPROXIMATE
DATUM: MLLW = 0.0'

moffatt & nichol

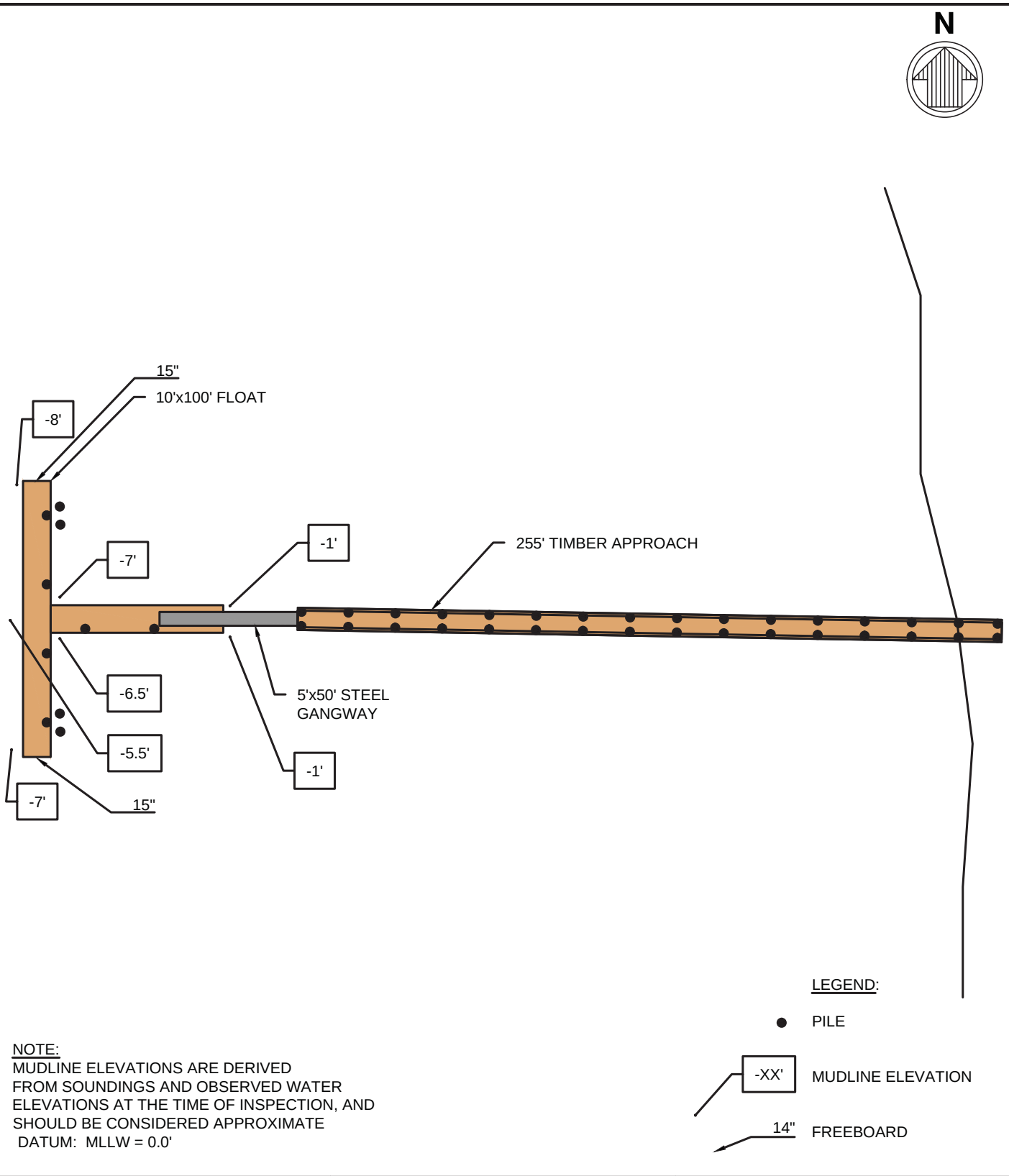
CONCRETE FLOAT, ADF&G KESTREL

0 50 100

FIGURE 4

PREPARED FOR: PETERSBURG BOROUGH

DATE: 11/17/15



NOTE:
MUDLINE ELEVATIONS ARE DERIVED FROM SOUNDINGS AND OBSERVED WATER ELEVATIONS AT THE TIME OF INSPECTION, AND SHOULD BE CONSIDERED APPROXIMATE
DATUM: MLLW = 0.0'

LEGEND:

- PILE
- -XX' MUDLINE ELEVATION
- 14" FREEBOARD

moffatt & nichol

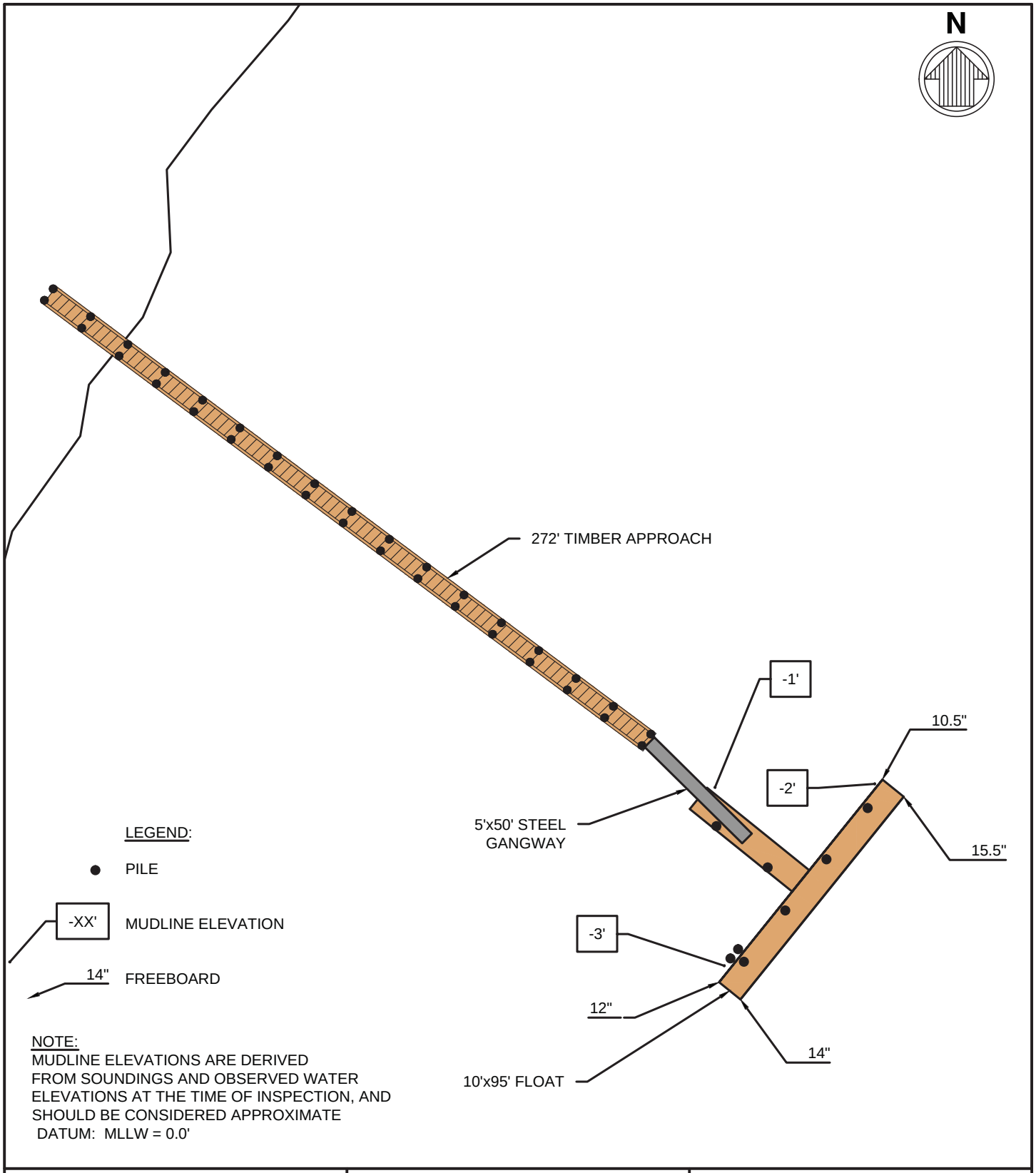
PAPKE'S FLOAT

0 50 100

FIGURE 5

PREPARED FOR: PETERSBURG BOROUGH

DATE: 11/17/15



moffatt & nichol

KUPREANOF FLOAT

0 50 100

FIGURE 6

PREPARED FOR: PETERSBURG BOROUGH

DATE: 11/17/15

Appendix C

Opinion of Probable Construction Costs

South Harbor

Middle Harbor

North Harbor

Papke's Landing

Kupreanof

SOUTH HARBOR
Opinion of Probable
Construction Cost (OPCC)

moffatt & nichol

Item No.	Description	Approx. Quantity	Unit	Unit Cost ($)	Extended Cost (Rounded)
1	**MOBILIZATION & DEMOBILIZATION**		LS	$ 1,000,000	$ 1,000,000
2	**CONSTRUCTION SURVEYING**	1	LS	$ 50,000	$ 50,000
	Headwalk Float and Approaches				
3	**Modify Crane Dock approach for new Gangway**	1	LS	$ 20,000	$ 20,000
4	**Modify South Approach for New Gangway**	1	LS	$ 20,000	$ 20,000
5	**North Gangway, 6'X80', ADA Compliant**	1	LS	$ 110,000	$ 110,000
6	**South Gangway, 6'X80', ADA Compliant**	1	LS	$ 110,000	$ 110,000
7	**Gangway Landing Floats**	2	LS	$ 40,000	$ 80,000
8	**Replace Headwalk Floats**	8,220	SF	$ 105	$ 863,000
9	**Headwalk Demolition**	10,396	SF	$ 20	$ 208,000
10	**Replace Headwalk Finger Floats**	37	EA	$ 10,000	$ 370,000
11	**Replace Headwalk Float Piles**	20	EA	$ 11,500	$ 230,000
12	**Headwalk Potable Water and Fire Suppresion**	1	LS	$ 100,000	$ 100,000
13	**Headwalk Power and Lighting**	1	LS	$ 75,000	$ 75,000
14	**Headwalk Fire Extinguishers, Life Rings, Ladders**	1	LS	$ 25,000	$ 25,000
	Total Headwalk Float and Approaches:				**$ 2,211,000**
	D - Float				
15	**D Float Demoltion**	14,160	SF	$ 20	$ 283,000
1	**Replace D Float Main Floats**	7,464	SF	$ 105	$ 784,000
16	**Replace D Float Piles**	47	EA	$ 11,500	$ 541,000
2	**Replace D Float Fingers**	18	EA	$ 40,920	$ 737,000
17	**D Float Potable Water and Fire Suppresion**	1	LS	$ 150,000	$ 150,000
3	**D Float Power and Lighting**	1	LS	$ 200,000	$ 200,000
18	**D Float Fire Extinguishers, Life Rings, Ladders**	1	LS	$ 25,000	$ 25,000
	Total D Float:				**$ 2,720,000**
	C - Float				
19	**C Float Demoltion**	8,760	SF	$ 20	$ 175,000
20	**Replace C Float Main Floats**	3,760	SF	$ 105	$ 395,000

Item No.	Description	Approx. Quantity	Unit	Unit Cost ($)	Extended Cost (Rounded)
21	Replace C Float Piles	34	EA	$ 11,500	$ 391,000
22	Replace C Float Fingers	20	EA	$ 27,500	$ 550,000
23	C Float Potable Water and Fire Suppresion	1	LS	$ 75,000	$ 75,000
24	C Float Power and Lighting	1	LS	$ 150,000	$ 150,000
25	C Float Fire Extinguishers, Life Rings, Ladders	1	LS	$ 25,000	$ 25,000
				Total C Float:	**$ 1,761,000**
	B Float				
26	B Float Demoltion	5,904	SF	$ 20	$ 118,000
27	Replace B Float Main Floats	2,304	SF	$ 105	$ 242,000
28	Replace B Float Piles	28	EA	$ 11,500	$ 322,000
29	Replace B Float Fingers	18	EA	$ 22,000	$ 396,000
30	B Float Potable Water and Fire Suppresion	1	LS	$ 75,000	$ 75,000
31	B Float Power and Lighting	1	LS	$ 100,000	$ 100,000
32	B Float Fire Extinguishers, Life Rings, Ladders	1	LS	$ 25,000	$ 25,000
				Total C Float:	**$ 1,278,000**
	A- Float				
33	A Float Demoltion	5,104	SF	$ 20	$ 102,000
34	Replace A Float Main Floats	2,304	SF	$ 105	$ 242,000
35	Replace A Float Piles	22	EA	$ 11,500	$ 253,000
36	Replace A Float Fingers	14	EA	$ 22,000	$ 308,000
37	B Float Potable Water and Fire Suppresion	1	LS	$ 75,000	$ 75,000
38	B Float Power and Lighting	1	LS	$ 75,000	$ 75,000
39	A Float Fire Extinguishers, Life Rings, Ladders	1	LS	$ 25,000	$ 25,000
				Total C Float:	**$ 1,080,000**
	Utility / Net Float				
40	Net Float Demolition	1	LS	$ 10,000	$ 10,000
41	Replace Net Float	1	LS	$ 276,000	$ 276,000
42	Re-Install Piling	6	EA	$ 4,500	$ 27,000

SOUTH HARBOR
Opinion of Probable
Construction Cost (OPCC)

moffatt & nichol

Item No.	Description	Approx. Quantity	Unit	Unit Cost ($)	Extended Cost (Rounded)
	Total Utility/Net Float:				**$ 313,000**
	Crane Dock				
43	**Replace Crane Dock Fender Piling**	117	EA	$ 3,000	$ 351,000
44	**Spray metalize or re-coat piling**	1	LS	$ 50,000	$ 50,000
	Total Crane Dock:				**$ 401,000**
	Estimated Bid Price				**$ 10,814,000**
	Contingency			(25%)	$ 2,704,000
	Opinion of Probable Construction Cost				**$ 13,518,000**
	Planning, Permitting, Design and Bid Documents			(10%)	$ 1,352,000
	Contract Administration, Construction Inspection & Other Indirect Costs			(5%)	$ 676,000
	Estimated Project Cost				**$ 15,546,000**

Notes:
- All estimates are in 2015 USD and rounded to the nearest thousand dollars.
- Pile costs include cost of passive (e.g. anode type) cathodic protection (CP) system
- Replacement costs at A, B, and C include replacement of only first-generation (i.e. c.1984) units; not more recently constructed sections.

MIDDLE HARBOR
Opinion of Probable
Construction Cost (OPCC)

moffatt & nichol

Item No.	Description	Approx. Quantity	Unit	Unit Cost ($)	Extended Cost (Rounded)
1	**MOBILIZATION & DEMOBILIZATION**		LS	$ 100,000	$ 100,000
2	**CONSTRUCTION SURVEYING**	1	LS	$ 10,000	$ 10,000
	Approach Replacement				
3	**Demolish Existing Approach Dock**	1	LS	$ 20,000	$ 20,000
4	**Install New Piling For Approach Dock**	10	LS	$ 10,000	$ 100,000
5	**Install New Timber Framing and Deck For Approach Dock**	1	LS	$ 110,000	$ 110,000
6	**Re-install Gangway**	1	EA	$ 10,000	$ 10,000
	Total Approach Replacement				**$ 240,000**
	Float Safety Improvements				
7	**Dry Standpipe fire protection system**	1	LS	$ 125,000	$ 125,000
8	**Safety Ladders**	15	EA	$ 1,000	$ 15,000
	Total Float Safety Improvements:				**$ 140,000**
	Corrosion Protection				
9	**Furnish and Install Anodes on Guide Piling**	38	EA	$ 1,500	$ 57,000
	Total Corrosion Protection:				**$ 57,000**
	Estimated Construction Cost				**$ 547,000**
	Contingency			(25%)	$ 137,000
	Opinion of Probable Construction Cost				**$ 684,000**
	Planning, Permitting, Design and Bid Documents			(10%)	$ 68,000
	Contract Administration, Construction Inspection & Other Indirect Costs			(5%)	$ 34,000
	Estimated Project Cost				**$ 786,000**

Note: All estimates are in 2015 USD and rounded to the nearest thousand dollars.

NORTH HARBOR
Opinion of Probable
Construction Cost (OPCC)

moffatt & nichol

Item No.	Description	Approx. Quantity	Unit	Unit Cost ($)	Extended Cost (Rounded)
1	**MOBILIZATION & DEMOBILIZATION**	1	LS	$ 500,000	$ 500,000
2	**CONSTRUCTION SURVEYING**	1	LS	$ 25,000	$ 25,000
	Skiff Float, Troller Float, and Launch Ramp				
3	**Demolish Skiff Float and Troller Float**	3,300	SF	$ 20	$ 66,000
4	**Replace Skiff Float**	1,700	SF	$ 187,000	$ 187,000
5	**Replace Troller Float**	1,600	SF	$ 160,000	$ 160,000
6	**New Skiff Float Gangway, 6'X80', ADA Compliant**	1	LS	$ 110,000	$ 110,000
7	**Modify Skiff Float Approach**	1	LS	$ 25,000	$ 25,000
8	**Life Rings, Fire Extinguishers, Ladders**	1	LS	$ 15,000	$ 15,000
9	**Re-install Guide Piling**	12	EA	$ 2,000	$ 24,000
10	**Install Anodes**	12	EA	$ 1,500	$ 18,000
11	**Demolish Existing Launch Ramp**	1	LS	$ 25,000	$ 25,000
	Total Skiff & Troller Floats, and Launch Ramp				**$ 630,000**
	Grid Dock				
12	**Demolish North and South Portions of Grid**	1	LS	$ 30,000	$ 30,000
13	**Install New Steel Grid Piles**	12	EA	$ 10,000	$ 120,000
14	**Install New Steel Grid Beams**	12	EA	$ 1,500	$ 18,000
15	**Install New Ladders**	2	EA	$ 7,500	$ 15,000
16	**Install New Fender Piles**	12	EA	$ 3,000	$ 36,000
17	**New Electrical Service to Grid**	1	LS	$ 25,000	$ 25,000
	Total Grid Dock:				**$ 244,000**
	Estimated Construction Cost				**$ 1,399,000**
	Contingency			(25%)	$ 350,000
	Opinion of Probable Construction Cost				**$ 1,749,000**
	Planning, Permitting, Design and Bid Documents			(10%)	$ 175,000
	Contract Administration, Construction Inspection & Other Indirect Costs			(5%)	$ 87,000
	Estimated Project Cost				**$ 2,011,000**

Note: All estimates are in 2015 USD and rounded to the nearest thousand dollars.

PAPKE'S LANDING
Opinion of Probable
Construction Cost (OPCC)

moffatt & nichol

Item No.	Description	Approx. Quantity	Unit	Unit Cost ($)	Extended Cost (Rounded)
1	**MOBILIZATION & DEMOBILIZATION**		LS	$ 250,000	$ 250,000
2	**CONSTRUCTION SURVEYING**	1	LS	$ 10,000	$ 10,000
	Float Replacement				
3	**Demolish Existing Float and Gangway**	1	LS	$ 50,000	$ 50,000
4	**Install new 10'x100' Float**	1	EA	$ 150,000	$ 150,000
5	**Install Gangway Landing Float**	1	EA	$ 40,000	$ 40,000
6	**Install New 80' Gangway**	1	LS	$ 110,000	$ 110,000
7	**Install Steel Piling**	10	EA	$ 10,000	$ 100,000
8	**Install Life Rings, Fire Extinguishers and Safey Ladders**	1	LS	$ 20,000	$ 20,000
	Total Float Replacement				**$ 470,000**
	Estimated Construction Cost				**$ 730,000**
	Contingency			(25%)	$ 183,000
	Opinion of Probable Construction Cost				**$ 913,000**
	Planning, Permitting, Design and Bid Documents			(10%)	$ 91,000
	Contract Administration, Construction Inspection & Other Indirect Costs			(5%)	$ 46,000
	Estimated Project Cost				**$ 1,050,000**

Note: All estimates are in 2015 USD and rounded to the nearest thousand dollars.

KUPREANOF
Opinion of Probable
Construction Cost (OPCC)

moffatt & nichol

Item No.	Description	Approx. Quantity	Unit	Unit Cost ($)	Extended Cost (Rounded)
1	**MOBILIZATION & DEMOBILIZATION**		LS	$ 250,000	$ 250,000
2	**CONSTRUCTION SURVEYING**	1	LS	$ 10,000	$ 10,000
	Float Replacement				
3	**Demolish Existing Float and Gangway**	1	LS	$ 50,000	$ 50,000
4	**Install new 10'x100' Float**	1	EA	$ 150,000	$ 150,000
5	**Install Gangway Landing Float**	1	EA	$ 40,000	$ 40,000
6	**Install New 80' Gangway**	1	LS	$ 110,000	$ 110,000
7	**Install Steel Float Piling**	8	EA	$ 10,000	$ 80,000
8	**Install Life Rings, Fire Extinguishers and Safey Ladders**	1	LS	$ 20,000	$ 20,000
				Total Float Replacement:	**$ 450,000**
	APPROACH				
8	**Demolish Existing Approach**	1	LS	$ 40,000	$ 40,000
9	**Install New Bearing Piles**	16	EA	$ 10,000	$ 160,000
10	**Install New Timber Framing**	1	LS	$ 40,000	$ 40,000
11	**Install New Abutment**	1	LS	$ 20,000	$ 20,000
				Total Approach	**$ 260,000**
				Estimated Construction Cost	**$ 970,000**
				Contingency (25%)	$ 243,000
				Opinion of Probable Construction Cost	**$ 1,213,000**
				Planning, Permitting, Design and Bid Documents (10%)	$ 121,000
				Contract Administration, Construction Inspection & Other Indirect Costs (5%)	$ 61,000
				Estimated Project Cost	**$ 1,395,000**

Note: All estimates are in 2015 USD and rounded to the nearest thousand dollars.

Appendix D

Operations and Maintenance

Recommendations

Borough of Petersburg, AK
Harbor Dock and Float Facilities

Operations and Maintenance Guide

General

Regular maintenance and repair of worn or damaged materials is advised to help extend the useful life of the dock or float. This guide outlines some basic operational and maintenance issues, and describes inspection intervals, that should be observed during the course of normal use under design conditions. These recommendations do not include every possible maintenance scenario, but provide a reasonable basis for a regular operation and maintenance plan. Unforeseen events such as earthquakes, flooding, vessel or ice impacts, improper use, etc. could cause damage to the dock. It is recommended the dock be inspected after such events occur.

Fixed Dock and Float Decking

Operational Issues:

- Sweep wood and concrete decking monthly to remove gravel and debris. Gravel tracked onto the deck accelerates wear of the decking.
- If necessary, remove Snow and Ice prior to use of facility in the spring. Care should be exercised during snow and ice removal. The use of metal-edged blades or tire chains on snow removal equipment can severely damage the timber deck.

Maintenance Issues:

- Light pressure washing is recommended to remove debris and mildew, as required. Use of a spray nozzle tip of 40-degree spray angle is recommended, and caution must be taken to maintain a safe distance between the spray tip and the work surface.
- Inspect for and Replace any deck planks experiencing unusual wear or abrasion. Recommend replacement if damage or crack penetrates the plank deeper than ½".
- Inspect for loose or missing deck fasteners, secure or replace as necessary.

Inspection Intervals:

- Annually

Fender Systems

Operational Issues:

- Avoid securing vessels directly to the rubber fender elements, or chains and other hardware.

Maintenance Issues:

- Visually inspect for signs of damage, especially vessel impact and abrasion.
- Visually inspect pile tops for cracking, splitting and rot. Remove any marine growth/debris from pile tops.

Fender Systems (cont.)

- Visually inspect rubber fender elements for cracking, inspect all mounting hardware for tightness and missing nuts/bolts.

Inspection Intervals:
- Annually

Gangways and Floats

Operational Issues:
- Lubricate Gangway sliding skids with water-resistant material on an as-needed basis to reduce friction wear and mitigate binding.

Maintenance Issues:
- Visually inspect for coating damage on the steel members.
- Visually inspect for damaged, loose or missing connection hardware at each end of the gangway or float unit attachments.

Inspection Intervals:
- Annually

Pile Bents

Operational Issues:
- None

Maintenance Issues:
- For wood, inspect for any significant spilling, cracking or checking. Not any conditions which have worsened since the last inspection. For steel, visually inspect for coating damage or failure.
- Visually inspect for obvious pile jacking, particularly on piles that have a history of jacking. To measure the magnitude of jacking, use a string line between adjacent non-jacked piles. The string line should be held at the pile tops of the adjacent piles and pulled tight. The difference can then be measured at the jacked pile(s)
- Visually inspect for obvious damage to piles and caps.

Inspection Intervals:
- Annually

Bullrails and Cleats

Operational Issues:
- Do not secure chain or wire rope directly to steel bull rails or cleats; only approved mooring lines and other appropriate hardware.

Bullrails and Cleats (cont.)

Maintenance Issues:

- Light pressure washing of the bullrail is recommended to remove any debris, mildew, or plant growth.
- Visually inspect for bolts tightness and missing nuts/washers. Tighten and replace if necessary.
- Visually inspect for damage to galvanized coating on bullrail and cleats. Damage may be repaired with careful application of either a hot-melt galvanizing product or a zinc-rich cold galvanizing compound. Prepare the damaged area per product recommendations.
- Visually inspect for damaged or rotted bullrail sections. Note that cracking and checking is common in large treated timbers. Severely cracked/checked sections may be replaced.

Inspection Intervals:

- Annually

Ladders

Operational Issues:

- Do not allow vessels to tie off directly to the ladders.

Maintenance Issues:

- Inspect for tightness of mounting bolts. Replace any missing bolts/nuts.
- Inspect for damage from ice or vessel impact. Replace damaged ladders.
- Inspect for damage to galvanized coating. Repair as above.

Inspection Intervals:

- Annually

Engineering Structural Inspection

- It is recommended that the city hire a consultant engineer to inspect the dock every 5 years, or immediately when structural damage is expected to have occurred.

Appendix E

Scow Bay Photo Log

N

moffatt & nichol

SCOW BAY

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PREPARED FOR: PETERSBURG BOROUGH

DATE: 11/17/15


A
4x4


B


C


D


E


F
EZ LOADER


G
Eric
26006

H

J


K


L


NO LANDING
CRAFTS OR
BARGES OVER 40'
AT LAUNCH RAMP


NO LANDING
CRAFTS OR
BARGES OVER 40'
AT LAUNCH RAMP


SCOW BAY LAUNCH RAMP
PERMIT LAUNCHING ONLY
YEARLY / ONE TIME LAUNCH PERMITS
AVAILABLE AT HARBORMASTER OFFICE
PERMITTED TRAILER PARKING ONLY
NO STORAGE OF BOATS ON TRAILERS
THANK YOU
PLEASE! HELP KEEP THIS RAMP OPEN FOR ALL TO USE. BECAUSE OF THE SHALLOW SLOPE OF THE RAMP, PROP AND JET WASH WHILE POWERING ON/OFF A TRAILOR ERODES COSTLY GRAVEL PLACED BY VOLUNTEERS IN JUST A FEW SECONDS. PLEASE DON'T BLOW IT AWAY.