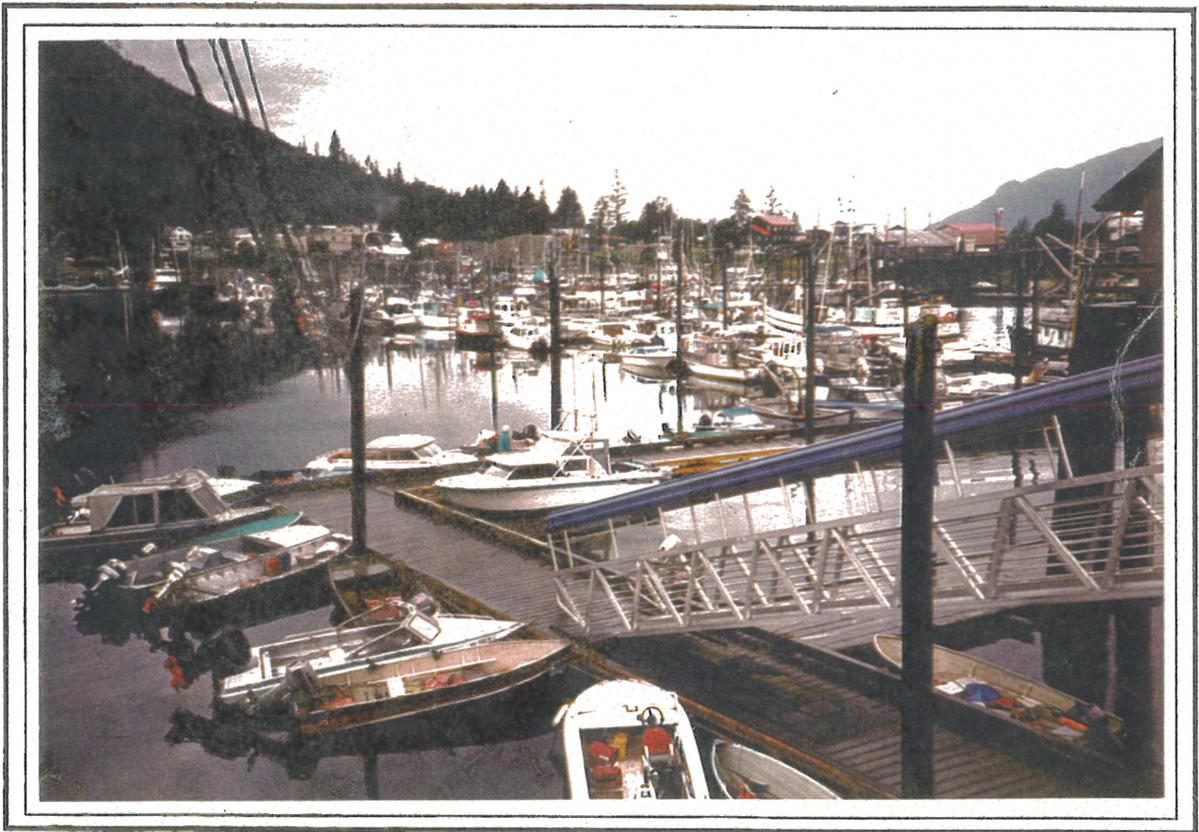


**CITY OF WRANGELL
HARBOR CONDITION STUDY
OF
RELIANCE HARBOR
INNER HARBOR
STANDARD OIL FLOAT
FISH & GAME FLOAT**



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1994

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1.0 INTRODUCTION

The City of Wrangell lies in the Panhandle region of Southeast Alaska. This study was developed for the City of Wrangell as a guide to the general condition of their existing harbor facilities, an integral part of the local economy. The harbor facilities studied are Reliance Harbor, Inner Harbor, the Standard Oil Float and the Fish and Game Float, located in close proximity to the downtown area.

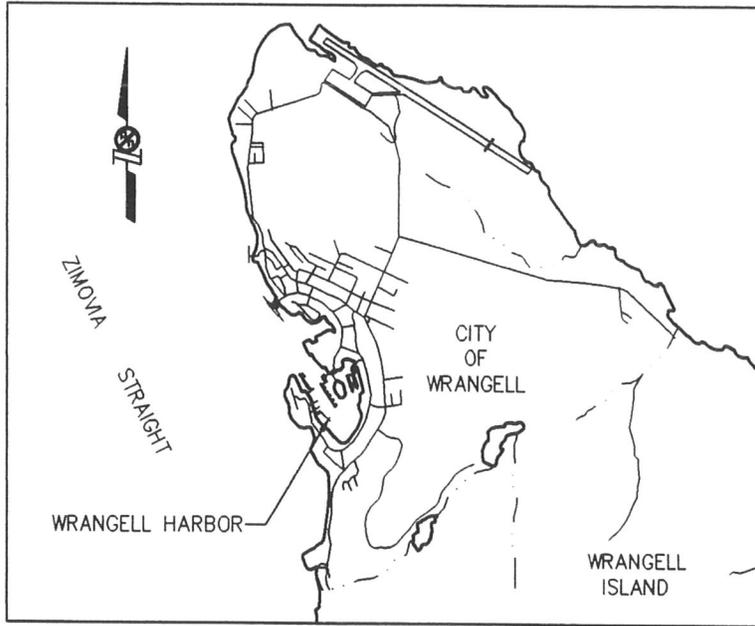
Wrangell Harbors are owned by the State of Alaska and operated by the City of Wrangell. The current trend across the State is to transfer responsibility for small boat harbors over to the local communities. Wrangell, therefore, has an interest in assessing the existing condition of the harbor facilities and the costs associated with upgrading them to current standards and like new conditions.

2.0 ORGANIZATION AND SCOPE OF WORK

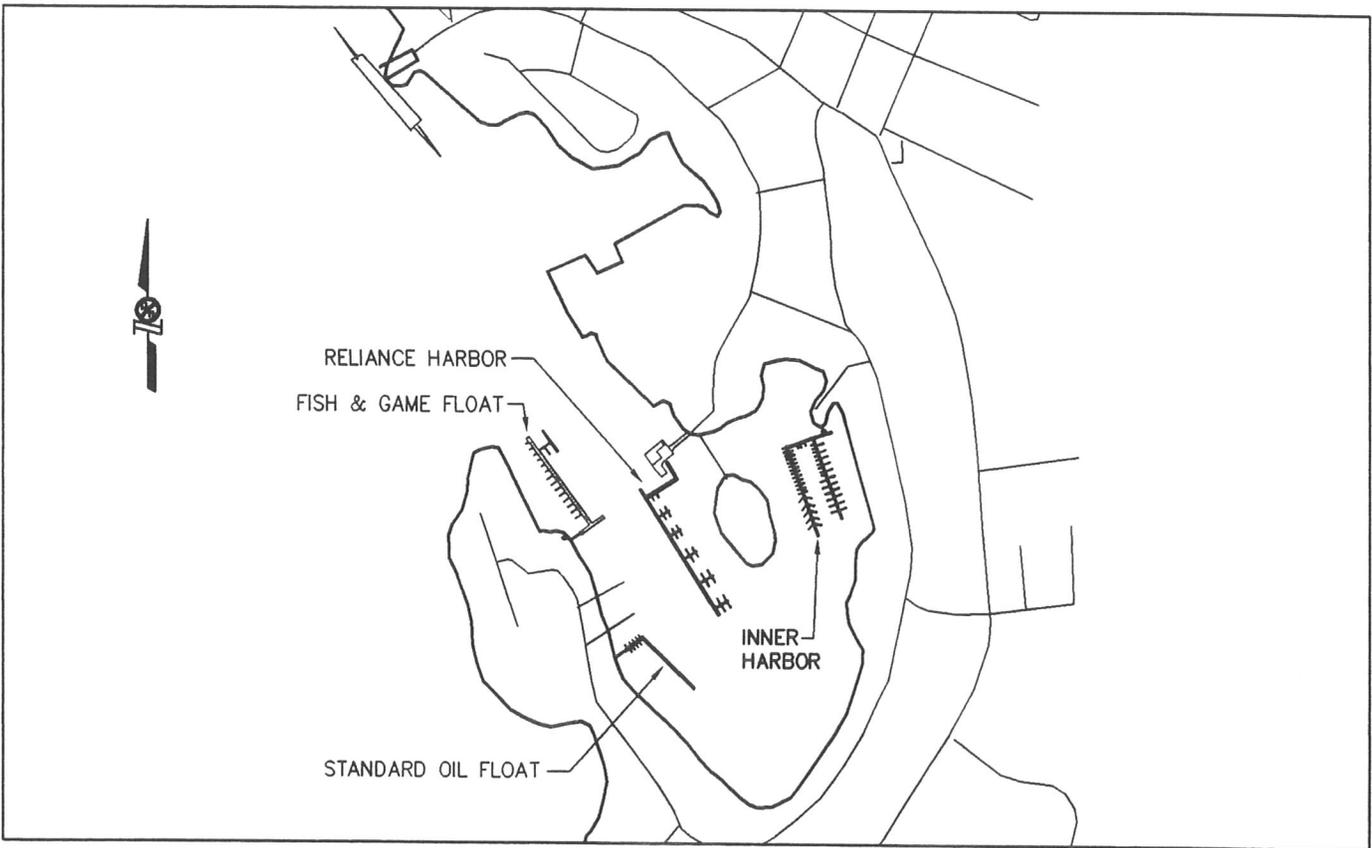
This report focuses mainly on the general condition of the existing harbor systems. This includes all floats, gangways, and approach docks in Reliance Harbor, Inner Harbor and the Fish and Game and Standard Oil floats.

In general, only a visual inspection was performed with limited non-destructive testing using a sharp instrument to check for wood rot. No decking was removed to check the float sub-structure, although the upper stringers were checked periodically through gaps in the decking. No borings were taken in the timber piles. Photographs were taken during the inspection and are included in this report.

This study describes actual damage that occurs most frequently with these facilities and which of these structures exhibit damage. The float/finger identification scheme used in this study corresponds to that currently employed by the Harbormaster so there will be no confusion as to which structure is being referred to. A repair/replacement item summary table for each harbor is included at the end of each section.



VICINITY MAP



WRANGELL HARBOR

**CITY OF WRANGELL
HARBOR CONDITION STUDY**



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**WRANGELL HARBOR
VICINITY MAPS**

**SHEET
1 of 1**

GRAPHIC DESIGN STUDIO AREA TIME

3.0 RELIANCE HARBOR

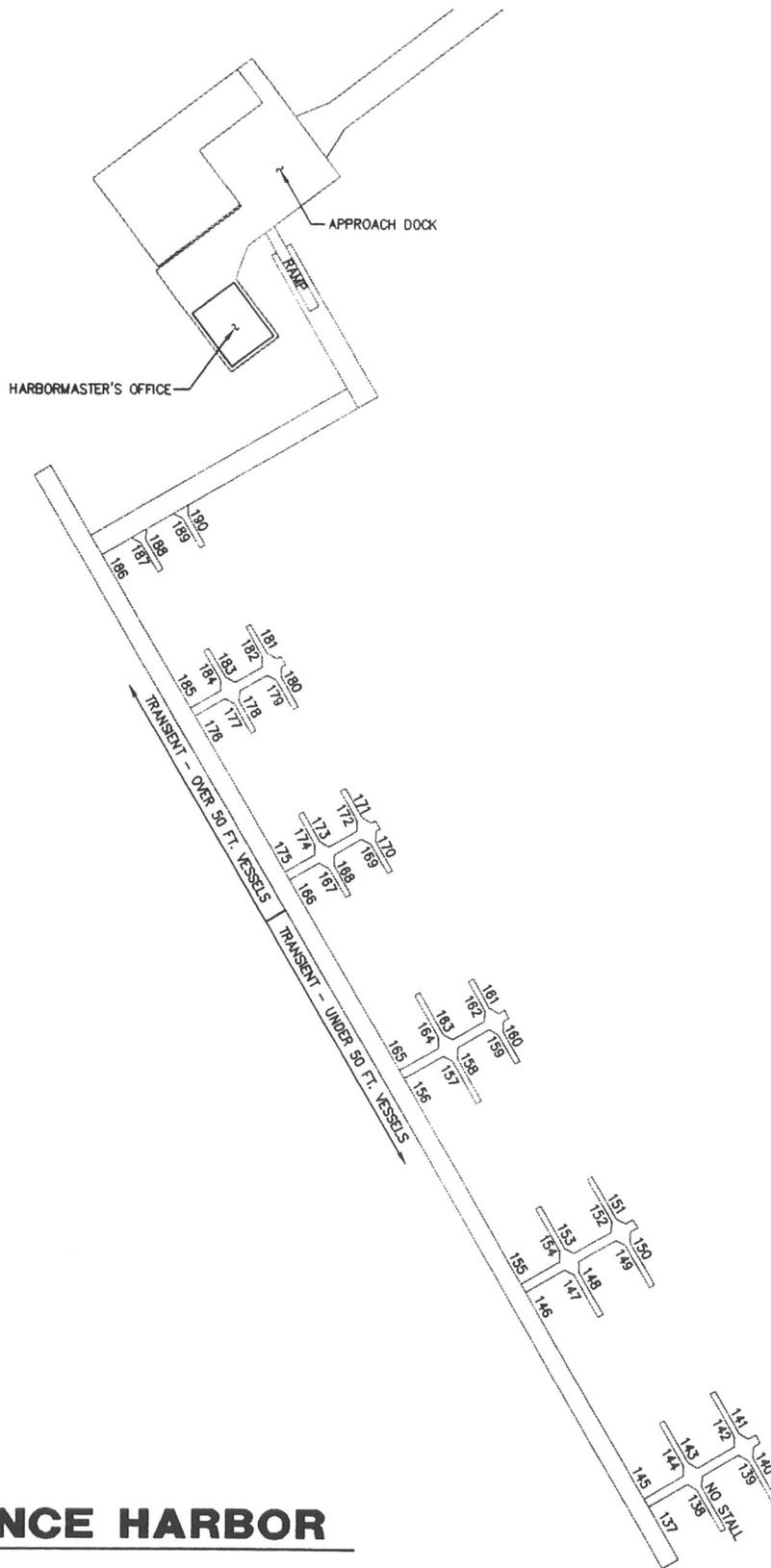
Reliance harbor was originally built using all timber construction. The float system consists of 2 main floats, constructed in 1962, and 5 finger floats and 22 stall floats constructed in 1975. An electrical system was added in 1977 (Photo 3.1).



Photo 3.1 - Reliance Harbor

3.1 Condition Summary

Overall, the floats in this harbor are in fair to good condition. The main floats are relatively old (34 years) and exhibit the usual wear and tear associated with long term use. Additionally, some design details we find standard today were not considered at the time these floats were designed. A few timber members show some minor rot and algae growth, evidence that the timber pressure treatment is nearing it's service life. Timber piles appear to be in good condition. We recommend that the City of Wrangell have a qualified electrical engineer perform a condition survey/inspection of the existing electrical utility provided to this float system.



RELIANCE HARBOR

3.2 Float Structure

The timber in these floats is in fair condition. Although only a few locations exhibit mild rot, this is evidence that the timber pressure treatment has reached or exceeded its service life. As stated previously, none of the decking was removed in order to thoroughly inspect all of the float sub-structure. Many sections of the outer rubstrip have been damaged and should be replaced with similar material to prevent critical structural members and bolts from being damaged by vessel contact, as well as preventing damage to vessels from contact with these items. Even after many years in service, the timber decking is in fair condition except for one location where some cracking and rot were observed.

3.3 Floatation

The floatation in this harbor is in good condition. One float unit does not have adequate floatation. This is the main float at the North end of the harbor behind the gangway landing area. It appears that a sewer pump out station has been installed on the back edge of this float beneath the gangway with no additional floatation added to the float substructure. This is causing a list in this float which is loading the structure unnecessarily. Additional floatation should be added to this area to prevent structural damage that will require repair.

3.4 Float Anchoring

In general, the timber anchor piles in Reliance Harbor appear to be in fair condition. Separation of the outer annular rings, evidence of marine borer invasion, is appearing in many of the anchor piles. No core samples were taken to determine this, but rot or deterioration was not found in these areas. An underwater inspection was not performed on these piles, which could reveal problems not observed at higher levels. Two steel pile hoops should be replaced because the galvanizing has been consumed and is no longer providing any corrosion protection. Otherwise, the pile hoops are in good condition. In two locations with steel piling, the steel pile hoops have no abrasion-resistant lining to prevent the galvanizing from wearing off the hoop and pile. These hoops should be lined with some type of abrasion resistant material to prevent this from occurring.

Except for one location, the timber pile block-outs in these floats are in good condition. The iron bark wear courses were in good shape considering their time in service (Photo 3.2). The one blockout that is damaged should be repaired accordingly to prevent the pile from wearing into adjacent structural members.

3.5 Float-to-Float Connections

Overall, the Float-to-Float Connections are in good condition. The connections between the float units are hinged connections with steel through bolts as the hinge. Over time, the galvanizing is consumed from these bolts, the bolts begin to wear and corrode, the bolt

holes elongate and the effective bolt cross-sectional area is reduced. Although the connections are still “working”, the bolts should be replaced to extend the serviceable life of the float system. Also, transition plates should be installed between the float units. This is a design detail incorporated into most modern designs and provides a safer harbor environment.

3.6 Bullrail and Cleats

The bullrail and cleats in this harbor are in good condition. One or two areas of bullrail are worn from many years of service, but are still sound (Photo 3.3). There are some bullrail supports missing as well. In these areas with substantial wear, the bullrail has worn enough to allow the vessels to make contact with the dock structure. These areas should be repaired to prevent further damage to the float structure.



Photo 3.2 - Timber Pile Blockout



Photo 3.3 - Bullrail Wear

3.7 Gangway

The Reliance Harbor gangway is a new aluminum gangway and is in good condition (Photo 3.1). The top hinge connection is not galvanized and should be replaced. The gangway guide rail on the gangway landing float should be adjusted so that the gangway lands squarely on the rail. This will prevent the gangway rails from wearing excessively. These rails should be lubricated with waterproof grease twice a year in order to prevent unnecessary wear. A transition plate should be provided at the base of the gangway as well for safety reasons.

3.8 Utilities

The water system on this dock seems to be in good operating condition, although it was not tested during below freezing conditions. The electrical system appeared to be in good operating condition as well. This system should be inspected by a qualified electrical engineer to determine it's actual condition. Some of the electrical panels were rusted through and allowing water to come into contact with electrical components (Photo 3.4). These should be replaced.

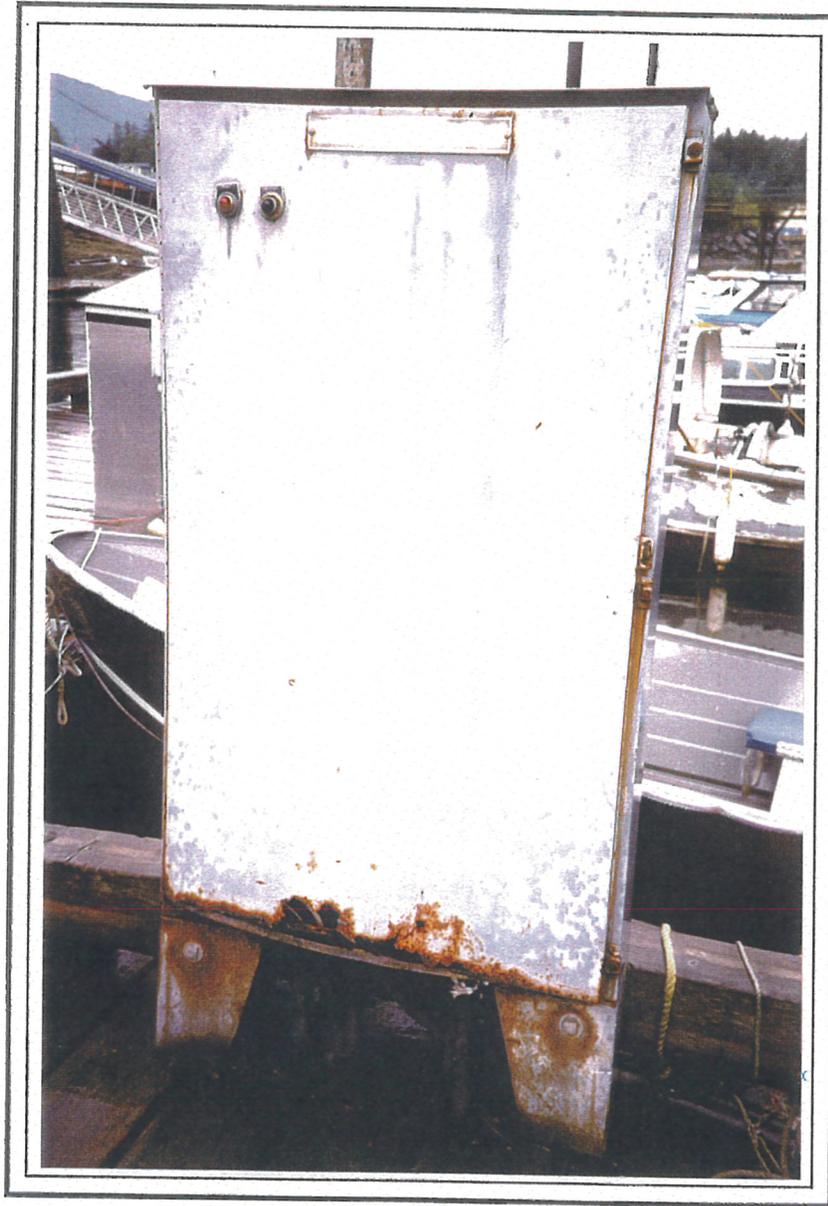


Photo 3.4 - Damaged Electrical Panel

3.9 Fire Safety

Reliance Harbor does not meet the requirements of the 1994 Uniform Fire Code. The 1994 UFC, Appendix IIC, Section 6, states that portions of floats more than 250 ft from fire apparatus access and marine motor vehicle fuel-dispensing stations shall be provided with an approved dry standpipe system. One fire extinguisher having a minimum rating of 2A, 20-B:C, shall be provided at each required hose station.

Fire protection systems on recently constructed State facilities in Southeast Alaska consist of standpipes with a 200 ft of hose and a fire extinguisher installed approximately every 150 ft. This is to ensure that all portions of the float system can be reached with a fire hose. To meet 1994 UFC requirements, dry standpipes and additional fire extinguishers should be added to this harbor.

3.10 Conclusions and Recommendations

Reliance Harbor, although in good condition, was originally constructed in 1962 and is now approximately 35 years old. Repairs that need to be made at this time are minor, but as time progresses they will become more extensive. Although repairs can be done to fix all of the apparent problems, the repaired facility is not a new facility. The design life is still the same as when it was originally constructed.

The construction repair cost estimate is approximately 3% of the replacement cost estimate of this harbor. Since this is a fairly low percentage, we recommend that this harbor system be considered for replacement in 10 to 15 years, or when the repair and maintenance costs equal roughly 10% of the replacement cost.

3.11 Reliance Harbor Repair Cost Estimate

<u>ITEM</u>	<u>LOCATION</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>AMOUNT</u>
Mobilization		L.S.	\$ 3,900	\$ 3,900
3.2 Float Structure				
2X10 Rubstrip	Stall 139	150 lf	\$ 5	\$ 750
	Stall 145			
	Opposite 155,146			
	Stall 169			
	Stall 179			
	Stall 181			
	Opposite 186			
	Stall 188			
	Stall 190			
2X10 Decking	Stall 137	20 lf	\$ 5	\$ 100
	Stall 179			
6X8 Exterior Stringer	Opposite 186	22 lf	\$ 15	\$ 330
3.3 Flotation				
Flotation Billet	Sewer Pumpout	5 approx.	\$ 200	\$ 1,000
3.4 Float Anchoring				
Timber Pile Blockout	Stall 156	1 ea.	\$ 200	\$ 200
Steel Pile Hoop	Stall 140	2 ea.	\$ 350	\$ 700
	Stall 150			
HDPE Pile Hoop Liner	Stall 158	3 ea.	\$ 150	\$ 450
	Stall 160			
	Stall 161			
Steel Pile & Hoop, Repair Galv.	Stall 158	3 ea.	\$ 500	\$ 1,500
	Stall 160			
	Stall 161			
3.5 Float-to-Float Connections				
Replace Bolts	All Connections	7 ea.	\$ 50	\$ 350
Transition Plate	All Connections	7 ea.	\$ 250	\$ 1,750
3.6 Bullrail and Cleats				
8X8 Bullrail	Stall 137	12 lf	\$ 15	\$ 180
4X8 Scupper Block	Opposite 188	2 ea.	\$ 30	\$ 60
3.7 Gangway				
Top Hinge Connection	Top Gangway	1 ea.	\$ 7,000	\$ 7,000
Transition Plate	Bottom Gangway	1 ea.	\$ 500	\$ 500
Adjust Guide Rail	Gangway Landing	1 ea.	\$ 50	\$ 50
3.8 Utilities				
Replace Electrical Box	Stall 186	1 ea.	\$ 2,500	\$ 2,500
3.9 Fire Safety				
Fire Extinguisher, 100' Hose w/ Cabinet (installed)	Main Floats	8 ea.	\$ 1,000	\$ 8,000
Signs	Existing Fire Extinguisher	3 ea.	\$ 50	\$ 150
Standpipes (installed)	All locations	11 ea.	\$ 500	\$ 5,500
15% Construction Contingency				\$ 4,400
<i>Estimated Repair Costs</i>				\$ 39,000

3.12 Reliance Harbor Replacement Cost Estimate

DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Mobilization	L.S.	All Req'd	\$ 100,000	\$ 100,000
Concrete Floats	SF	13635	\$ 38	\$ 518,130
Float Piles	EA	40	\$ 6,000	\$ 240,000
Utilities	SF	13635	\$ 18	\$ 245,430
Construction Sub-Total				\$ 1,100,000
15% Construction Contingency				\$ 170,000
Construction Total				\$ 1,270,000
Design				\$ 70,000
Contract Administration				\$ 60,000
City Administration				\$ 110,000
Total Estimated Replacement Cost				\$ 1,510,000

4.0 INNER HARBOR

The Inner Harbor main float system was originally a log stringer float system constructed in 1936. These floats were replaced in 1958 or 1959. Some additional floatation was added in 1962, and the approach dock, gangway and parking area were relocated to the opposite side of the harbor in 1973. In 1980 some finger floats and an electrical system were added and dredging was performed. Additional maintenance dredging was performed in 1994.

4.1 Condition Summary

The Inner Harbor float system is in good condition (Photo 4.1). Similar to Reliance Harbor, the main floats are relatively old (37 years) and exhibit the usual wear and tear associated with long term use. The location of the float system away from any kind of wave action has contributed significantly to it's longevity. However, some design details we find standard today were not considered at the time these floats were designed and therefore they are not up to "standard" in that respect.

Additionally, we recommend that the City of Wrangell have a qualified electrical engineer perform a condition survey/inspection of the existing electrical utility provided to this float system.

4.2 Float Structure

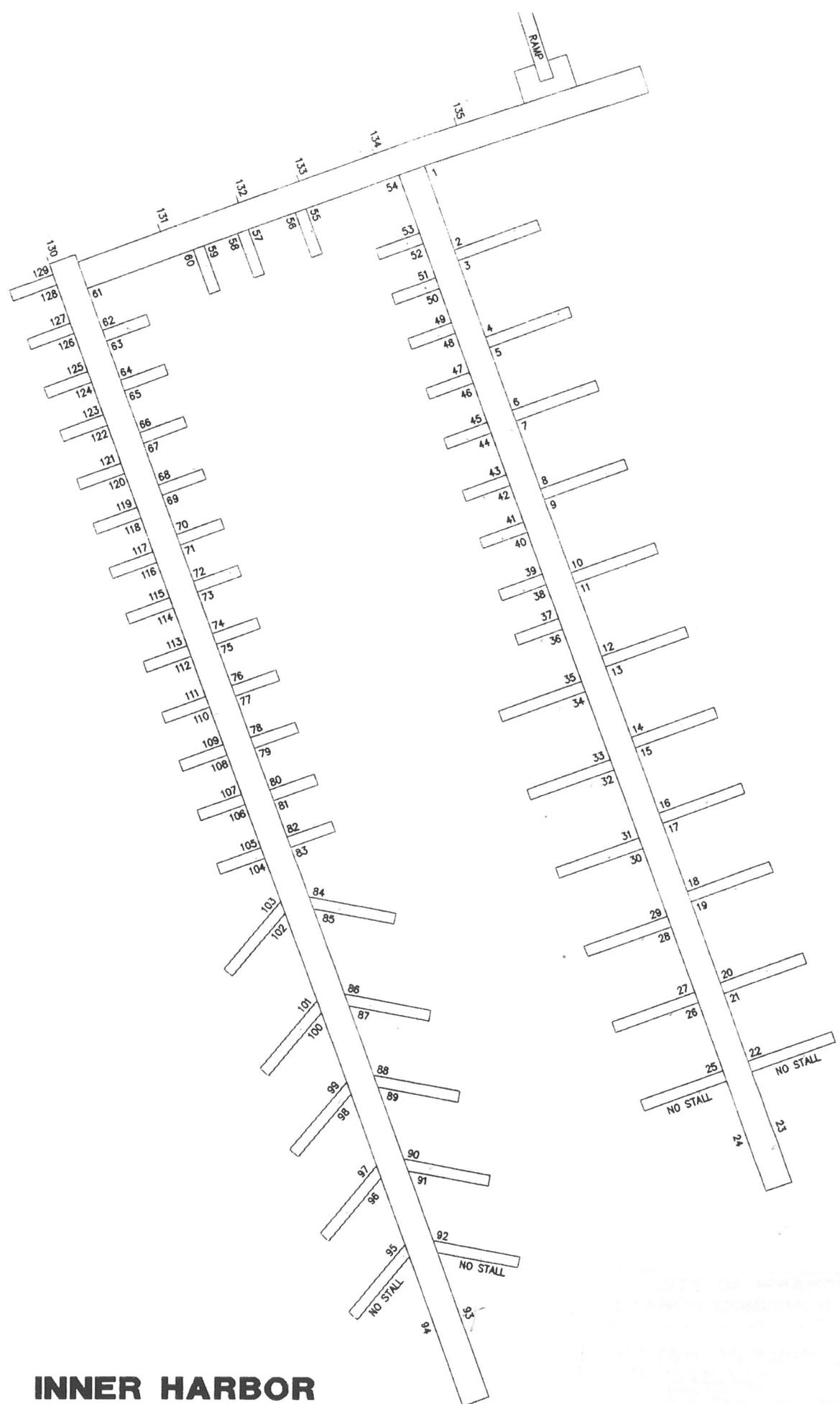
The float structure itself is in good condition. There are some segments of rubstrip that should be replaced as well as one piece of decking and one short stringer segment. The timber pressure treatment has neared its service life, but no substantial deterioration was observed. As stated before, none of the decking was removed to further inspect the float sub-structure.

4.3 Floatation

The floatation in this harbor is in good condition except for the gangway landing float. This float does not have adequate floatation to support the loads from the steel gangway and still maintain a level freeboard. This un-even freeboard subjects the float to float connection between the landing float and the main float to excessive loads, most likely beyond the loading they were originally designed for. Additional floatation should be added to the underside of this float to prevent any damage that might occur to this connection.

4.4 Float Anchoring

Except for one pile, all of the timber piles in Inner Harbor appear to be in good condition. However, as in Reliance Harbor, the piles were not inspected over the entire tidal range



INNER HARBOR

nor were core samples taken. One pile has some evidence of rot occurring and should be considered for replacement in another ten years or so. In one location with a steel pile, the steel pile hoop has no abrasion-resistant lining to prevent the galvanizing from wearing off the hoop and pile. This hoop has to be lined with some type of abrasion resistant material to prevent this from occurring. For a thorough repair beyond adding abrasion resistant material to the hoop, the pile and hoop should be spray metalized to repair the galvanizing that has worn away.

One timber pile blockout is missing interior rubstrips. These should be replaced to prevent the pile from wearing into adjacent structural members.

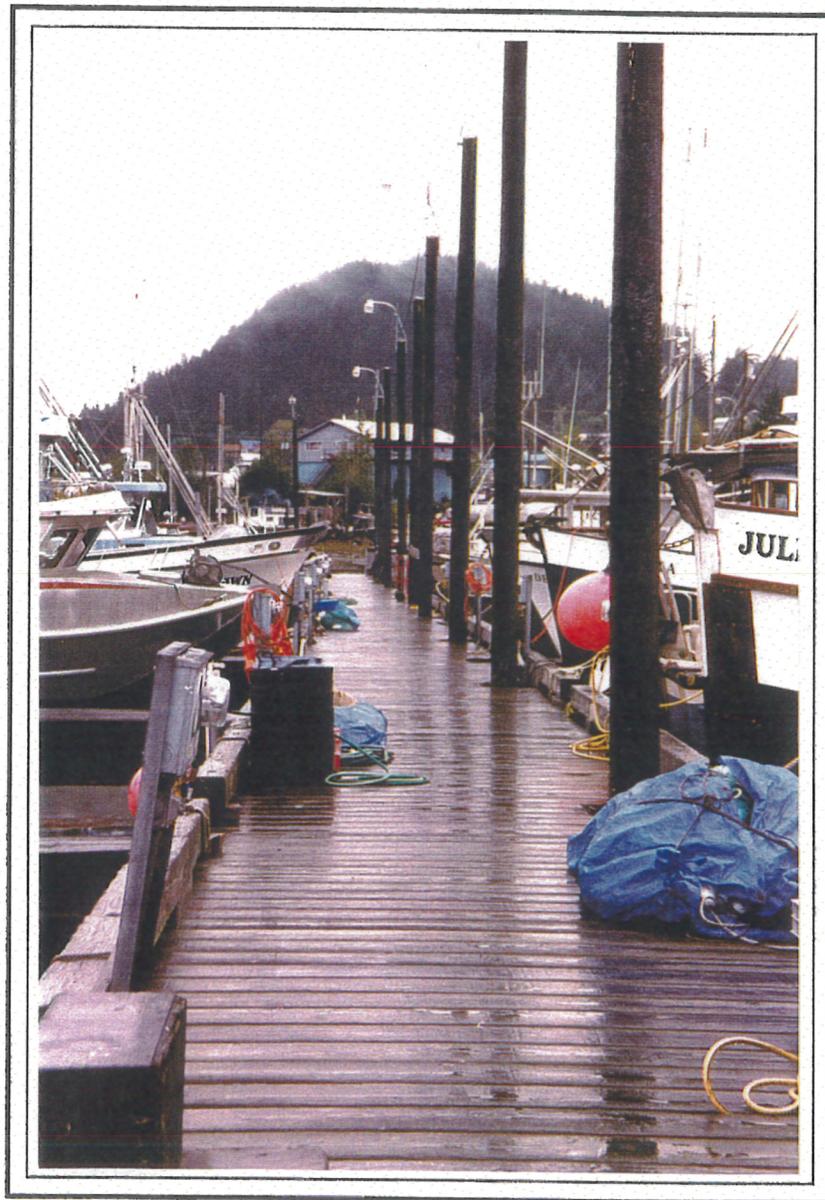


Photo 4.1 - Inner Harbor

4.5 Float-to-Float Connections

All of the float to float connections in this harbor are in good condition and do not require repair or replacement.

4.6 Bullrail and Cleats

Some of the bullrail in this harbor is deteriorated from the usual wear and tear of mooring lines, but the timber is still sound. Overall, the bullrail and cleats in this harbor are in good condition and do not require repair or replacement.

4.7 Approach Dock and Gangway

The approach dock that connects the parking area with the gangway and float system is in fair condition. Several cross bracing members are broken in the dock sub-structure (Photo 4.2) and an adjacent drainage stream is undermining a support pile (Photo 4.3). This cross bracing should be replaced and a small amount of rip-rap fill should be added to the drainage side of the approach dock to prevent the flow from further undermining the support pile. The timber backwall is damaged (Photo 4.4). The gangway needs a transition plate at the bottom to eliminate a tripping point. Also, handrail extensions should be installed at the top of the gangway for safety reasons.

4.8 Utilities

The power line that leads from the approach dock to the main float is connected to the gangway with some small rope line (Photo 4.5). This method does not meet any type of code or standard for construction. This power supply should be attached to the gangway in a more secure manner. In addition, the overall electrical system should be inspected by a qualified electrical engineer.

The water system seems to be in good working order, although it was not tested in below freezing conditions.

4.9 Fire Safety

Inner Harbor does not meet the requirements of the 1994 Uniform Fire Code. The 1994 UFC, Appendix IIC, Section 6, states that portions of floats more than 250 ft from fire apparatus access and marine motor vehicle fuel-dispensing stations shall be provided with an approved dry standpipe system. One fire extinguisher having a minimum rating of 2A, 20-B:C, shall be provided at each required hose station.

Fire protection systems on recently constructed State facilities in Southeast Alaska consist of standpipes with a 200 ft of hose and a fire extinguisher installed approximately every 150 feet. This is to ensure that all portions of the float system can be reached with a fire

hose. To meet 1994 UFC requirements, dry standpipes and additional fire extinguishers should be added to this harbor.

As in Reliance Harbor, the four fire stations should be labeled with large red lettering that is visible from all sides including the water.

4.10 Conclusions and Recommendations

Inner Harbor, although in good condition, was originally constructed in 1958 or 1959 and is now approximately 38 years old. As with Reliance Harbor, repairs that need to be made at this time are minor, but as time progresses they will become more extensive. Although repairs can be done to fix all of the apparent problems, the repaired facility is by no means a new facility. The intended design life span is still the same as was originally intended. Timber float systems can be expected to last from 40 to 50 years, depending on the type of service and environmental conditions they are subjected to.

The construction repair cost estimate is approximately 1% of the replacement cost of these floats. Since this is such a low percentage, we recommend that these floats be considered for replacement in 10 to 15 years or when maintenance costs compared with the replacement costs reach approximately 10%.

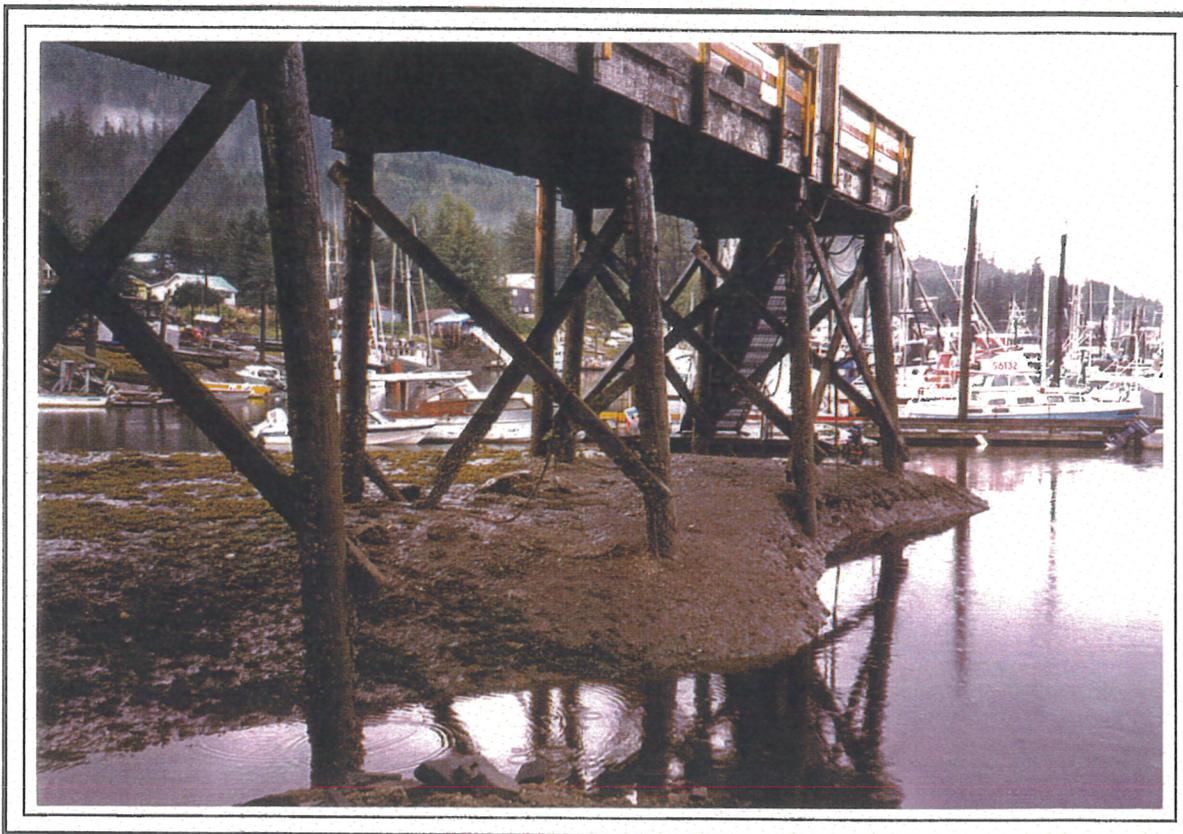


Photo 4.2 - Damaged Cross Bracing

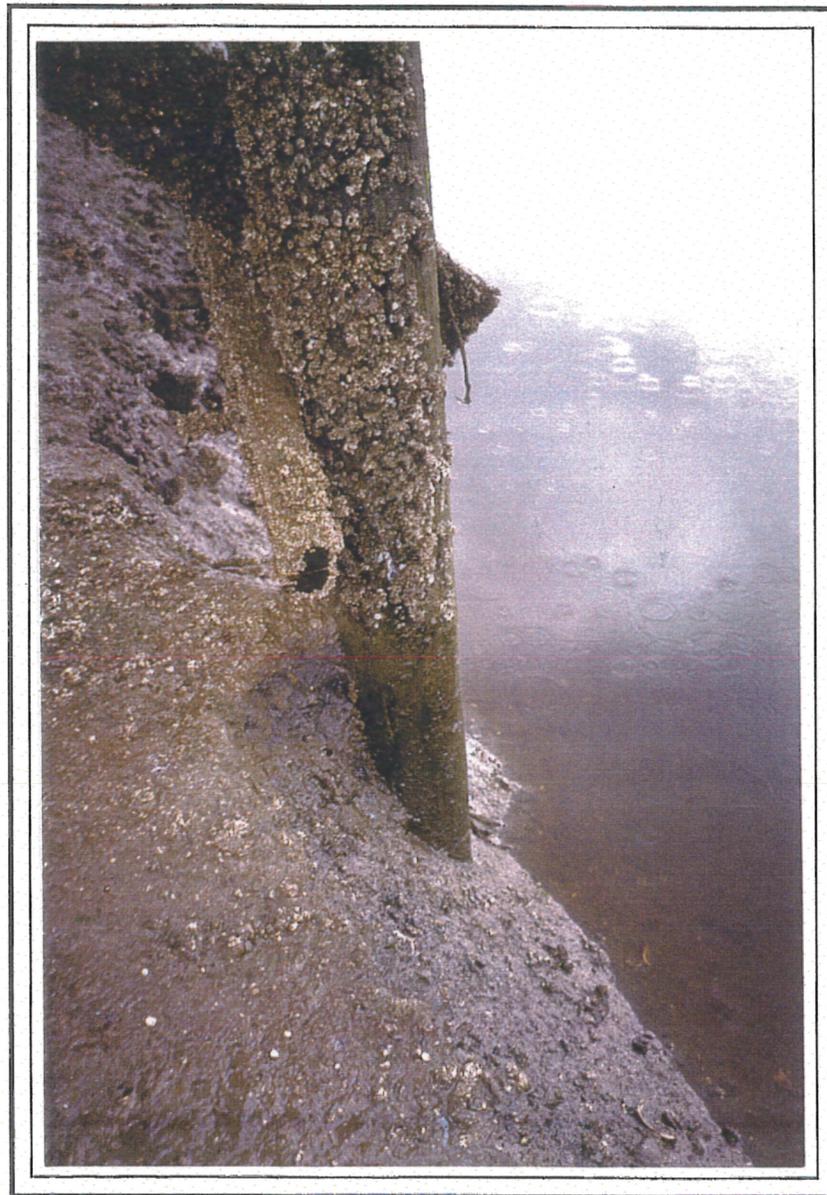


Photo 4.3 - Undermined Support Pile



Photo 4.4 - Backwall Damage

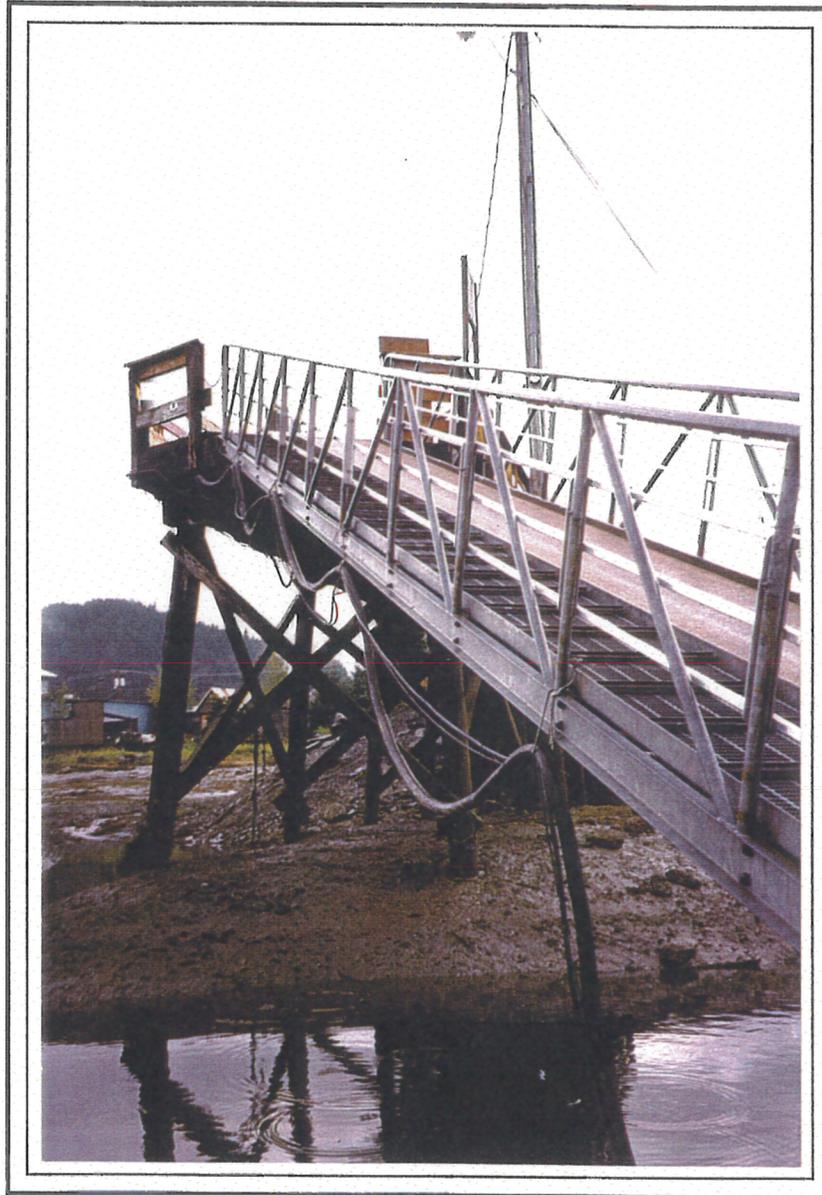


Photo 4.5 - Insecure Powerline Attachment

4.11 Inner Harbor Repair Cost Estimate

<u>ITEM</u>	<u>LOCATION</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>AMOUNT</u>
Mobilization		L.S.	\$ 1,700	\$ 1,700
4.2 Float Structure				
2X10 Rubstrip	Finger 10,11 Finger 24,25	50 lf	\$ 5	\$ 250
2X10 Decking	Finger 52,53	50 lf	\$ 5	\$ 250
6X8 Stringer	Finger 24,25	32 lf	\$ 15	\$ 480
4X8 Stringer	Finger 26,27 Finger 24,25	8 lf	\$ 15	\$ 120
4.3 Flotation				
Flotation Billet	Gangway Landing	3 approx	\$ 200	\$ 600
4.4 Float Anchoring				
Timber Pile Blockout	Finger 94,95	1 ea.	\$ 200	\$ 200
HDPE Pile Hoop Liner	Stall 135	1 ea.	\$ 150	\$ 150
Steel Pile & Hoop, Repair Galv.	Stall 135	1 ea.	\$ 500	\$ 500
4.7 Approach Dock & Gangway				
4X12 Plank	Abutment	8 lf	\$ 20	\$ 160
3X8 Cross Bracing & Bolts	Bent 1 Bent 3	48 lf	\$ 7	\$ 336
Rip-Rap Slope Protection	Bent 4	10 cy	\$ 50	\$ 500
Gangway Transition Plate	Gangway Landing	1 ea.	\$ 500	\$ 500
Gangway Handrail Extension	Top Gangway	1 ea.	\$ 250	\$ 250
4.8 Utilities				
Powerline Hangers	Gangway	5 approx	\$ 200	\$ 1,000
4.9 Fire Safety				
Fire Extinguishers, 100' Hose w/ Cabinet (installed)	Main Floats	4 ea.	\$ 1,000	\$ 4,000
Signs	Existing Fire Extinguishe	4 ea.	\$ 50	\$ 200
Standpipes (installed)	All locations	8 ea.	\$ 500	\$ 4,000
15% Construction Contingency				\$ 2,000
<i>Estimated Repair Costs</i>				\$ 17,000

4.12 Inner Harbor Replacement Cost Estimate

DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Mobilization	L.S.	All Req'd	\$ 111,000	\$ 111,000
Concrete Floats	SF	15450	\$ 38	\$ 587,100
Float Piles	EA	40	\$ 6,000	\$ 240,000
Utilities	SF	15450	\$ 18	\$ 278,100
Construction Sub-Total				\$ 1,220,000
15% Construction Contingency				\$ 180,000
Construction Total				\$ 1,400,000
Design				\$ 70,000
Contract Administration				\$ 60,000
City Administration				\$ 120,000
Total Estimated Replacement Cost				\$ 1,650,000

5.0 STANDARD OIL FLOAT

The Standard Oil Float was constructed in 1962 to replace an existing log float system. The harbor received a new electrical system in 1985, a new gangway in 1988, and some new finger floats in 1995. All of these floats are timber construction (Photo 5.1).

5.1 Condition Summary

The Standard Oil float is in fair condition. A good portion of the timber in the original floats has advanced algae growth and weathering (Photo 5.2). The decking and bullrails are checked and cracked in many places, and the timber pile blockouts in the original floats need rehabilitation. This is evidence that the timber pressure treatment has met or exceeded its design life.

Two thirds of the new stall floats that were recently installed on the outside of the main float all have deteriorated floatation.

We recommend that the City of Wrangell have a qualified electrical engineer perform a condition survey/inspection of the existing electrical utility provided to this float system.

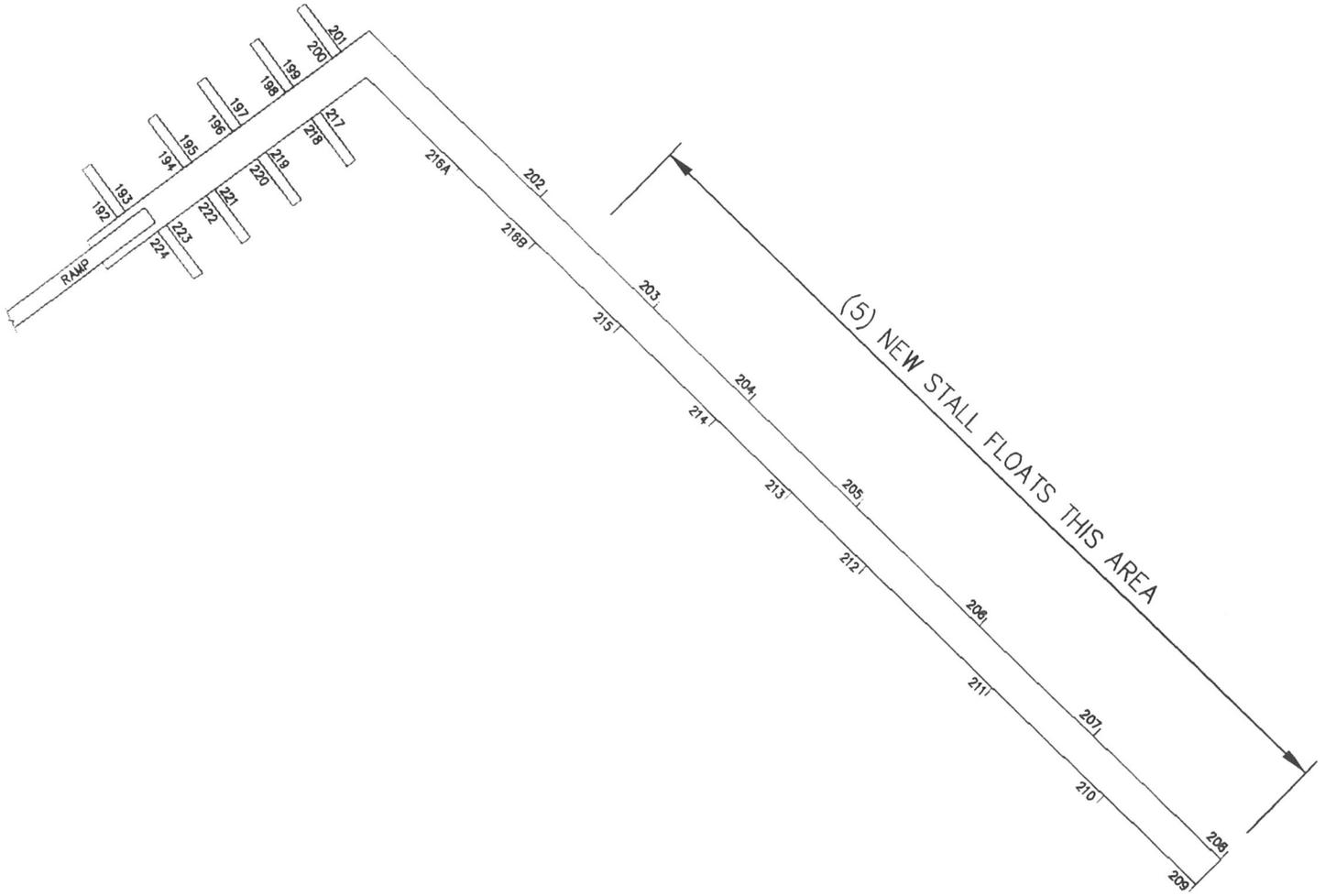
5.2 Float Structure

The pressure treatment on most of the timber members in this float system has exceeded its design life. The wood is rotten in places and the decking is checking and splitting (Photo's 5.2, 5.3). None of the decking was removed to perform a thorough inspection of the float sub-structure. As these timber members crack even more, rot and decay will occur at an accelerated rate. We recommend that this float system be considered for replacement in the next five to ten years.

5.3 Floatation

The floatation in the vicinity of the gangway landing is not adequate to support the weight of the steel gangway. Additional floatation billets should be added in this area to prevent additional damage to the main float.

The floatation has deteriorated in four of the five recently installed finger floats. After discussion with the Harbormaster, it was learned that there was a long term fuel leak on shore uphill from these floats. Polystyrene floatation material deteriorates in the presence of fuels or petroleum products. Fuel present on the water surface could have deteriorated the polystyrene floatation billets in these floats, resulting in low freeboard and listing. Additional floatation should be added to these finger floats to prevent the damage that will occur to the float to float connections (Photo's 5.4, 5.5).



STANDARD OIL FLOAT

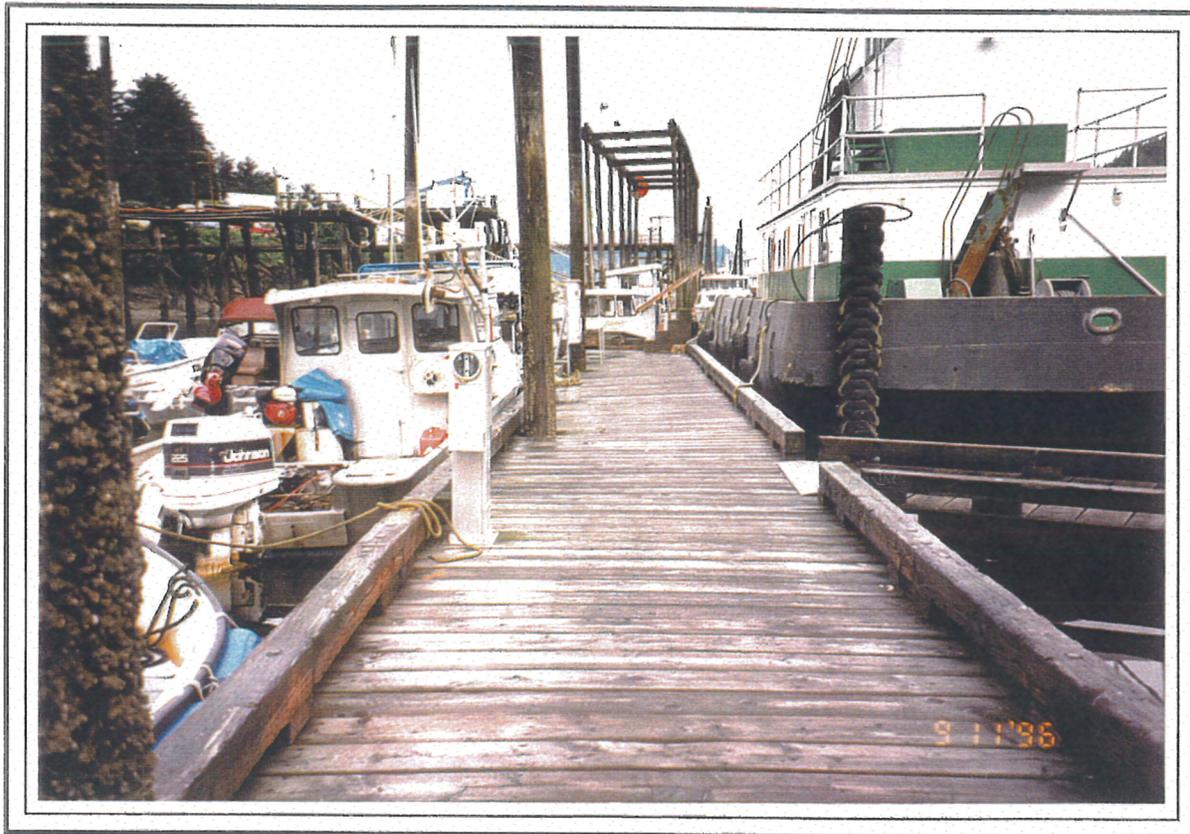


Photo 5.1 - Standard Oil Float

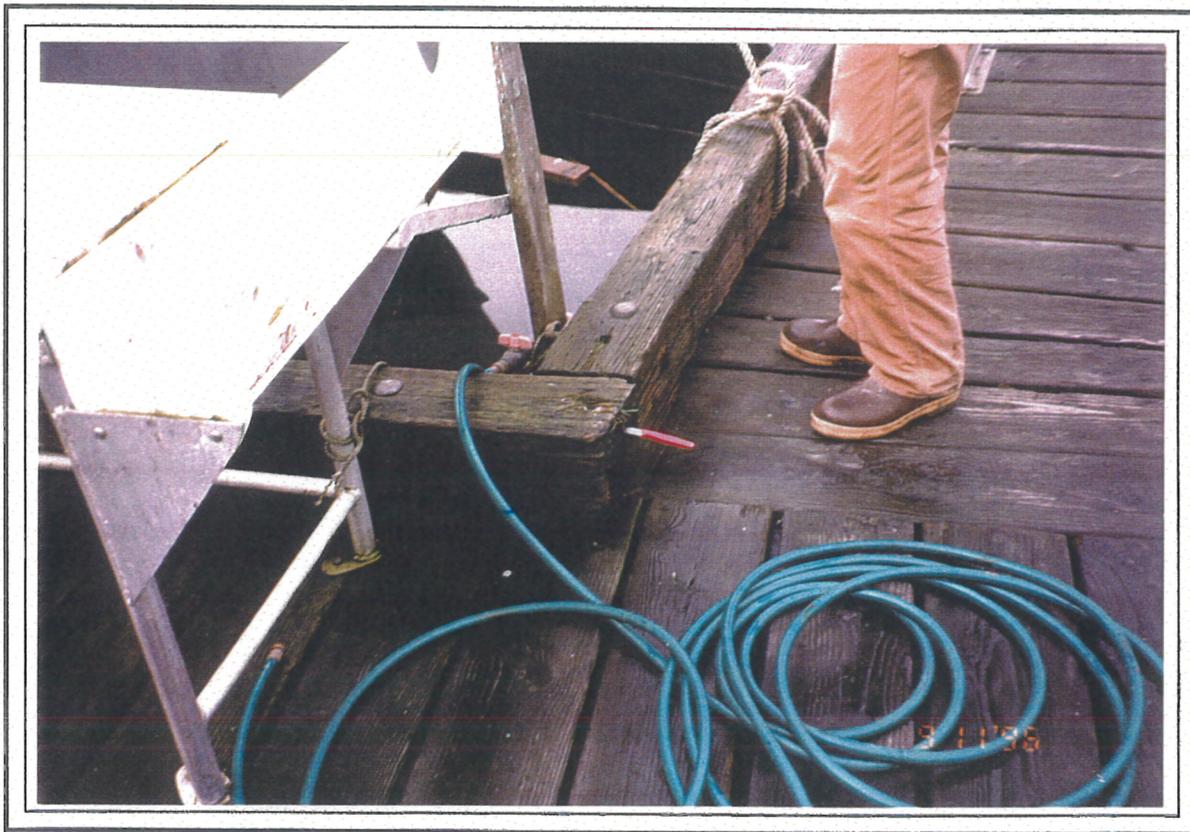


Photo 5.2 - Typical Timber Rot



Photo 5.3 - Rotten and Damaged Decking

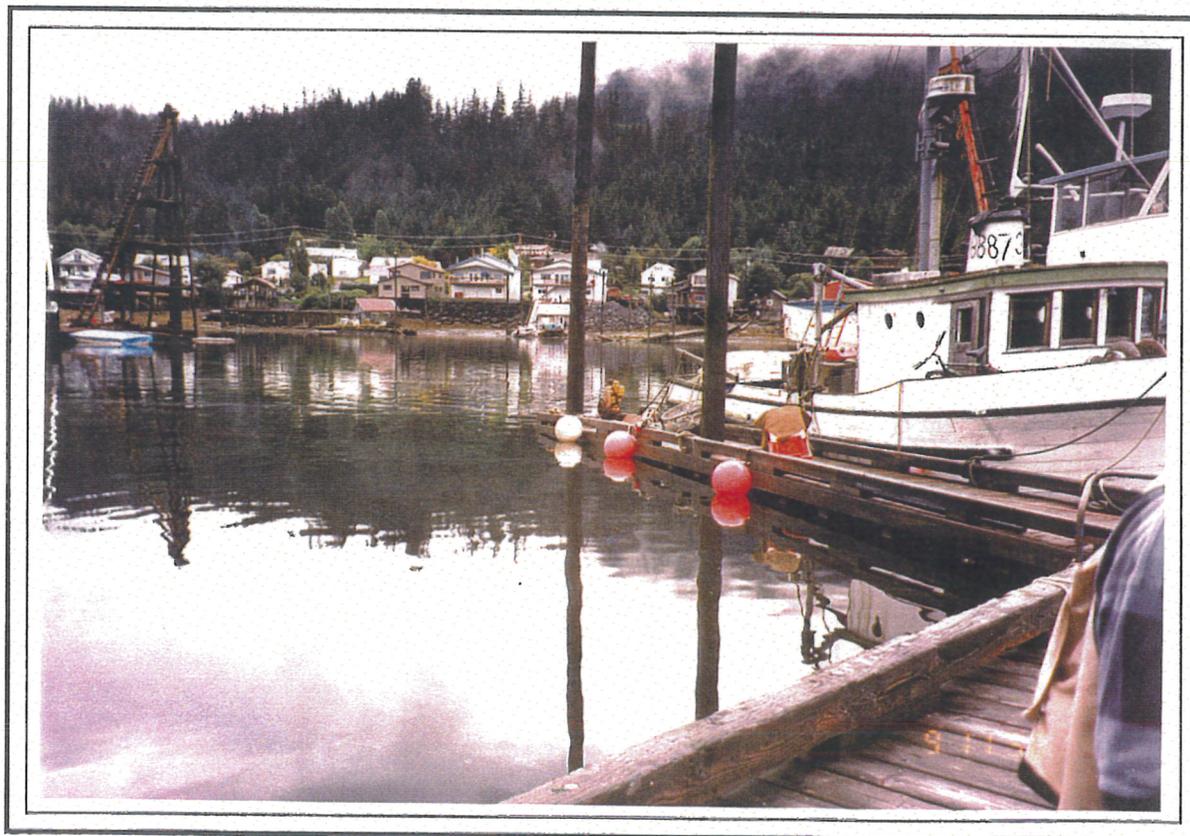


Photo 5.4 - Poor Floatation

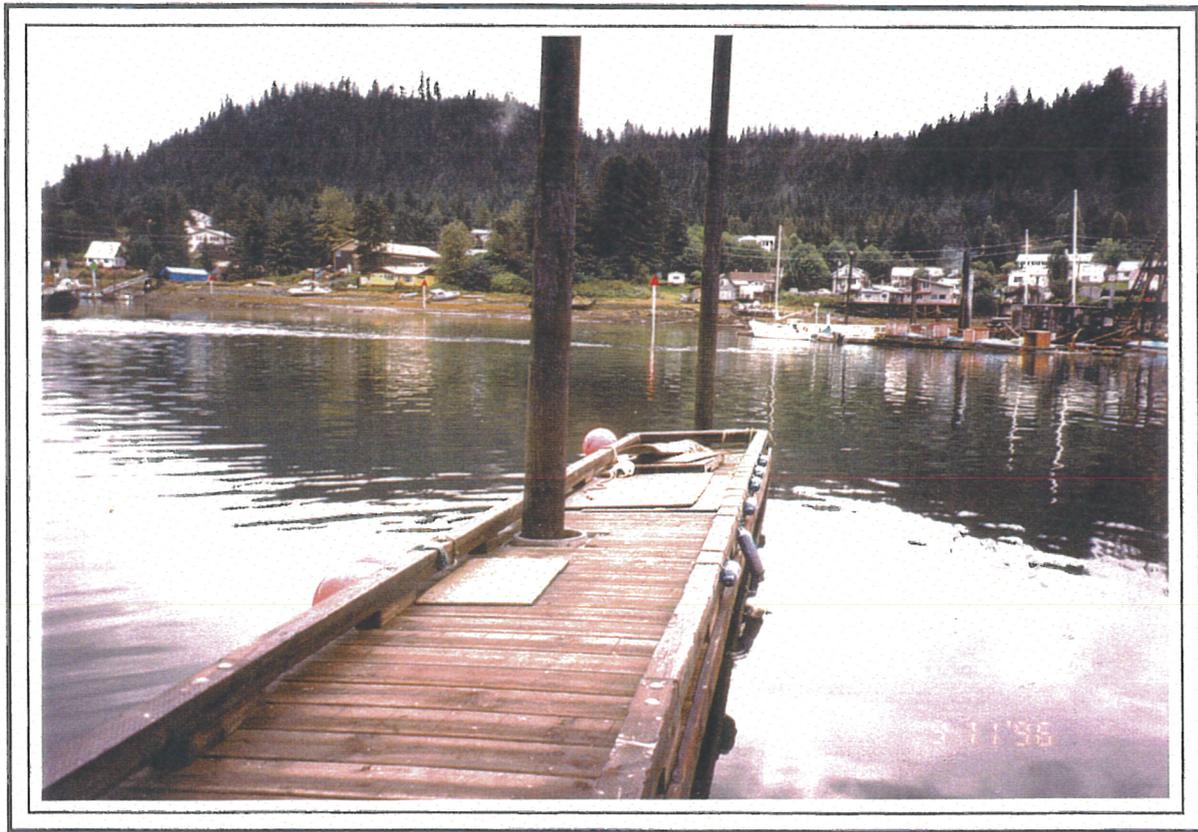


Photo 5.5 - Poor Floatation, List

5.4 Float Anchoring

The timber piles and timber pile blockouts are showing signs of rot and wear (Photo's 5.3, 5.6). Separation of the outer annular rings, evidence of marine borer invasion, is appearing on many of the anchor piles. Although no rot or soft wood was found in these areas, no wood core samples were taken of these piles to determine the extent of the marine borer invasion, if any. Some pile wear was observed. The timber pile blockouts should be re-built with new wear courses to prevent the piles from wearing into critical structural members within the floats.

5.5 Float-to-Float Connections

The galvanizing on the main float to main float connection has been consumed. This connection should be replaced. The connections between the main float and the new finger floats are all in good condition. These new connections will last longer if the floatation problems in the new finger floats are remedied. One older finger float connection needs replacement, as well.

5.6 Bullrail and Cleats

The bullrail on the original floats is showing signs of long term wear and rot (Photo's 5.2, 5.7). The pressure treatment has obviously exceeded its design life. The bullrail present on the new stall floats is all in good condition. All of the cleats on this float are in good condition.

5.7 Approach Dock and Gangway

The approach dock that leads from Peninsula Street to the Standard Oil Float is in fair condition, although some items need attention. The cross bracing that is intended to add lateral resistance to the support piles is broken in many places. These members should be restored to provide the approach dock with lateral resistance (Photo 5.8, 5.11). The butt end of one support pile is visible above the ground surface (Photo 5.9). The power poles are attached with ½-inch diameter bare steel rod. We do not feel that this is an adequate connection for this application (Photo 5.10). A portion of the handrail is broken and should be replaced for safety reasons.

5.8 Utilities

The water and electrical systems in this harbor seem to be in good working order, although they were not inspected in below freezing conditions. As stated previously, the electrical system should be inspected by a qualified electrical engineer.



Photo 5.6 - Pile Wear



Photo 5.7 - Bullrail Wear

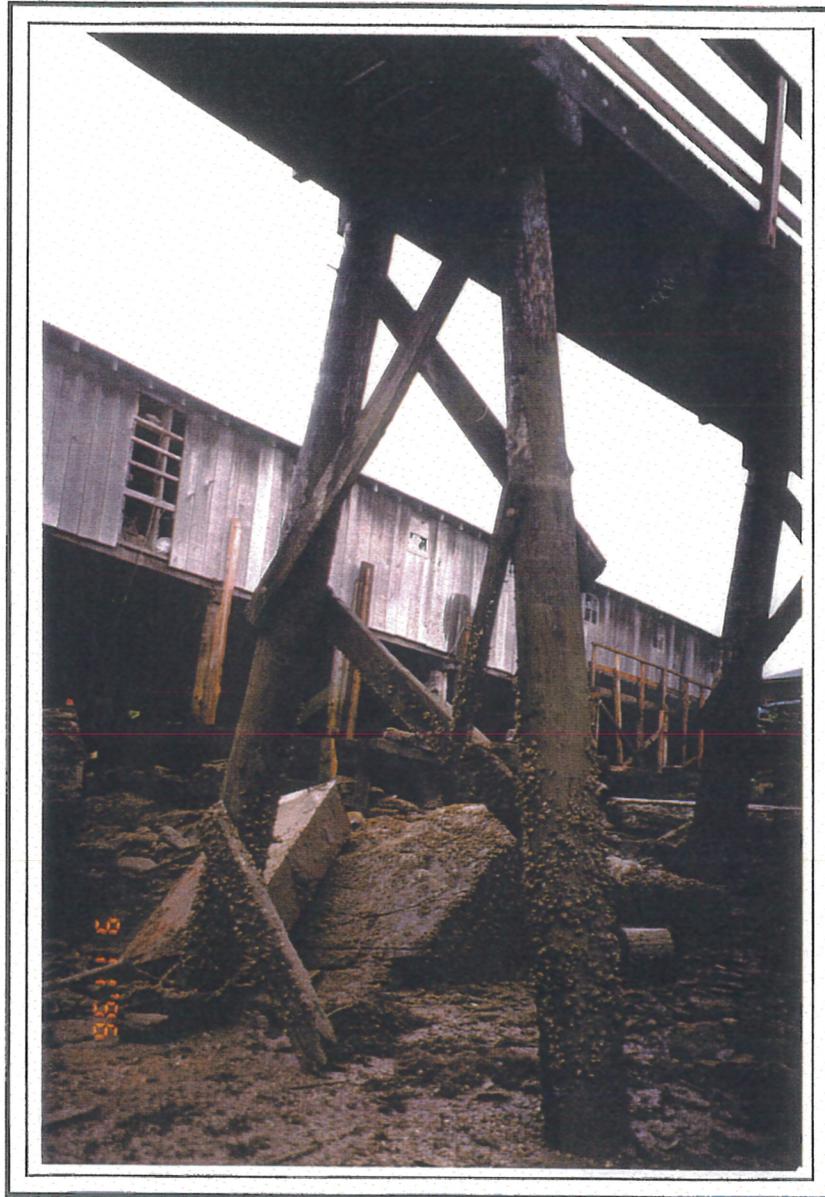


Photo 5.8 - Damaged Cross Bracing

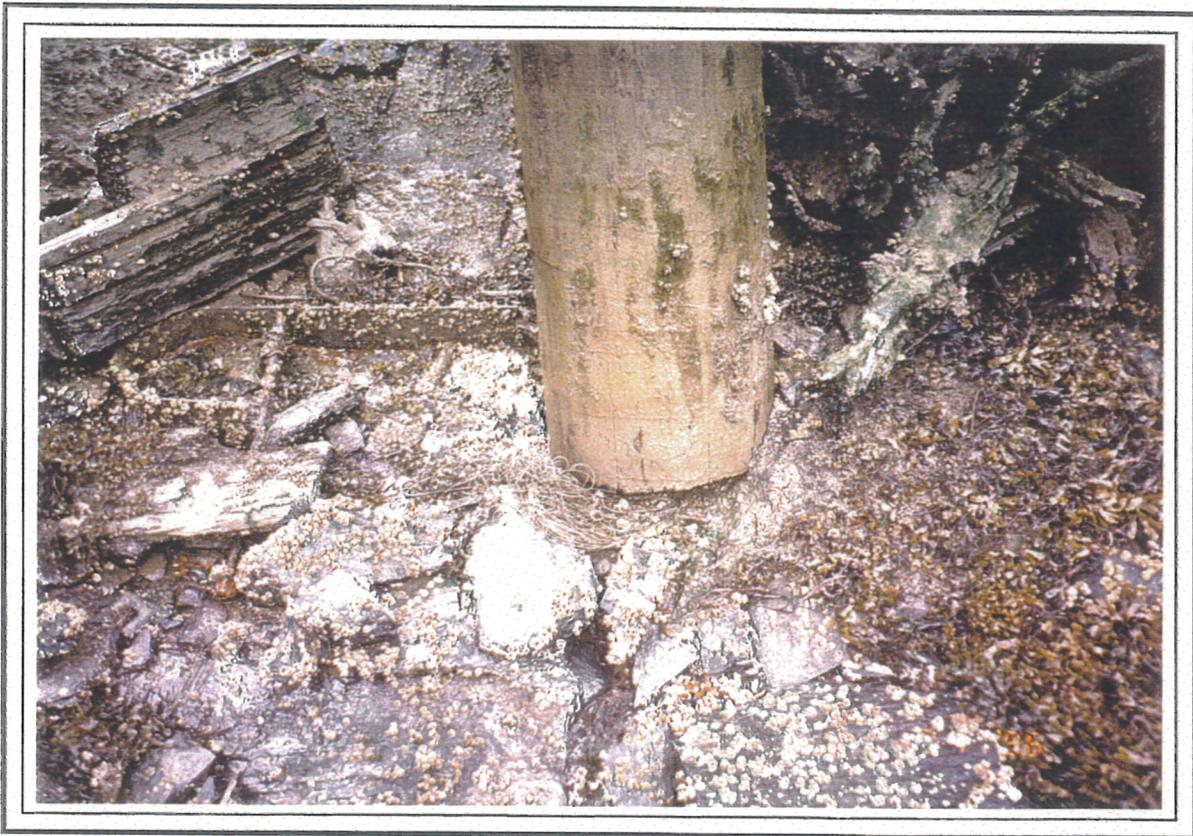


Photo 5.9 - Exposed Pile Tip



Photo 5.10 - Power Pole Attachment

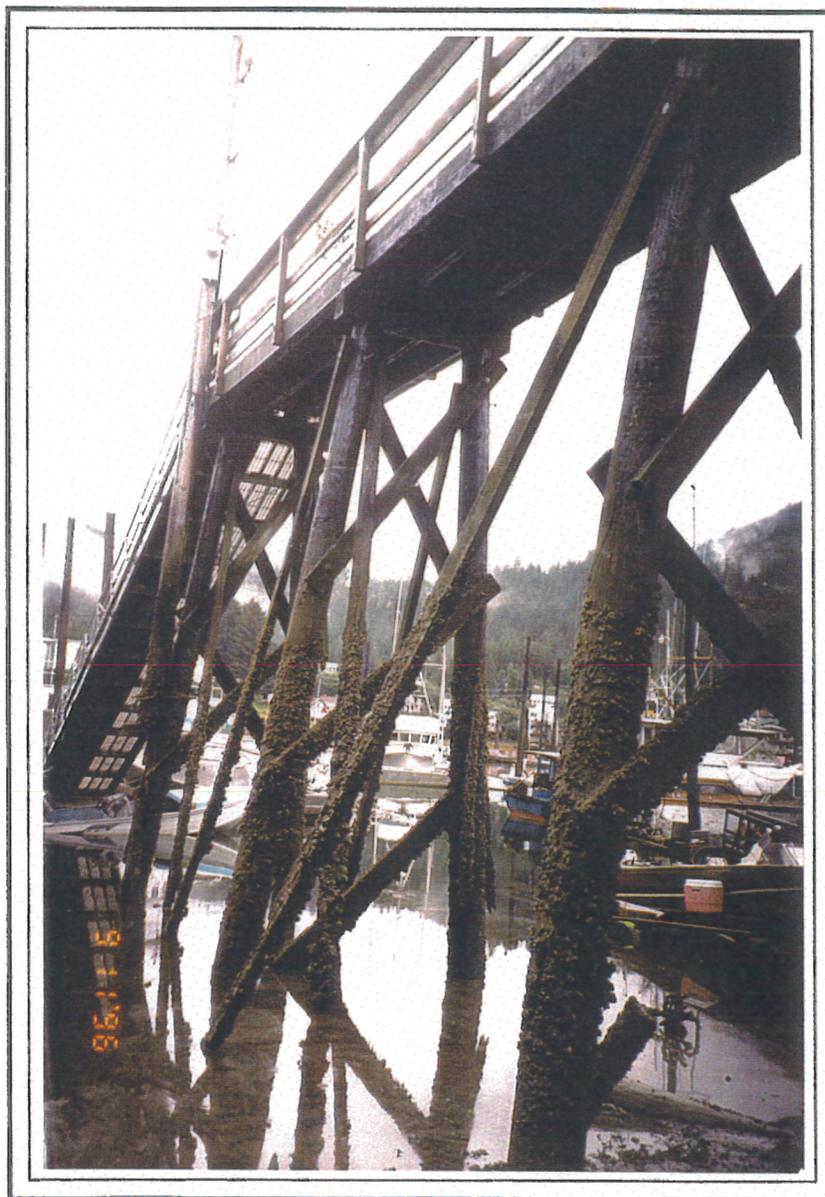


Photo 5.11 - Damaged Cross Bracing

5.9 Fire Safety

The Standard Oil Float does not meet the requirements of the 1994 Uniform Fire Code. The 1994 UFC, Appendix IIC, Section 6, states that portions of floats more than 250 ft from fire apparatus access and marine motor vehicle fuel-dispensing stations shall be provided with an approved dry standpipe system. One fire extinguisher having a minimum rating of 2A, 20-B:C, shall be provided at each required hose station.

Fire protection systems on recently constructed State facilities in Southeast Alaska consist of standpipes with a 200 ft of hose and a fire extinguisher installed approximately every 150 ft. This is to ensure that all portions of the float system can be reached with a fire hose. To meet 1994 UFC requirements, dry standpipes and additional fire extinguishers should be added to this harbor.

5.10 Conclusions and Recommendations

The Standard Oil Float was constructed in 1962 and is now approximately 35 years old. Although the float is in safe condition at this time, the timber pressure treatment in the float timbers as well as the anchor piles has met or exceeded its intended design life. Maintenance and repair costs will continue to rise. This float should be considered for replacement in 5 to 10 years. The new stall floats that were recently installed, except for the flotation, are in good condition.

The included repair cost estimate is roughly 4% of the replacement construction cost estimate. This percentage can be expected to rise as maintenance costs increase. As noted previously, the repairs, if done, will not extend the design service life-span of the facility. They will only ensure that the facility remains useable until that time.

5.11 Standard Oil Float Repair Cost Estimate

<u>ITEM</u>	<u>LOCATIONS</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>AMOUNT</u>
Mobilization		L.S.	\$ 1,800	\$ 1,800
5.2 Float Structure				
2X10 Rubstrip, Re-attach	Stall 216B	30 lf	\$ 5	\$ 150
2X10 Rubstrip, Replace	Stall 204	32 lf	\$ 5	\$ 160
2X10 Decking	Float 122-123	10 lf	\$ 5	\$ 50
5.3 Flotation				
Flotation Billet	Gangway Landing Fingers Opposite 206 209 210 211	15 approx.	\$ 200	\$ 3,000
5.4 Float Anchoring				
Timber Pile Blockout	Main Float 1 Stall 210 Stall 214 Stall 215 Stall 216B	8 ea.	\$ 200	\$ 1,600
5.5 Float-to-Float Connections				
Float to Float Conn.	Main Float Float 200-201	2 ea.	\$ 200	\$ 400
5.6 Bullrail and Cleats				
8X8 Bullrail	Main Float	60 lf	\$ 15	\$ 900
5.7 Approach Dock & Gangway				
3X8 Cross Bracing & Bolts	Bents 6 thru 10	264 lf	\$ 7	\$ 1,848
2X8 Handrail	Approach Dock	20 lf	\$ 5	\$ 100
Power Pole Attachment	Approach Dock	4 ea.	\$ 750	\$ 3,000
5.9 Fire Safety				
Fire Extinguisher, 100' Hose w/ Cabinet (installed)		1 ea.	\$ 1,000	\$ 1,000
Signs	Existing Fire Extinguishers	2 ea.	\$ 50	\$ 100
Standpipes (installed)	All locations	3 ea.	\$ 500	\$ 1,500
15% Construction Contingency				\$ 2,000
<i>Estimated Repair Costs</i>				\$ 18,000

5.12 Standard Oil Float Replacement Cost Estimate

DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Mobilization	L.S.	All Req'd	\$ 34,000	\$ 34,000
Concrete Floats	SF	4760	\$ 38	\$ 180,880
Float Piles	EA	12	\$ 6,000	\$ 72,000
Utilities	SF	4760	\$ 18	\$ 85,680
Construction Subtotal				\$ 370,000
15% Construction Contingency				\$ 60,000
Construction Total				\$ 430,000
Design				\$ 30,000
Contract Administration				\$ 20,000
City Administration				\$ 40,000
Total Estimated Replacement Cost				\$ 520,000

6.0 FISH AND GAME FLOAT

The Fish and Game float was constructed in 1966 to replace an existing log float system. An electrical system was installed in 1983 and a 10 X 75 ft float was replaced in 1988, along with some anchor piles.

6.1 Condition Summary

The main Fish and Game Float is in fair to poor condition. Factors contributing to this are old construction, large vessels and wave action. The galvanized coating on most of the older steel hardware is gone. The floats have been damaged and warped by moorage of large tug boats, pile block outs are badly worn or missing and the timber pressure treatment has reached or exceeded it's service life. The newer portions of the float system are in fair condition.

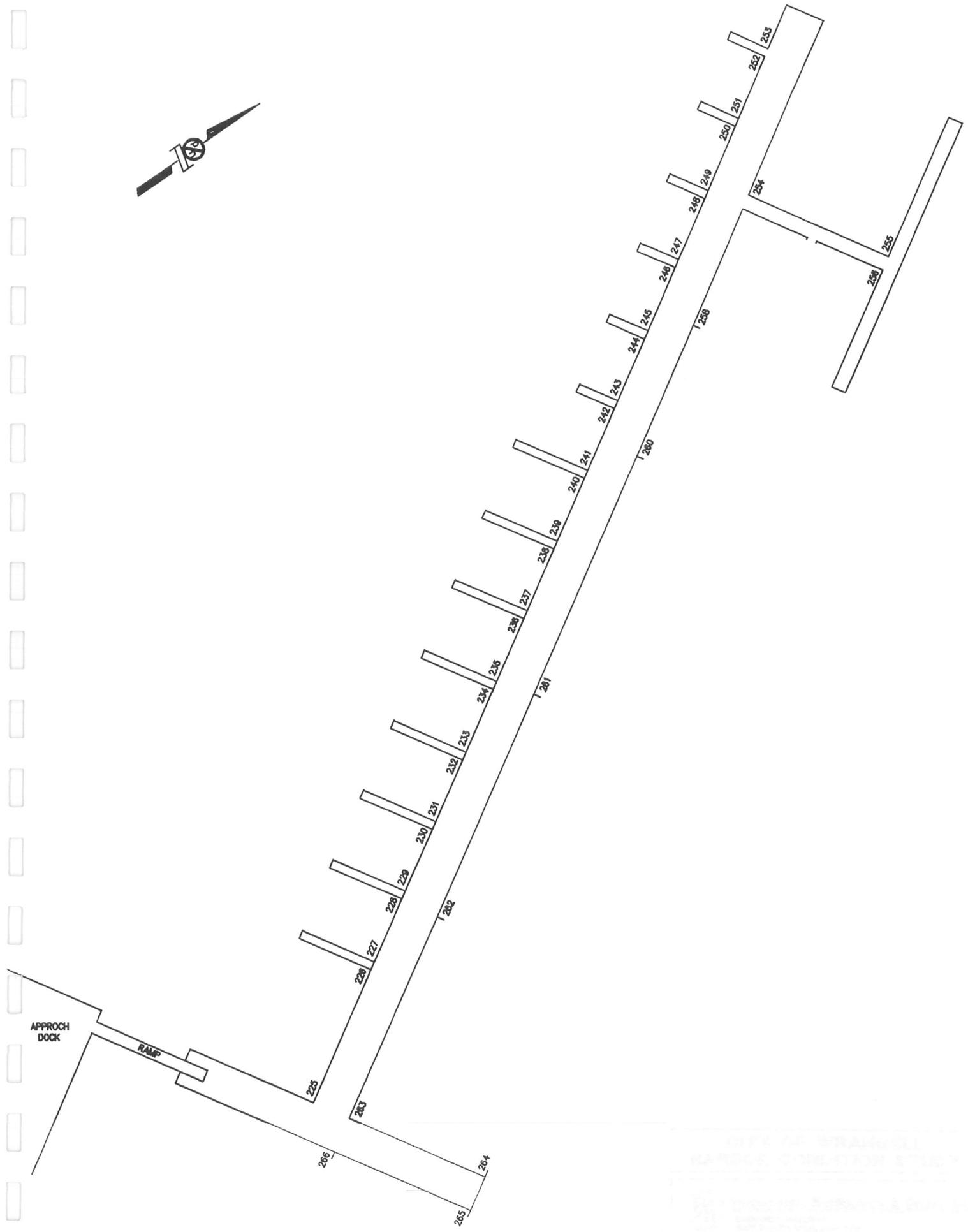
We recommend that the City of Wrangell have a qualified electrical engineer perform a condition survey/inspection of the existing electrical utility provided to this float system.

6.2 Float Structure

The main structural components of the older float structure are nearing the end of their design life. The structure itself has been warped and the main connections between these components have experienced creep due to excessive loading from large vessels and wave action from vessel traffic (Photo 6.1). Some sections of rubstrip are missing or are broken, as well as some structural members. These items should be repaired or replaced. The decking on the older floats has significant algae growth and checking (Photo 6.2). The 38 foot finger float, stalls 257A and 257B, is an old float with structural damage. The decking has been overlaid with plywood and the float structure is warped. This is evidence of structural damage to the float stringers (Photo's 6.3, 6.4).

6.3 Flootation

The flootation on the main dock is still in good condition except for the gangway landing area and the extreme north end of the main float (Photo 6.5). Flootation is poor in many of the smaller finger floats. This is evidenced by low freeboard and excessive stress to the float-to-float connections (Photo 6.6).



FISH & GAME FLOAT



Photo 6.1 - Warped Main Float



Photo 6.2 - Old Decking

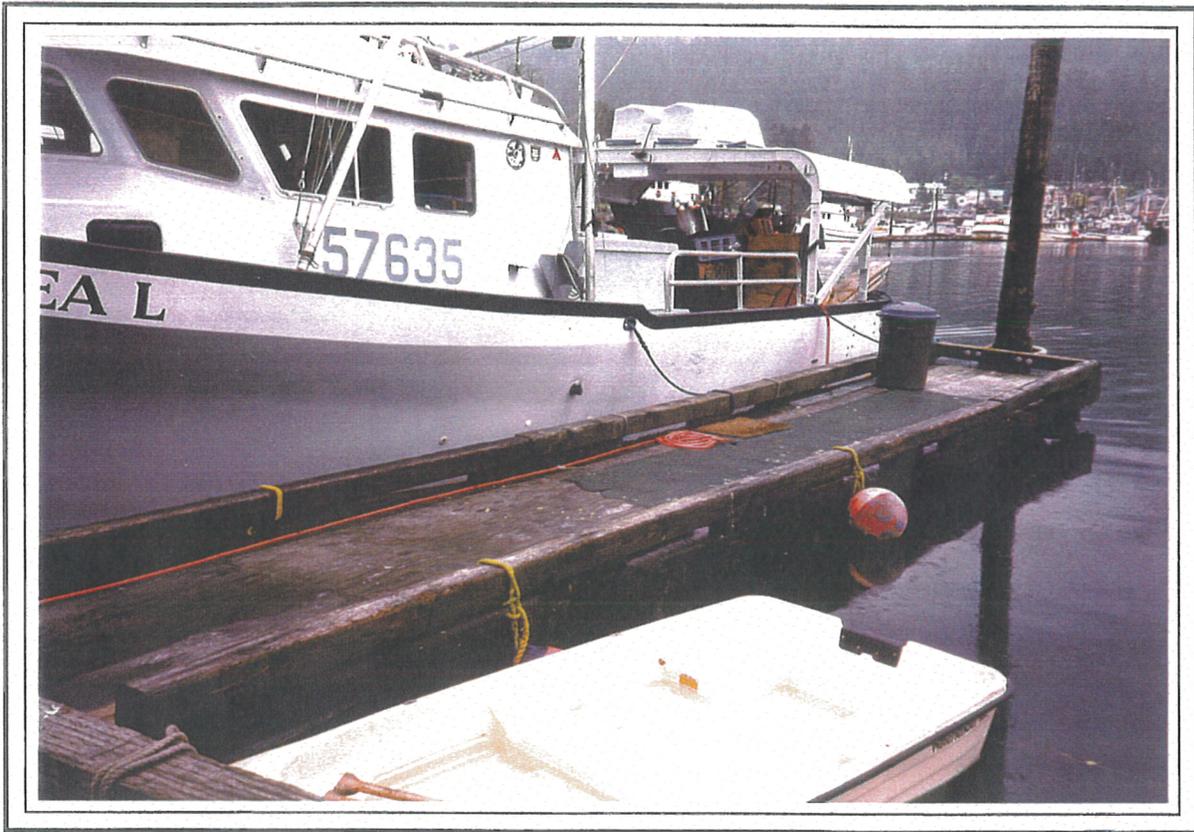


Photo 6.3 - Damaged Float

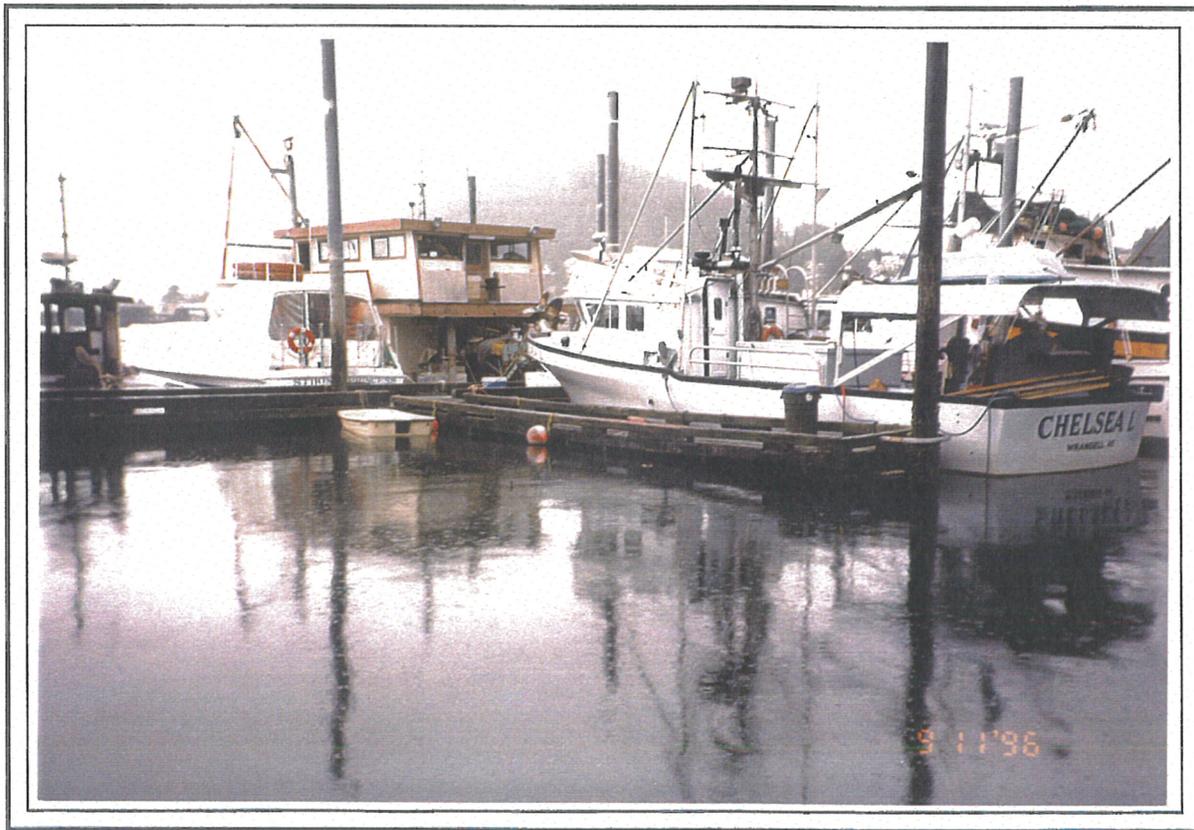


Photo 6.4 - Damaged Float

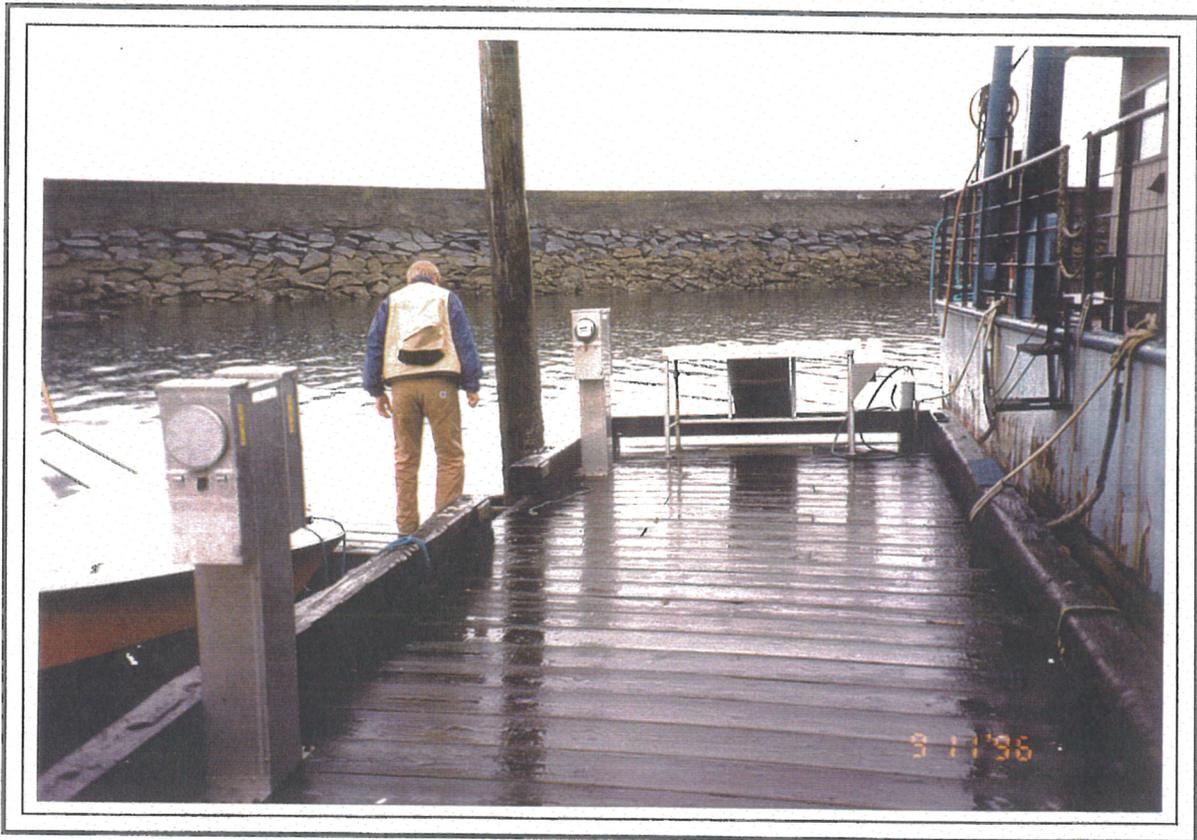


Photo 6.5 - Poor Floatation



Photo 6.6 - Float to Float Connection

6.4 Float Anchoring

The timber and steel piles in this harbor are in fair condition. The timber piling has abraded and worn in places from long term use (Photo 6.7). Minor surface checking is visible and could be evidence of marine borer invasion. No core samples were taken to prove or disprove this. Several timber pile blockouts are completely worn away or missing altogether and the piles are wearing into the float structure (Photos 6.8, 6.9). These blockouts should be repaired as soon as possible to prevent further damage to the float structure. The damaged portions of the float structure in these areas should be repaired as well. Many of the steel pile hoops have lost all of their galvanizing protection and should be replaced (Photo 6.10). Along the portion of the main float where large vessels are moored, a makeshift camel log / fender pile system has been installed (Photo 6.11). The float to which these fender piles are breasting is not adequate for this type of loading. We would recommend a heavy duty float to replace the existing float in this area.

6.5 Float to Float Connections

As stated before, various items that are considered in modern designs weren't considered at the time these floats were designed. Transition plates should be added between all float-to-float connections. The float-to float connections between the smaller finger floats and the main float should all be replaced. These connections have weathered to bare steel and will require maintenance if not replaced (Photo 6.6). All bolts in the connections between the main floats should be replaced, as well.

6.6 Bullrail and Cleats

The bullrail on the older portions of the main floats is broken in a few spots (Photo 6.12), some of the scupper blocks are missing, the pressure treatment has reached it's design life in many places. Most of the bullrail damage is seen where large vessels have attached mooring lines (Photo 6.13). The existing cleats in this harbor are in good condition.

6.7 Gangway and Approach Dock

The gangway in this harbor is too steep and corrosion is visible on the steel members. No thickness measurements were taken of these members. From conversations with the Harbormaster, it was learned that this particular gangway will soon be replaced. A transition plate should be added to the bottom of this gangway to eliminate the tripping point. In the mean time, an intermediate railing should be added to the existing gangway handrail for safety reasons.



Photo 6.7 - Pile Wear



Photo 6.8 - Pile Wear in Float Structure

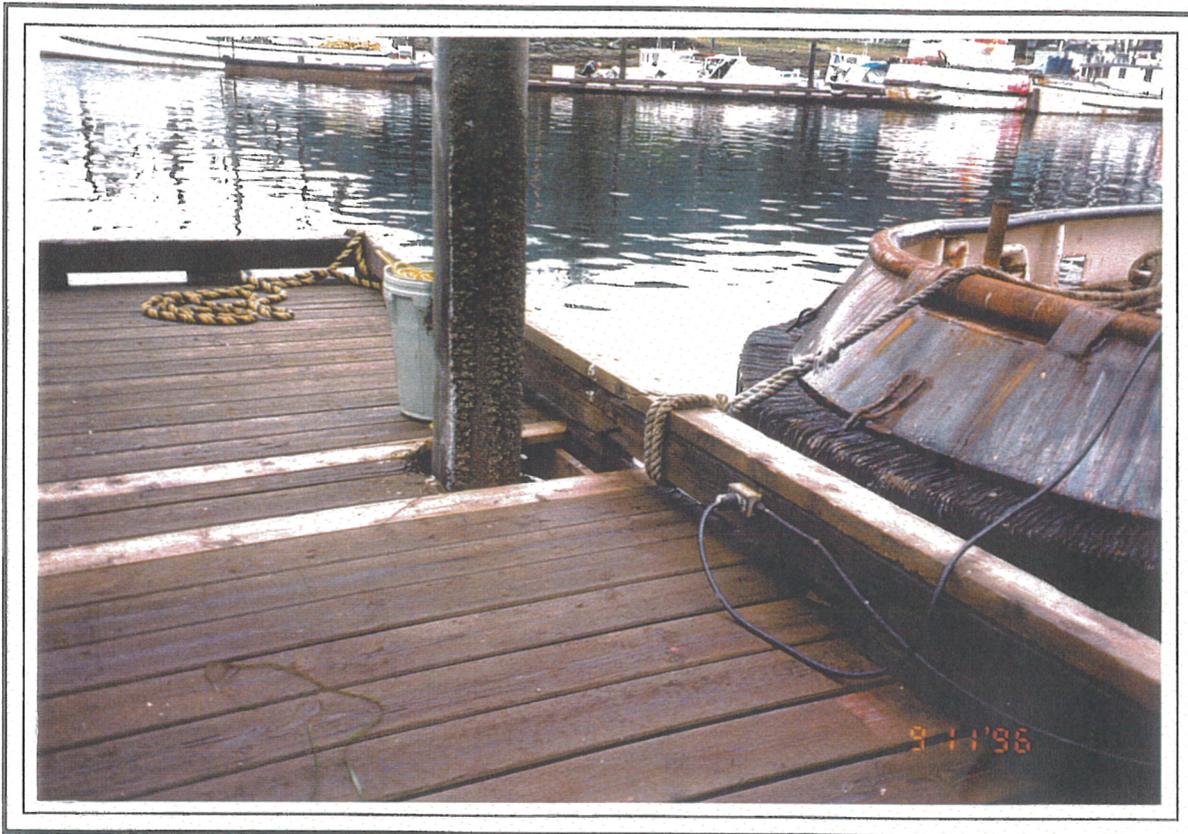


Photo 6.9 - Pile Wear in Float Structure



Photo 6.10 - Typical Corroded Pile Hoop

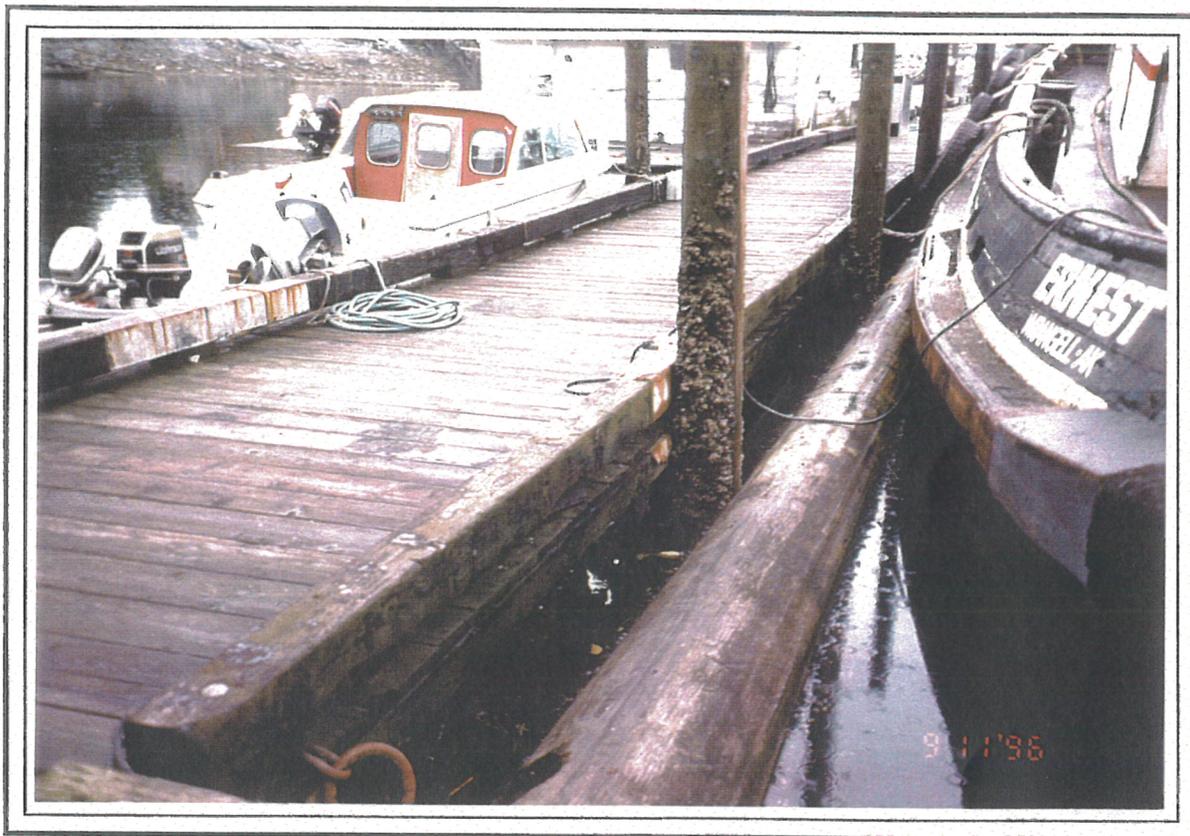


Photo 6.11 - Fender System

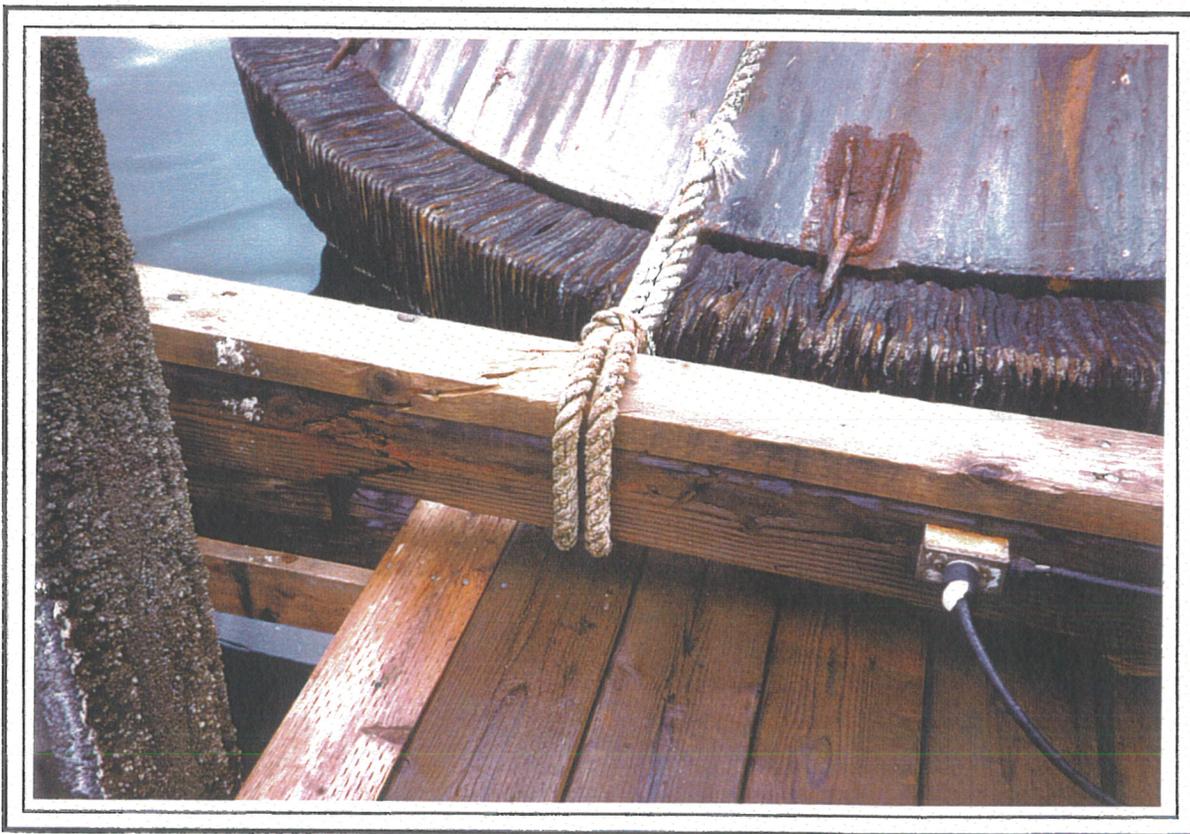


Photo 6.12 - Damaged Bullrail



Photo 6.13 - Large Vessel, Damaged Bullrail

6.8 Utilities

The electrical system on this float should be inspected by a qualified electrical engineer. The power supply lines that are attached to the inside face of the bullrail on the main float might not be safe (Photo 6.14). The water system seems to be in good working order.

6.9 Fire Safety

The fire stations should be labeled with large red lettering that is visible from all sides including the water. NFPA 303, Section 4-3.2.1, states the following: "Extinguishers listed for Class A, B, and C fires shall be installed at each end of a pier and bulkhead that exceeds 25 ft (7.6 m) in length, and on piers exceeding 50 ft (15.2 m) in length, such that not more than 50 ft (15.2 m) separates extinguishers." The fire extinguishers on the Fish and Game Float do not meet this requirement of the National Fire Code.

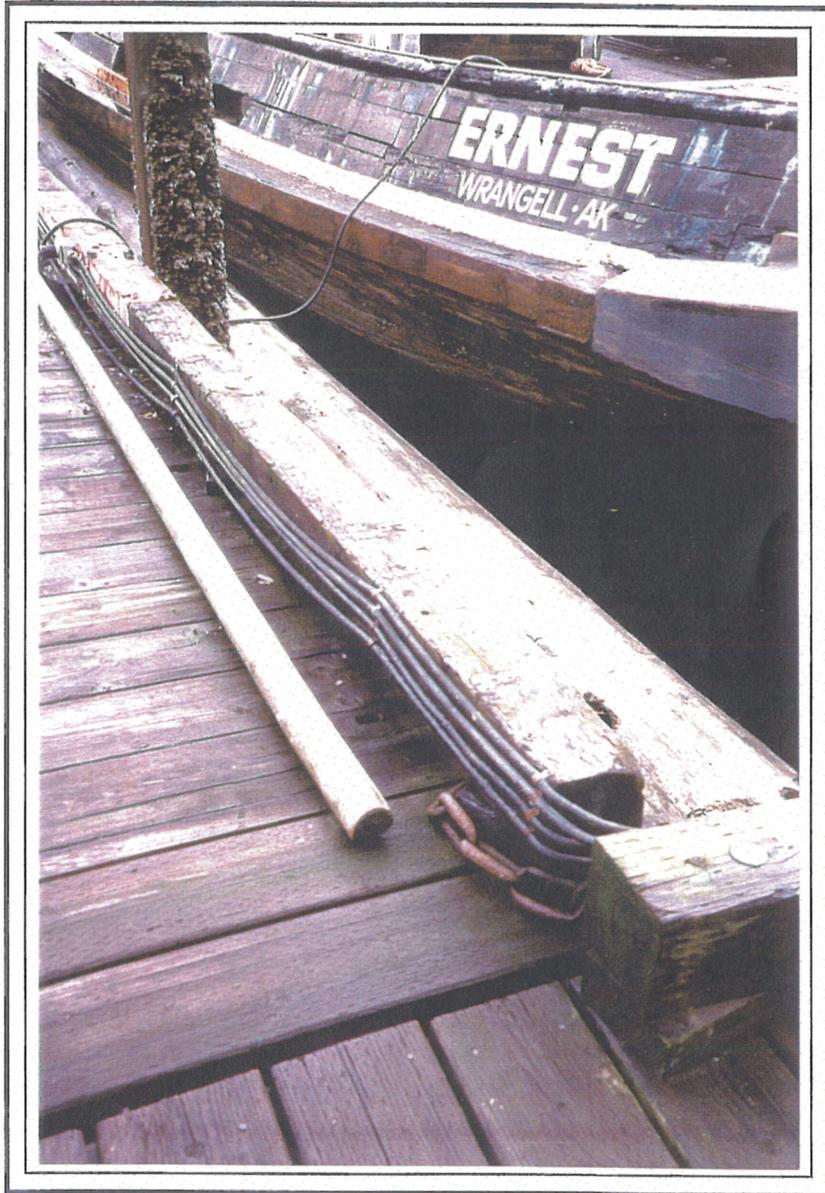


Photo 6.14 - Electrical Lines

6.10 Conclusions and Recommendations

The existing Fish & Game Float was originally constructed in 1966 and is now 30 years old. This float is in the worst condition of all of the floats in Wrangell Harbor for two reasons. First, it is exposed to much more wave action than any of the other floats because it is the closest to the harbor entrance and large vessel wake. Second, much larger vessels tie to the float than was originally intended. This has contributed to the structural problems found on portions of the main float, such as warpage and creep. These effects have essentially caused these floats to outlive their intended design life-span.

The construction repair cost estimate for this float is approximately 14% of the estimated replacement cost and is likely to rise as time progresses. These repairs will only allow for the float to remain useable for the time being and will most likely need to be performed again in the near future.

We recommend that this float system be replaced in order to avoid these high repair costs.

6.11 Fish & Game Float Repair Cost Estimate

<u>ITEM</u>	<u>LOCATION</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>AMOUNT</u>
Mobilization		L.S.	\$ 10,000	\$ 10,000
6.2 Float Structure				
2X8 Rubstrip, Replace	Opposite 228 Stall 229	50 lf	\$ 5	\$ 250
6X8 Exterior Stringer (Replace)	Slip 265 Finger 257	75 lf	\$ 15	\$ 1,125
6.3 Flotation				
Flotation Billet	Base of Gangway Finger 232-233 Finger 236-237	10 approx.	\$ 200	\$ 2,000
6.4 Float Anchoring				
Timber Pile Blockout (Replace/Reconstruct)	Base of Gangway Slip 263 Slip 265 Main Float	14 ea.	\$ 200	\$ 2,800
Steel Pile Hoops (Replace)	Main Float	6 ea.	\$ 350	\$ 2,100
6.5 Float-to-Float Connections				
Replace Connections	All Connections	18 ea.	\$ 400	\$ 7,200
Add Transition Plates	All Connections w/o	16 ea.	\$ 500	\$ 8,000
6.6 Bullrail and Cleats				
8X8 Bullrail	Slip 264 Slip 265	40 lf	\$ 15	\$ 600
4X8 Scupper Block	Slip 254	4 lf	\$ 5	\$ 20
6.7 Gangway				
Replace Gangway		1 ea.	\$ 50,000	\$ 50,000
6.9 Fire Safety				
Fire Extinguisher, 100' Hose w/ Cabinet (installed)		3 ea.	\$ 1,000	\$ 3,000
Signs	Existing Fire Extinguishe	3 ea.	\$ 50	\$ 150
Standpipes (installed)	All locations	6 ea.	\$ 500	\$ 3,000
15% Construction Contingency				\$ 13,000
<i>Estimated Repair Cost</i>				<i>\$ 100,000</i>

6.12 Fish & Game Float Replacement Cost Estimate

DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
Mobilization	L.S.	All Req'd	\$ 55,000	\$ 55,000
Concrete Floats	SF	7550	\$ 38	\$ 286,900
Float Piles	EA	22	\$ 6,000	\$ 132,000
Utilities	SF	7550	\$ 18	\$ 135,900
Construction Subtotal				\$ 610,000
15% Construction Contingency				\$ 90,000
Construction Total				\$ 700,000
Design				\$ 40,000
Contract Administration				\$ 30,000
City Administration				\$ 60,000
Total Estimated Replacement Cost				\$ 830,000

