Wrangell Harbor Condition Assessment and Renovation Study

Final Report

Prepared for

The City of Wrangell

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Table of Contents

Executive Summary ..... **I**

1.0 Introduction **2**

1.1 Background 2

2.0 Existing Facilities **3**

2.1 General Observations 3
2.2 Inspection Results 6

3.0 Preliminary Scope of Work **38**

3.1 Reliance Harbor – Preliminary Scope of Work 39
3.2 Inner Harbor – Preliminary Scope of Work 40
3.3 Standard Oil Float – Preliminary Scope of Work 41
3.4 Fish and Game Float – Preliminary Scope of Work 42
3.5 Shoemaker Bay – Preliminary Scope of Work 43
3.6 Harbor Staff Equipment, Supplies, and Labor 44

4.0 Cost Estimates **44**

5.0 Contracting Strategies **45**

6.0 Conclusions, Recommendations, and Future Work **46**

6.1 Reliance Harbor – Phase One Scope of Work 46
6.2 Inner Harbor – Phase One Scope of Work 47
6.3 Standard Oil Float – Phase One Scope of Work 47
6.4 Fish and Game Float – Phase One Scope of Work 47
6.5 Shoemaker Bay – Phase One Scope of Work 47

7.0 Appendices **49**

Appendix A - Electrical Report
Appendix B - Geotechnical Memo
Appendix C - E-mail Related to Valdez Harbor HDPE Fusing System
Appendix D - Drawings
Appendix E - Cost Estimates

Tables

Table 2.1-1 Approximate Wind Loads 4
Table 2.1-2 Waiting List 5
Table 2.1-3 Existing Slips 5
Table 4.0-1 Preliminary Costs for Each Harbor, Wrangell, Alaska 45

Figures

Figure 2.2-1 Reliance Harbor Gangway 8
Figure 2.2-2 Reliance Harbor Gangway 9
Figure 2.2-3 Reliance Harbor 9
Figure 2.2-4 Reliance Harbor 10
Figure 2.2-5 Reliance Harbor Main Float 10
Figure 2.2-6 Reliance Harbor Moorage Floats 11
Figure 2.2-7 Reliance Harbor Potable Water Riser 11
Figure 2.2-8 Inner Harbor Gangway 13
Figure 2.2-9 Inner Harbor Gangway Landing 14
Figure 2.2-10 Inner Harbor Gangway Landing 14
Figure 2.2-11 Inner Harbor 15
Figure 2.2-12 Inner Harbor 15
Figure 2.2-13 Inner Harbor Potable Water Riser 16
Figure 2.2-14 Inner Harbor Main Float 16
Figure 2.2-15 Inner Harbor Slip Moorage 17
Figure 2.2-16 Inner Harbor Fish Cleaning Table 17
Figure 2.2-17 Standard Oil Float Parking Area 19
Figure 2.2-18 Standard Oil Float Approach Trestle 20
Figure 2.2-19 Standard Oil Float Approach Trestle 20
Figure 2.2-20 Standard Oil Float Gangway 21
Figure 2.2-21 Standard Oil Float Gangway 21
Figure 2.2-22 Standard Oil Float Gangway 22
Figure 2.2-23 Standard Oil Float 22
Figure 2.2-24 Standard Oil Float Insulated Potable Water Riser 23
Figure 2.2-25 Standard Oil Float Moorage Float 23
Figure 2.2-26 Fish and Game Float Trestle 25
Figure 2.2-27 Fish and Game Float Trestle and Gangway 26
Figure 2.2-28 Fish and Game Float Gangway 26
Figure 2.2-29 Fish and Game Float Gangway Landing 27
Figure 2.2-30 Fish and Game Float, USFS Float 27
Figure 2.2-31 New Section of Fish and Game Float 28
Figure 2.2-32 Fish and Game Float Tee Float 28
Figure 2.2-33 Main Float, Fish and Game Float 29
Figure 2.2-34 Main Float, Fish and Game Float 29
Figure 2.2-35 Fish and Game Float Rafted Tugs 30
Figure 2.2-36 Finger Float, Fish and Game Float 30
Figure 2.2-37 Finger Float, Fish and Game Float 31
Figure 2.2-38 Shoemaker Bay North Trestle Approach 33

Figure 2.2-39 Shoemaker Bay South Trestle Approach 33
Figure 2.2-40 Shoemaker Bay North Gangway 34
Figure 2.2-41 Shoemaker Bay North Gangway 34
Figure 2.2-42 Shoemaker Bay North Gangway Landing 35
Figure 2.2-43 Shoemaker Bay South Gangway 35
Figure 2.2-44 Shoemaker Bay South Gangway Landing 36
Figure 2.2-45 Shoemaker Bay South Mooring Float 36
Figure 2.2-46 Shoemaker Bay Potable Water Riser 37
Figure 2.2-47 Shoemaker Bay Deteriorated Deck 37
Figure 2.2-48 Shoemaker Bay Deteriorated Deck 38

Executive Summary

This report summarizes the results of a condition survey of the five local Wrangell harbors including: Reliance Harbor, Inner Harbor, Standard Oil Float, Fish and Game Float, and Shoemaker Bay Harbor. Prioritized lists of problems discovered during the site visit are provided. A set of phased repairs, renovations, and replacements are identified. Preliminary cost estimates for the recommended work are also included.

The City has designated a total maximum budget of $3.4 million for the project. A total of $8.5 million worth of repairs and renovations are identified in this report. The estimated cost (rounded to nearest thousand) of renovation work needed for each harbor is listed below:

Reliance Harbor	$1,698,000
Inner Harbor	$1,559,000
Standard Oil Float	$ 635,000
Fish & Game Float	$1,874,000
Shoemaker Bay Harbor	$2,437,000

Because the total cost outweighs the City's budget for the project at hand, the needed work has been broken down into prioritized phases for potential construction projects. These costs (rounded to nearest thousand) for these categories include:

Critical Items	$ 87,000
Phase 1 Construction	$2,469,000
Phase 2 Construction	$3,006,000
Phase 3 Construction	$ 346,000
Harbor Staff Repairs	$ 349,000

The above listing does not include mobilization, construction survey or contingencies. Combining the Critical Items, Phase 1, and Harbor Staff repair budget totals $2.9 million. With an allowance for mobilization, survey, and contingency this work is in the approximate range of the City's $3.4 million budget and is recommended as a starting place for developing the renovation projects for completion. Phases 2 and 3 are considered *secondary* in priority and should be considered for future planning.

Many of the Critical and Phase 1 items are related to electrical utilities upgrades. Most of the gangways are too short to meet the standards of the Americans with Disabilities Act. Generally, the renovation strategy begins by completing work at the shore end first, with new gangways, new gangway floats, and new electrical service and distribution panels, followed by renovations of the float system itself and associated utilities.

A notable exception is the Fish and Game Float, which is in the worst condition of all the harbors. The report recommends replacing nearly the entire system during Phase 1. The only item to remain is the newer Tee float at the north end. The budget cost estimate for this harbor is $1.9 million.

1.0 Introduction

The purpose of this report is to summarize the results of the condition assessment and develop engineering concepts in support of the renovation of the five existing harbors in Wrangell Alaska. The harbors include: Reliance Harbor, Inner Harbor, Standard Oil Float, Fish and Game Float, and Shoemaker Bay Harbor.

The entire project is expected to be a several year process of upgrading and replacing these facilities to meet modern standards and levels of service. The report begins with a description of the existing facilities and outlines an evaluation of the condition of the existing infrastructure. A prioritized list of recommended repairs and associated preliminary cost estimates are also provided.

The City of Wrangell has recently taken ownership of their local harbors from the State of Alaska. This ownership now includes responsibility for harbor operation, maintenance, repair, and renovation. This report is the result of the first phase of a project that is intended to help the City with the assessment of needs and prioritizing the repairs and renovations within the confines of the budget. In addition, the project includes engineering support for bringing the harbors up to date.

1.1 Background

Many of the small boat harbors in the State were built during the 1960s and 1970s. This followed a statewide reconstruction effort after the 1964 Great Alaska Earthquake. During this period, the federal government, through the U.S. Army Corps of Engineers, built breakwaters and dredged the harbor basins and entrance channels at various small boat harbors throughout the State. The State of Alaska built the inner harbor features including the floats and access trestles. The typical arrangement for this type of project was that the federal government would be responsible for funding about 80% of the General Navigation Features (GNF) and the "local sponsor", in this case the State of Alaska, was responsible for 20% of the cost of the GNF plus 100% of the inner harbor facilities.

Until recently, the State of Alaska has maintained ownership of the inner harbor facilities for many harbors throughout the State. The federal government still owns and maintains the GNF including the breakwaters and entrance channels as well as a portion of the mooring basin. In the last few years, the State has begun a program to divest itself from ownership of small boat harbors. This involves negotiating a Transfer of Responsibility Agreement (TORA) with the local communities. Typically these TORA negotiations involve a payout of "deferred maintenance funds" to the local communities. The intent of the deferred maintenance funds is to cover the anticipated costs required to bring the harbor up to modern and serviceable standards for the new owner.

There are a number of challenges facing small communities taking ownership of the inner harbor facilities. First, is the fact that many of the float systems are over 30 years old and do not meet modern standards. In some cases, the entire system must be replaced. In

other cases, maintenance and upgrades are possible. Achieving the required modifications with the available deferred maintenance funds is often very challenging. In some cases, there is simply not enough funds to cover all the work. Another challenge is the moorage rate structures in Alaska, which have historically been such that the harbors are not self-sufficient from a financial standpoint. This means that many harbors have a difficult time just meeting operating costs and have little or no budget for capital improvements.

2.0 Existing Facilities

Members of the condition assessment team, including engineers specializing in marine, civil, electrical, and geotechnical engineering and surveyors traveled to Wrangell in December 2004 for an on-site inspection of existing facilities. This work included a specific site inspection at each harbor. It also included a discussion of the various needs and concerns with local harbor and City staff. The electrical report is included in Appendix A. A letter report of the geotechnical findings is included in Appendix B. These are summarized herein with the marine/civil related issues.

2.1 General Observations

Many of the float systems in Wrangell are of typical State of Alaska design. The typical design includes timber decking, overlapping longitudinal timber stringers, timber bullrails, upper and lower timber sills, and polystyrene floatation. The majority of the piles are timber.

Shoemaker Bay is the one Wrangell harbor built using modular concrete floats. These consist of modular units about 10 feet long. Each module consists of a concrete deck and sides cast over a polystyrene core. The modules are joined together by timber walers that are through bolted from one side of the floats to the other.

2.1.1 Potable Water

There are several types of potable water systems in place. Shoemaker Bay and Reliance Harbor have continuous polyvinyl chloride (PVC) pipe potable water systems. The risers are galvanized steel. The other harbors have various types of potable water systems that typically include insulated water risers.

2.1.2 Fire Suppression

All harbors in Wrangell are protected by 125-pound ABC dry chemical fire extinguishers. These large extinguishers are stored in aluminum sheds on the float systems. This is a very functional system but does not meet current National Fire Protection Association (NFPA) standards for small boat harbors.

2.1.3 Geotechnical

An examination of historical pile driving logs reveals that there is shallow bedrock in the area. Refusal is often encountered after less than 10 feet of penetration. There are a number of locations where pilings have failed due to lateral loads. The Fish and Game float is one such location.

2.1.4 Wind Loads

Many of the floats are overloaded because the vessels that are now using them are larger than the original design vessels. The overload condition is particularly related to the wind loads and the berthing and mooring loads. Wind striking the vessel creates a force that must be transferred thru the mooring system to the floats and from there to the piling. Many of the existing stall floats, or fingers, are cantilevered off of the main floats and do not include a dedicated pile.

Table 2.1.1 outlines approximate wind loads that can be used for preliminary design of the mooring system and piling.

Table 2.1-1 Approximate Wind Loads

Boat length (Feet)	Approximate maximum wind load (Lbs)
32	1,000
50	2,400
100	4,500

2.1.5 Freeboard

In general, the majority of the float systems in Wrangell have very low freeboard (the distance from the top of the deck to the water line). Freeboard is typically less than one foot in the Wrangell harbors. Modern standards are typically 18 to 20 inches. Low free board does not allow for reserve buoyancy and places structural elements and under-deck utilities near or below the water line. The low freeboard is typically the result of several factors including; original design conditions, the weight of many years worth of marine growth attached to the bottom of the units, and the fact that the uncoated polystyrene floatation billets and submerged timber soak up water over time and eventually start to sink.

2.1.6 Electrical and Other Utilities

The majority of the float systems have overhead electrical and lighting. This includes power cables stung between piling that also act as light poles. Some of the power pedestals are 1960s and 1970s vintage, which typically have a 20 year life expectancy and should be replaced. Some of the electrical distribution systems are also of 1960s and 1970s vintage and need to be upgraded with new cables and distribution panels. Many of the more critical issues identified are related to electrical utilities. Most of the feed wires are under-sized for modern codes. Many of the power pedestals are in poor shape and or have less capacity than is desirable. In general, lighting utilizes "barnyard" style luminaries that generally spread light in a wide area and many lamps are mercury vapor type, which have low efficiency. Newer luminaries are high-pressure sodium lamps with golden yellow light which is more visible in inclement weather and is more efficient for energy consumption and lamp maintenance.

The majority of the float systems have on-float potable water. Typically this is provided by a submerged water system and insulated hose bib risers. Fire protection is provided by 125-pound ABC dry chemical fire extinguishers stored in aluminum housings distributed along the float system.

2.1.7 Slip Size and Layout

In general, there is an abundance of slips for smaller vessels and comparatively few for larger vessels in the existing Wrangell harbors. The vast majority of the slips are less than 30 feet long. Since the design of these harbors, average boat sizes have increased dramatically. Most harbors now report that the largest number of vessels both using the harbor and on the waiting lists are between 30 and 50 feet long. The current waiting list for the Wrangell harbor reflects this trend to larger vessels. The waiting list contains the following vessels:

Table 2.1-2 Waiting List

Waiting List	Number	Percentage
Less than 30 feet	8	15.7%
30 to 39 feet	8	15.7%
40 to 49 feet	25	49.0%
Greater than 50 feet	10	19.6%
Totals	**51**	**100%**

The existing harbors currently provide the following numbers of slips arranged by size:

Table 2.1-3 Existing Slips

Slip Size Range	Number	Percentage
30 feet and smaller	394	81.7%
32 feet	16	3.3%
40 feet	30	6.2%
50 feet	22	4.6%
60 feet	20	4.2%
Totals	**482**	**100%**

Note that by comparing the waiting list to the existing slip count it can be seen that additional larger slips are needed in the harbors. Also note that the slip count does not take into consideration the parallel moorage area or transient use. These areas and types of uses also tend to be used more by the larger vessels.

Many of the slips in the harbor are 3 to 3.5 feet wide. This is quite narrow compared to modern standards and is typically only used for skiffs and vessels less than about 20 feet

long. Narrow fingers can have problems with stability and twisting under both pedestrian and mooring loads.

2.2 Inspection Results

The inspection results are divided into four distinct groups of items for each harbor these include:

- Critical Items
- Primary Items
- Secondary Items
- Harbor Staff / Heavy Maintenance Items

Critical items are those things, which are either blatant code violations or pose a safety risk to the public. Typically these are related to the electrical system.

Primary items are those things, which are required to bring the harbor up to serviceable standards. They include some code violation items that are not necessarily related to a direct safety risk. For example, some gangway replacements as well as a dry standpipe fire system are included in this group. These items are regulated by the Americans with Disabilities Act (ADA) and NFPA standards. However, they are typically not strictly enforced and many harbors have been out of compliance for years.

Secondary items are things that affect the general level of service but are not absolutely required for operation. These include items such as wider fingers, new bullrails and decking, upgraded water systems, and other less imperative items.

Harbor staff heavy maintenance items include things that may be possible to accomplish by the harbor maintenance staff. These include the installation of life rings, the installation 2x8 timber rub strips, replacement of timber decking, installation of hose stanchions, through bolts, and flotation billets.

What follows is a description of the results of the inspection:

2.2.1 Reliance Harbor

Reliance Harbor is located in the center area of the Wrangell Harbor. It is adjacent to the harbormasters office. The float system is of timber construction that is typical of the standard State of Alaska design. The floats are restrained by timber piling. Access to the harbor is via a newer model 6-foot by 66-foot covered aluminum gangway. This gangway leads to a 12-foot wide log boom timber access float that was in fair condition. This float acts as a partial wave barrier. The timber access float links to a 10-foot wide timber main float. The west side of the main float is parallel moorage for transient use. There are several 6-foot wide main floats with slips located along the east side of the main float. There are twelve 3-foot by 24-foot fingers and ten 3.5-foot by 30-foot fingers. Utilities include overhead electrical and lighting, submerged PVC potable water, and 125-pound ABC dry chemical fire extinguishers. Figures 2.2-1 through 2.2-7 are

photographs of existing conditions at Reliance Harbor. A plan view of existing conditions at this harbor is shown on Sheet C02 of Appendix D.

The float system is in serviceable condition. There is evidence of recent maintenance in terms of replaced decking. Several of the vessels in the 30-foot stalls are fairly large, heavy, commercial fishing boats. Many are longer than the slips and could be overloading them. The gangway is too short to meet modern ADA standards. Recommended modifications for this harbor are shown on Sheet C07 of Appendix D.

Electrical systems and recommended repairs and renovations are described in detail in Appendix A; however, notable issues are summarized here. The power service equipment is beyond its normal service life and is in poor condition. The feeders are generally in poor condition and the configuration and location of the cable on the deck is considered a safety hazard to people using the floats. In addition, the feeder is undersized for present and future load demand. The ground current monitor appears non-functional and the main distribution panel (MDP) is inadequately rated for the shore-tie loads. In addition, the grounding electrode, meter bases, circuit breakers, and receptacles associated with shore-tie pedestals are in poor condition. Also, luminaries/fixtures and feeder systems are in poor condition with no service life remaining.

What follows is a list of recommended items to be replaced or renovated at Reliance Harbor:

Critical

- Grounding system maintenance
- Lighting system repairs
- Shore tie pedestal repairs
- Replace service feeder to MDP with gangway and float supported type
- Replace the MDP

Primary

- Demolish and replace the gangway and log boom float.
- Install new main float with provisions for under deck utilities including electrical.
- Install new 6x80 gangway and new gangway landing float.
- Install dry standpipe fire system.
- Install additional floatation under main floats and fingers
- Replace the shore tie pedestals
- Supplement and or replace the feeders
- Replace service equipment on approach
- Replace the utility transformer with a larger size to match upgraded capacity
- Replace the lighting system with float mounted luminaries

Secondary

- Install HDPE potable water system
- Install new fingers

Harbor Staff

- Install life rings
- Replace 2x8 timber Rub strips
- Install galvanized components for water system
- Repair decking and bullrails

Reliance Harbor Selected Photos

Figure 2.2-1 Reliance Harbor Gangway

Figure 2.2-2 Reliance Harbor Gangway

Figure 2.2-3 Reliance Harbor

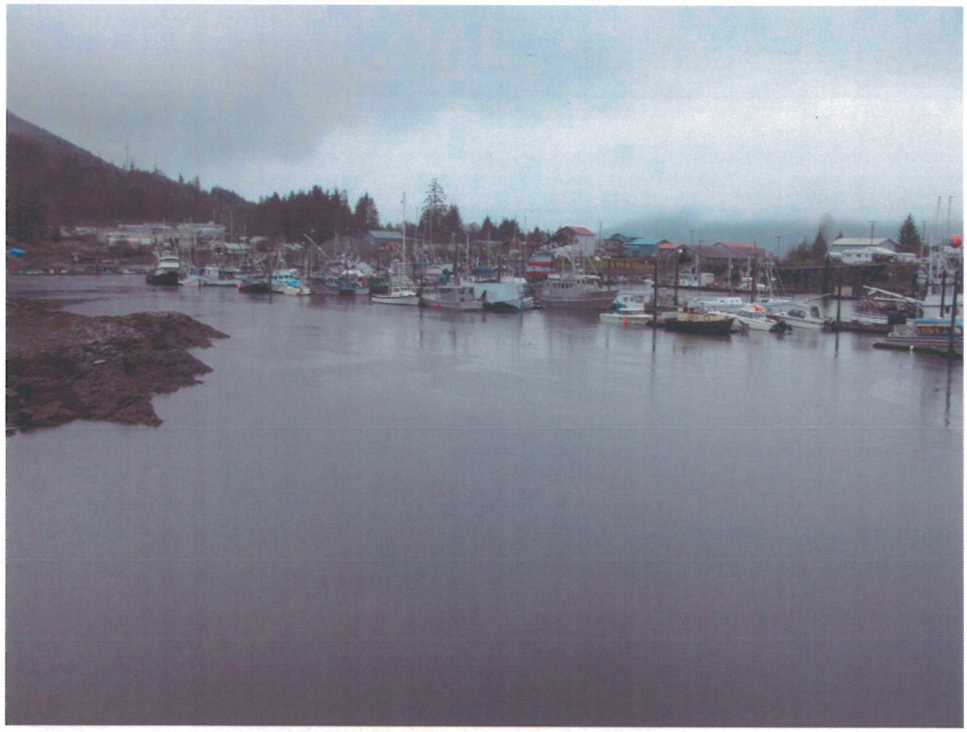

Figure 2.2-4 Reliance Harbor

Figure 2.2-5 Reliance Harbor Main Float

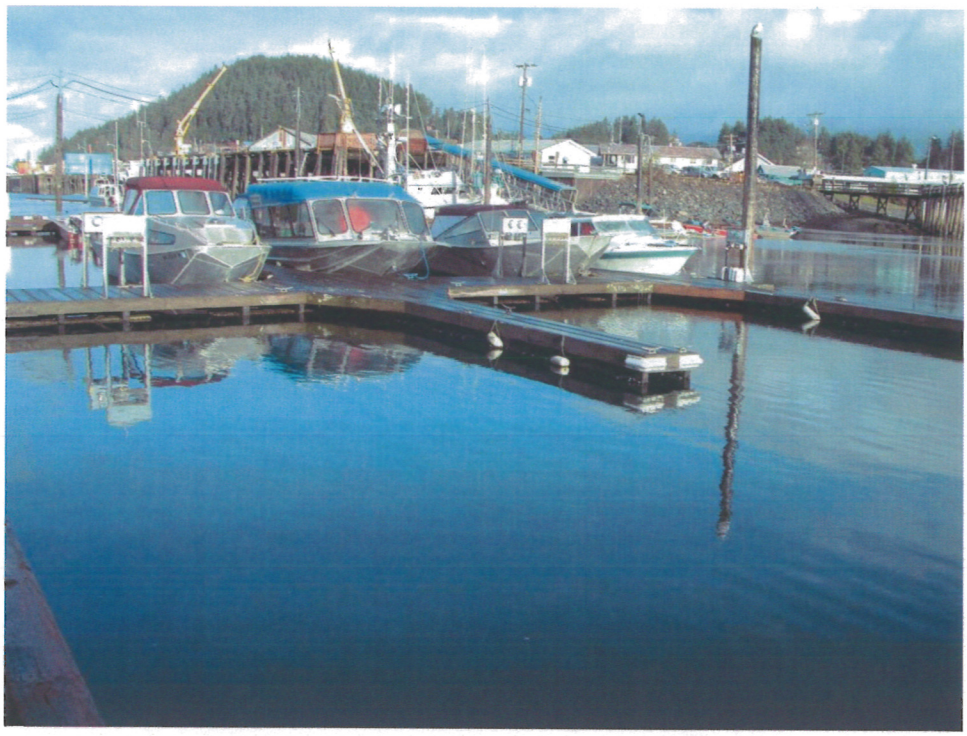

Figure 2.2-6 Reliance Harbor Moorage Floats

Figure 2.2-7 Reliance Harbor Potable Water Riser

2.2.2 Inner Harbor

The Inner Harbor is located in the eastern side of the Wrangell Harbor basin. It consists of timber floats typical of the State of Alaska design. The floats are restrained by timber piling. Access is by a 6' x 50' steel gangway to a timber gangway float. There is a 10-foot wide access float leading to two main floats that each are 10 feet wide and run north and south. There are about thirty-five 3-foot by 17-foot fingers and about twenty-seven 3.5-foot by 30-foot fingers. Utilities include overhead electrical and lighting and submerged potable water. Fire protection consists of 125-pound ABC dry chemical fire extinguishers. There is a fish cleaning table at the intersection of the main and access float. Figures 2.2-8 through 2.2-16 are photographs of existing conditions at Inner Harbor. A plan view of existing conditions at this harbor is shown on Sheet C03 of Appendix D.

The float system is in serviceable condition. The gangway float is in generally poor condition. The gangway is too short to meet modern ADA standards and the transition plate at the bottom of the gangway is missing. Like the Reliance Harbor, many of the vessels are longer than the slips and could be overloading the fingers/piling. Recommended modifications for this harbor are shown on Sheet C08 of Appendix D.

Electrical systems and recommended repairs and renovations are described in detail in Appendix A; however, notable issues are summarized here. The power service main meter and circuit breaker are in fair condition. The feeders are generally in poor to fair condition, poorly supported from the gangway, there's a missing ground conductor, and considered a safety hazard to people using the floats. In addition, the feeder is undersized for present and future load demand. The ground current monitor appears non-functional and the main distribution panel (MDP) is inadequately rated for the shore-tie loads. In addition, the grounding electrode, meter bases, circuit breakers, and receptacles associated with shore-tie pedestals are in poor to fair condition. Also, luminaries/fixtures and feeder systems are outdated and in poor condition with no service life remaining.

What follows is a list of recommended items to be replaced or renovated at Inner Harbor:

Critical

- Grounding system repairs and maintenance
- Lighting system repairs
- Shore tie pedestal repairs
- Re-support the service feeder to the MDP on the gangway

Primary

- Demolish existing and install new 6x80 gangway and new gangway landing float
- Install additional floatation under main floats and fingers
- Install dry standpipe fire system
- Replace shore tie pedestals
- Supplement and or replace feeders
- Replace the MDP

- Replace service equipment on approach
- Replace the utility transformer with a larger size to match the upgraded capacity of the distribution system
- Replace the lighting system with float mounted luminaries

Secondary

- Install new finger floats
- Install HDPE potable water system

Harbor Staff

- Install life rings
- Replace 2x8 timber Rub strips
- Repair decking and bullrails

Inner Harbor Selected Photos

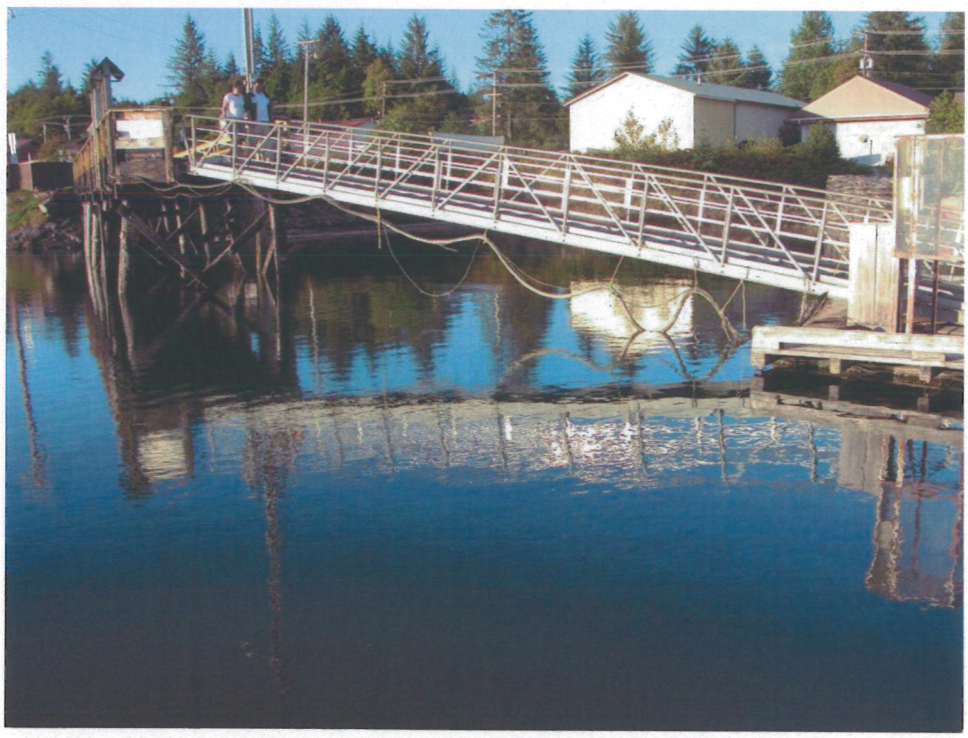

Figure 2.2-8 Inner Harbor Gangway

Figure 2.2-9 Inner Harbor Gangway Landing

Figure 2.2-10 Inner Harbor Gangway Landing

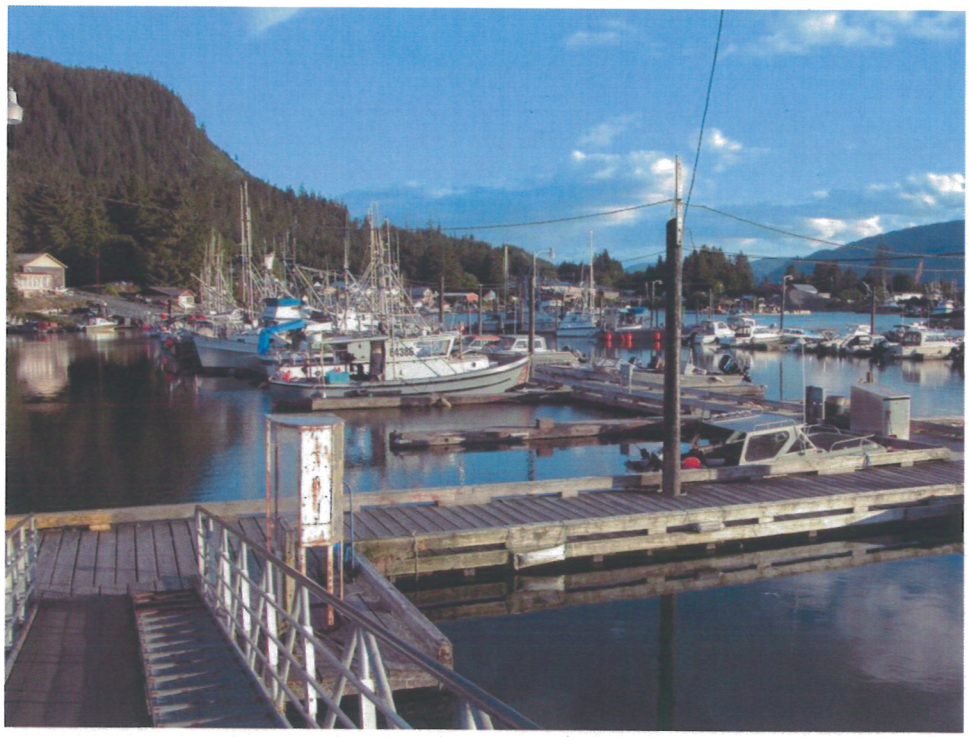

Figure 2.2-11 Inner Harbor

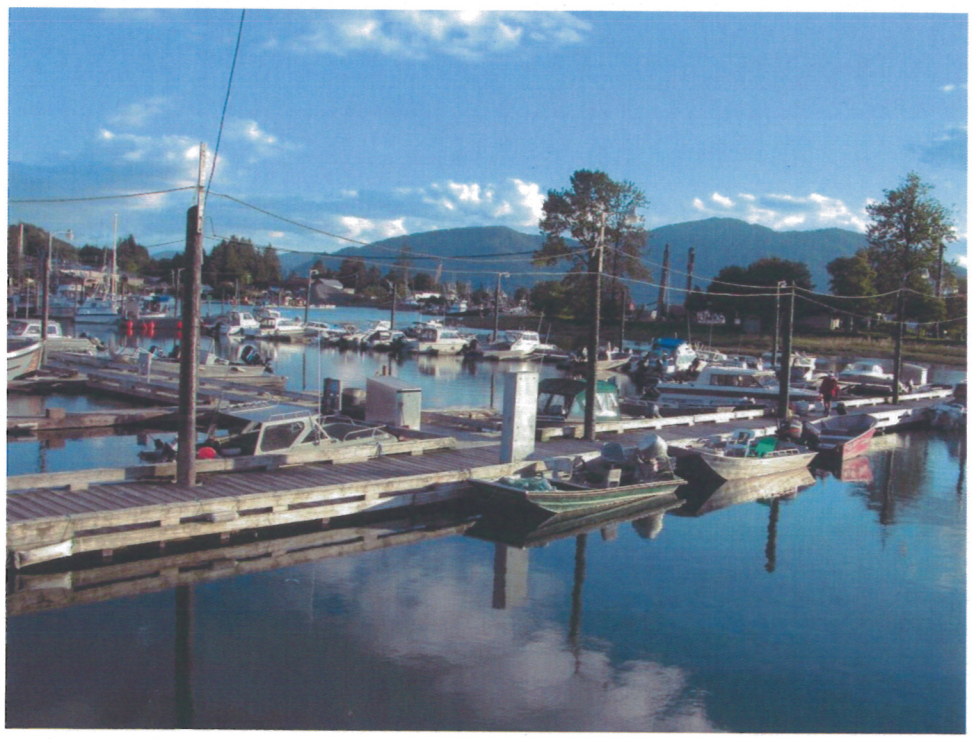

Figure 2.2-12 Inner Harbor

Figure 2.2-13 Inner Harbor Potable Water Riser

Figure 2.2-14 Inner Harbor Main Float

Figure 2.2-15 Inner Harbor Slip Moorage

Figure 2.2-16 Inner Harbor Fish Cleaning Table

2.2.3 Standard Oil Float

The Standard Oil float is located on the west side of the Wrangell Harbor basin. It consists of timber floats, typical of the State of Alaska design. The floats are primarily restrained by timber piling with a few steel piling included. Access to the basin is via a long trestle. The trestle leads to a 6-foot wide by 50-foot long steel gangway. The gangway lands on a timber access float. The timber access float leads to a 10-foot wide timber main float. There are fingers on both the access float and main float. There are nine 3-foot by 17-foot finger floats along the access float. There are six newer 6-foot by 50-foot angled fingers along the main float. Utilities include overhead electrical and lighting and submerged potable water. Fire protection consists of 125-pound ABC dry chemical fire extinguishers. There is a fish cleaning table at the intersection of the main and access float. Figures 2.2-17 through 2.2-25 are photographs of existing conditions at Standard Oil Float. A plan view of existing conditions is shown on Sheet C05 of Appendix D.

The float system is serviceable. The gangway is too short to meet current ADA standards. The access trestle railing does not meet current standards for spacing between rails. The trestle may not meet current minimum load requirements. Recommended modifications for the Standard Oil Float are shown on Sheet C10 of Appendix D.

Electrical systems and recommended repairs and renovations are described in detail in Appendix A; however, notable issues are summarized here. The main circuit breakers, feeder cable supports (routed down gangway), and MDP are in fair condition with less than 5 years of service life expected. The feeders to shore-tie pedestals lie in the water in some locations and are in fair condition. The distribution capacity for the harbor appears less than required by National Electric Code (NEC) for the number of shore-tie pedestals and their rating and the feeders may need to be replaced or supplemented with additional circuits to gain compliance. The pedestals are in poor condition due to lighter structural strength and exposure to damage. The luminaries/fixtures and feeder system are outdated and in poor condition.

What follows is a list of recommended items to be replaced or renovated:

Critical

- Grounding system maintenance
- Lighting system repairs
- Shore tie pedestal repairs
- Repair feeder cable support system on gangways

Primary

- Demolish existing and install new 6x80 gangway and new gangway landing float
- Install new gangway float
- Install additional floatation under main floats and fingers
- Install dry standpipe for fire protection
- Replace shore tie pedestals

- Supplement and or replace feeders
- Replace service equipment on approach
- Replace the MDP
- Replace the utility transformer with a larger size to match upgraded capacity of distribution system
- Replace the lighting system with float mounted luminaries.

Secondary

- Install HDPE potable water system

Harbor Staff

- Add railing to the access trestle.
- Repair decking and bullrails
- Install life rings
- Replace 2x8 timber Rub strips

Standard Oil Float Selected Photos

Figure 2.2-17 Standard Oil Float Parking Area

Figure 2.2-18 Standard Oil Float Approach Trestle

Figure 2.2-19 Standard Oil Float Approach Trestle

Figure 2.2-20 Standard Oil Float Gangway

Figure 2.2-21 Standard Oil Float Gangway

Figure 2.2-22 Standard Oil Float Gangway

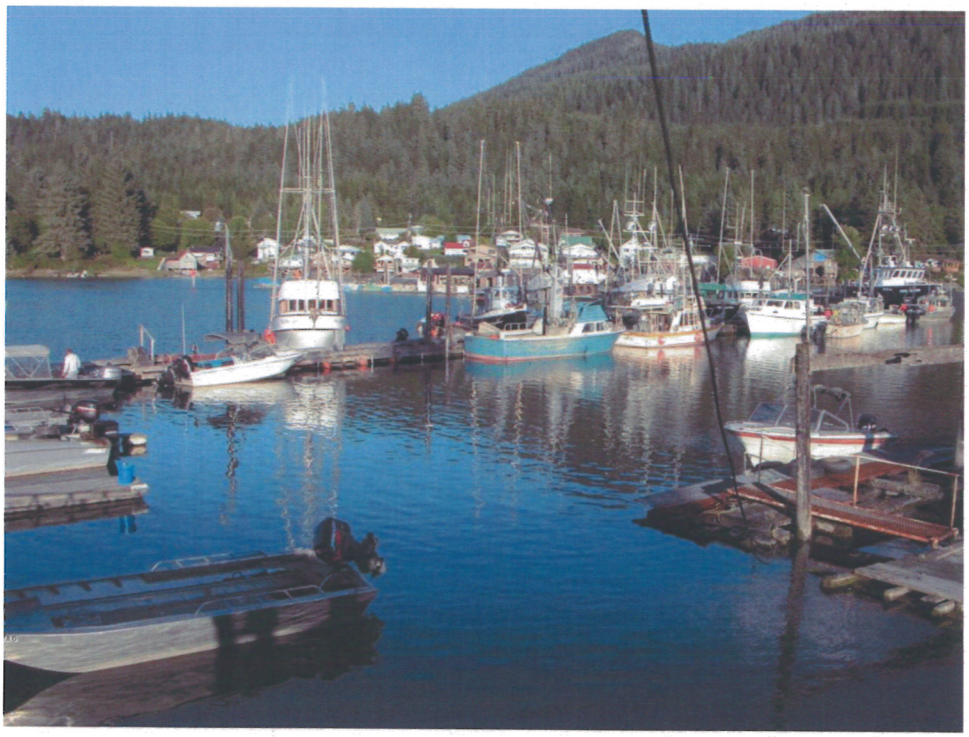

Figure 2.2-23 Standard Oil Float

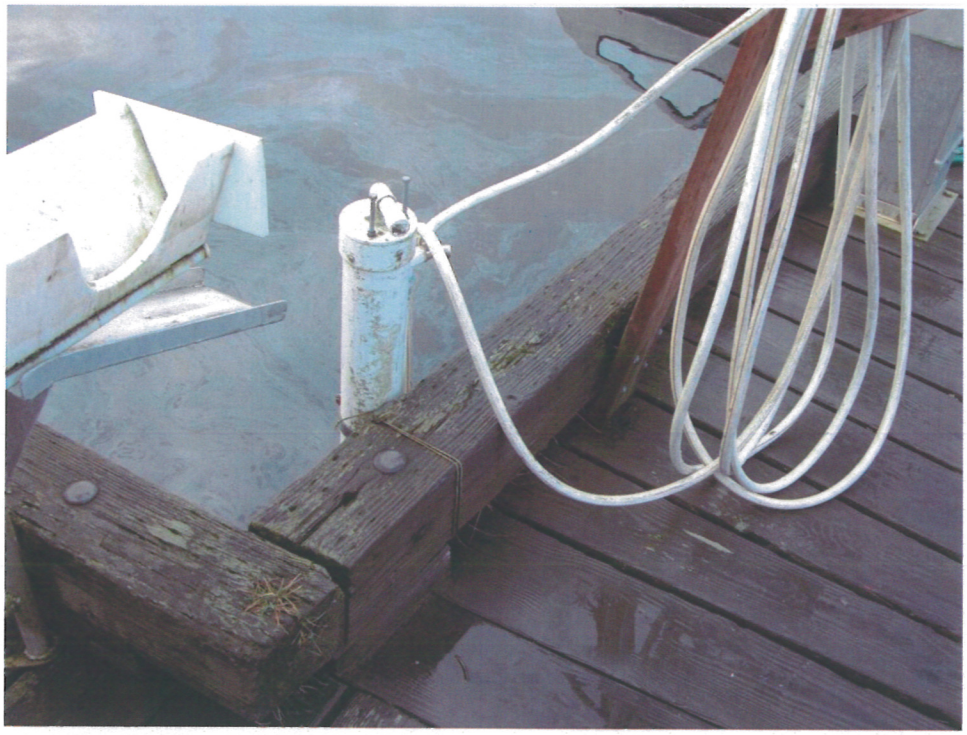

Figure 2.2-24 Standard Oil Float Insulated Potable Water Riser

Figure 2.2-25 Standard Oil Float Moorage Float

2.2.4 Fish and Game Float

The Fish and Game float is located near the entrance to Wrangell Harbor on the northwest side of the basin. Immediately south of the float is a floating complex owned by the US Fish and Wildlife service (not included in this assessment). The Fish and Game float consists of timber floats typical of the State of Alaska design. The floats are restrained by a combination of timber piling and steel piling. Access to the basin is via a 6-foot wide by 50-foot long covered steel gangway. The gangway lands on a timber access float. The timber access float leads to a 10-foot wide timber main float. There are eight 3-foot by 32-foot finger floats and six 3-foot by 17-foot finger floats on the west side of the main float. There is a newer moorage float on the northeast end of the main float that includes a Tee dock and a 50-foot finger float. The majority of the east side of the main float is parallel moorage. Several large tugboats are moored in a rafted condition in this area. Utilities include overhead electrical and lighting and submerged potable water. Fire protection consists of 125-pound ABC dry chemical fire extinguishers. There is a fish cleaning table at the intersection of the main and access float. Figures 2.2-26 through 2.2-37 are photographs of existing conditions at the Fish and Game Float. A plan view of existing conditions is shown on Sheet C04 of Appendix D.

The Fish and Game float is in poor condition. Portions of the main float are bowed out of position, the obvious result of overloading. It appears that additional piling have been driven in several places in an attempt to provide a temporary solution to this problem. There is grass growing out of the decking in several places indicating a rot condition of the timber. The gangway is too short to meet ADA standards. Also, the bottom of the gangway is missing the transition plate. The Tee float is of newer construction and is in serviceable condition. Recommended modifications for the Fish and Game Float are shown on Sheet C09 of Appendix D.

Electrical systems and recommended repairs and renovations are described in detail in Appendix A; however, notable issues are summarized here. The MDP includes a ground monitoring relay that appears to be inoperative. The service feeder that runs down the gangway to the MDP is susceptible to abrasion and strain from gangway movements and is in fair condition. The tugboat barge service was installed as a temporary service several years ago and is in poor condition and considered a potential safety hazard. Shore-tie pedestals appear in fair condition and some have been damaged and require repair and maintenance to extend service life. Some of the lighting fixtures are not operational and the feeder system is also in poor condition. If it is decided not to replace the entire float system this year, the items listed below as critical should be accomplished at a minimum.

What follows is a list of recommended items to be replaced or renovated:

Critical

- Replace the temporary circuiting to tugboat barge with a new feeder from the MDP
- Grounding system maintenance

- Lighting system repairs
- Shore tie pedestal repairs
- Repair feeder cable support system on gangway

Primary

- Replace the entire float system and gangway. Provide an alternative layout to allow for large vessel stalls on east side. Provide new under deck electrical, new potable water and new fire system. Salvage some of the newer floats from the northeast end of the system for possible reuse.
- Replace shore tie pedestals
- Replace Feeders
- Replace service equipment on approach and include master meter

Secondary

- Replace the MDP

Fish and Game Float Selected Photos

Figure 2.2-26 Fish and Game Float Trestle

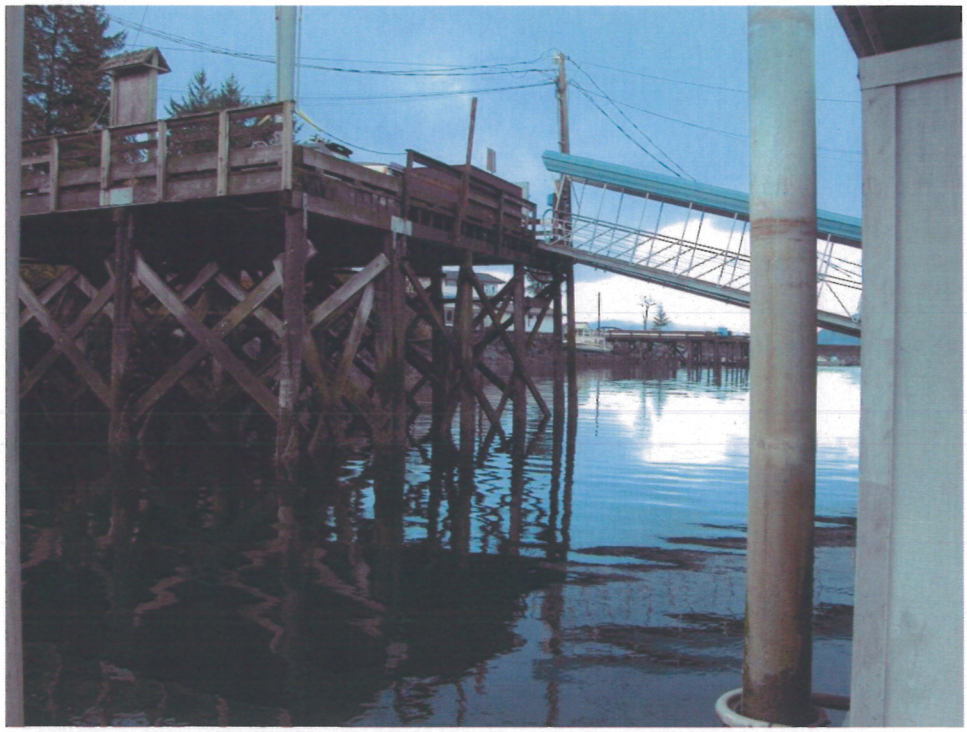

Figure 2.2-27 Fish and Game Float Trestle and Gangway

Figure 2.2-28 Fish and Game Float Gangway

Figure 2.2-29 Fish and Game Float Gangway Landing

Figure 2.2-30 Fish and Game Float, USFS Float

Figure 2.2-31 New Section of Fish and Game Float

Figure 2.2-32 Fish and Game Float Tee Float

Figure 2.2-33 Main Float, Fish and Game Float

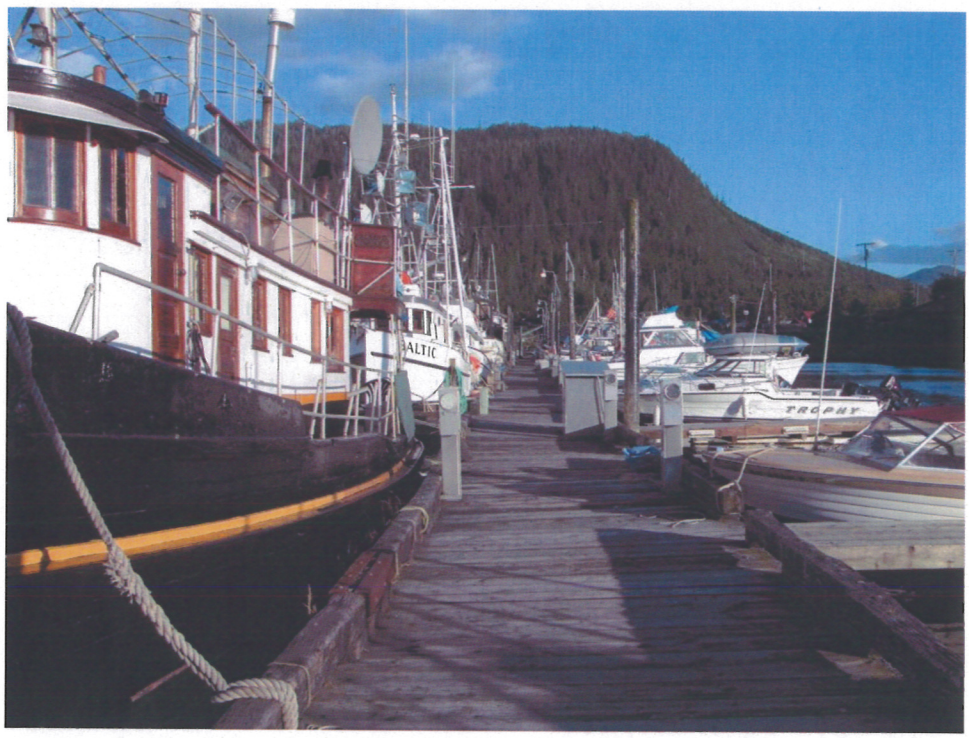

Figure 2.2-34 Main Float, Fish and Game Float

Figure 2.2-35 Fish and Game Float Rafted Tugs

Figure 2.2-36 Finger Float, Fish and Game Float

Figure 2.2-37 Finger Float, Fish and Game Float

2.2.5 Shoemaker Bay

Shoemaker Bay is located about 5 miles south of the City of Wrangell. The floats are modular concrete typical of a Bellingham Marine Inc. design. The floats are restrained by a combination of timber piling and steel piling. Access to the basin is via two trestles and gangways. The north gangway is a newer 6-foot by 80-foot aluminum unit. The south gangway is a shorter 6-foot wide by 50-foot long steel gangway. The gangways land on a marginal or head walk float. There are five 10-foot wide main floats leading off of the marginal float. There are four 5-foot by 60-foot fingers and six 4-foot by 50-foot fingers on the north main float. On the second from the northernmost main float there are fourteen 3-foot by 40-foot fingers. The middle float has eighteen 3-foot by 30-foot fingers. The second float from the south also has eighteen 3-foot by 30-foot fingers. The southernmost main float has twenty-six 3-foot by 20-foot fingers. In addition, there are twenty-five 3-foot by 20-foot fingers along the east side of the marginal float. Utilities include overhead electrical and lighting and submerged PVC potable water. Fire protection consists of 125-pound ABC dry chemical fire extinguishers. Figures 2.2-38 through 2.2-48 are photographs of existing conditions at Shoemaker Bay. A plan view of existing conditions at this harbor is shown on Sheet C06 of Appendix D.

The Shoemaker Bay float system is in serviceable condition. The southern gangway is too short to meet ADA standards. There are a number of float modules that have had extensive concrete cracks and field repairs to the decking. Recommended modifications for this harbor are shown on Sheet C11 of Appendix D.

Electrical systems and recommended repairs and renovations are described in detail in Appendix A; however, notable issues are summarized here. The ground monitoring system did not appear operational at the time of the survey. The service feeder from the main disconnect to the MDP is in fair condition and is undersized for present and future load demand. The feeder from the MDP to the shore-tie pedestals is also in fair condition. The grounding system is in fair condition and requires cleaning and a new electrode. The meter bases associated with shore-tie pedestals are in fair condition and some require replacement due to corrosion. The associated circuit breakers and receptacles are in poor condition. Luminaries/fixtures and feeder systems are in fair condition.

What follows is a list of items to be replaced or renovated:

Critical

- Grounding system repairs and maintenance
- Lighting system repairs and maintenance
- Shore tie pedestal repairs and maintenance

Primary

- Replace selected concrete float modules with new units.
- Install a new gangway float under north gangway.
- Install flotation billets to raise freeboard throughout harbor
- Replace shore tie pedestals to gain greater capacity for each vessel
- Supplement and or replace feeders to gain more system capacity
- Replace the MDP to gain greater capacity
- Replace service equipment to gain greater capacity

Secondary

- Install new HDPE potable water system
- Replace south gangway with a new 6-foot x 80-foot aluminum (or salvaged from Reliance Harbor) unit. This will require trestle modifications.
- Replace the utility transformer with a larger size to match the upgraded capacity of the distribution system
- Replace the lighting system with float-mounted luminaries

Harbor Staff

- Install life rings
- Replace 2x8 timber Rub strips
- Install and tighten through bolts
- Replace selected 3 x 8 timber walers
- Install galvanized components for water system

Shoemaker Bay Selected Photos

Figure 2.2-38 Shoemaker Bay North Trestle Approach

Figure 2.2-39 Shoemaker Bay South Trestle Approach

Figure 2.2-40 Shoemaker Bay North Gangway

Figure 2.2-41 Shoemaker Bay North Gangway

Figure 2.2-42 Shoemaker Bay North Gangway Landing

Figure 2.2-43 Shoemaker Bay South Gangway

Figure 2.2-44 Shoemaker Bay South Gangway Landing

Figure 2.2-45 Shoemaker Bay South Mooring Float

Figure 2.2-46 Shoemaker Bay Potable Water Riser

Figure 2.2-47 Shoemaker Bay Deteriorated Deck

Figure 2.2-48 Shoemaker Bay Deteriorated Deck

3.0 Preliminary Scope of Work

A preliminary scope of work for each harbor has been identified based on the list of deficiencies identified in the previous section. After some discussion, it was decided to advance a general strategy for the renovations. Where new floats and components are added, these typically begin at the shore and work outward. For example because virtually all of the harbors have issues with gangways and electrical service, the preliminary scope of work typically includes installing a new aluminum gangway along with a new gangway float and a new electrical service run from the shore down the gangway and to an on-float electrical distribution panel. This sets the stage for further renovations and or replacement at a later date.

Many of the critical and preliminary phase items are related to electrical utilities. Most of the feed wires are under-sized for modern codes. Many of the power pedestals are in poor shape and or have less capacity than is desirable. A general strategy is to install the electrical below deck level. Lighting can be from deck mounted luminaries as opposed to the pile mounted system currently in place. This removes the potential safety issue with contacting live electrical wires with ship masts or antennas.

Floats that are to remain typically require the addition of flotation billets to increase freeboard. This could be done under separate contract to local construction companies. Differing sizes of coated billets can be supplied and installed in a manner that brings the freeboard of all remaining floats up to 16 to 20 inches.

The scope of work includes a fairly significant amount of work that may be completed by the harbor staff or temporary/skilled labor. This includes replacing deck boards, rub strips and bullrails. There are several ways that this work could be achieved. One method is for the City to purchase a bulk order of treated timber materials in the typical sizes required. An ongoing maintenance project could then be initiated using existing staff supplemented with seasonal employees. Alternatively, some type of force account could be used. This would include hiring local skilled labor on an on-going small project basis.

Some harbors, such as the City of Valdez, are now installing previously designed fused HDPE piping systems. This requires the purchase of a fusing machine and some special training. The City of Valdez reports that there was an initial capital outlay followed by a fairly significant amount of in-house maintenance to replace large sections of the harbor water system. They report that their system is now primarily fused together HDPE and that it is considerably more reliable than it was in the past (see attached e-mail in the appendix of this document). It is recommended that the City of Wrangell follow this idea. The cost estimates include provisions for the purchase of a fusing machine and some training..

The following subsections outline a preliminary scope of work for each harbor.

3.1 Reliance Harbor – Preliminary Scope of Work

3.1.1 Critical

Grounding System Repairs and Maintenance
Lighting System Repairs and Maintenance
Shore-tie Pedestal Repairs and Maintenance
Replace Service Feeder to the MDP
Replace the MDP

3.1.2 Phase 1

Removal of the Existing Floats, Piling, and Utilities
Remove and Salvage Existing Gangway
Furnish and Install 12' Wide Timber Float
Furnish and Install 20' x 20' Timber Gangway Float
16" Diam. X ½" Wall, Steel Piles, Furnished and Driven
130 lb Anode, Furnished and Installed
Furnish and Install 6' x 80' Aluminum Gangway
Replace Utility Transformer
Replace Service Equipment
Replace Service Feeder to the MDP
Replace the MDP
Connection and Retrofit @ New to Existing Float Intersections

3.1.3 Phase 2

Leveling Flotation, Furnished

Leveling Flotation, Installed
Furnish and Install Potable Water System on Floats
Furnish and Install Fire Protection System on Floats
Replace Shore-tie Pedestals
Replace Shore-tie Feeders
Replace the Lighting System

3.1.4 Phase 3

New 4' x 24' Fingers

3.1.5 Harbor Staff

Furnish and Install Life Rings on Floats
Furnish and Install Safety Ladders on Floats
Replace Decking
Replace Bullrails
Replace Rub Rails

3.2 Inner Harbor – Preliminary Scope of Work

3.2.1 Critical

Repair Feeder Support on Gangway
Grounding System Repairs and Maintenance
Lighting System Repairs and Maintenance
Shore-tie Pedestal Repairs and Maintenance

3.2.2 Phase 1

Removal of the Existing Floats, Piling, and Utilities
Remove and Salvage Existing Gangway
Demolish Section of Trestle
Furnish and Install 16' x 20' Timber Gangway Float
16" Diam. X ½" Wall, Steel Piles, Furnished and Driven
130 lb Anode, Furnished and Installed
Furnish and Install 6' x 80' Aluminum Gangway
Replace Utility Transformer
Replace Service Equipment
Replace the MDP and Feeder

3.2.3 Phase 2

Leveling Flotation, Furnished
Leveling Flotation, Installed
Furnish and Install Potable Water System on Floats
Furnish and Install Fire Protection System on Floats
Replace Lighting
Replace Shore-tie Pedestals
Replace Shore-tie Feeders

3.2.4 Phase 3

4' x 30' and 3.5' x 31' Fingers Removed
New 4' x 30' Fingers Furnished and Installed
16" Diam x ½" Wall, Steel Piles, Furnished and Driven
130 lb Anode, Furnished and Installed

3.2.5 Harbor Staff

Furnish and Install Life Rings on Floats
Furnish and Install Safety Ladders on Floats
Replace Decking
Replace Bullrails
Replace Rub Rails

3.3 Standard Oil Float – Preliminary Scope of Work

3.3.1 Critical

Repair Feeder Support on Gangway
Grounding System Repairs and Maintenance
Lighting System Repairs and Maintenance
Shore-tie Pedestal Repairs and Maintenance

3.3.2 Phase 1

Removal of the Existing Floats, Piling, and Utilities
Remove and Salvage Existing Gangway
Demolish Section of Trestle
Furnish and Install 20' x 20' Timber Gangway Float
16" Diam. X ½" Wall, Steel Piles, Furnished and Driven
130 lb Anode, Furnished and Installed
Furnish and Install 6' x 80' Aluminum Gangway
Replace Utility Transformer
Replace the MDP and Feeder
Replace Service Equipment

3.3.3 Phase 2

Leveling Flotation, Furnished
Leveling Flotation, Installed
Furnish and Install Potable Water System on Floats
Furnish and Install Fire Protection System on Floats
Replace Lighting
Replace Shore-tie Pedestals
Replace Shore-tie Feeders

3.3.4 Phase 3

None

3.3.5 Harbor Staff

Furnish and Install Life Rings on Floats
Furnish and Install Safety Ladders on Floats
Replace Decking
Replace Bullrails
Replace Rub Rails
Trestle Handrail

3.4 Fish and Game Float – Preliminary Scope of Work

3.4.1 Critical

Replace Feeder and Service Equipment to Tugboat Barge
Grounding System Repairs and Maintenance
Lighting System Repairs and Maintenance
Shore-tie Pedestal Repairs and Maintenance

3.4.2 Phase 1

Removal of the Existing Floats, Piling, and Utilities
Remove and Salvage Existing Gangway
Cut Existing 10' x 75' Timber Float
Furnish and Install New Floats
Furnish and Install 20' x 20' Timber Gangway Float
16" Diam. X ½" Wall, Steel Piles, Furnished and Driven
130 lb Anodes, Furnished and Installed
Furnish and Install 6' x 80' Aluminum Gangway
Furnish and Install Potable Water System on Floats
Furnish and Install Fire Protection System on Floats
Replace Shore-tie Pedestals
Replace Shore-tie Feeders
Replace Service Equipment
Replace MDP and Feeder
Replace Lighting

3.4.3 Phase 2

None

3.4.4 Phase 3

None

3.4.5 Harbor Staff

Furnish and Install Fire Extinguishers on Floats
Furnish and Install Life Rings on Floats
Furnish and Install Safety Ladders on Floats

3.5 Shoemaker Bay – Preliminary Scope of Work

3.5.1 Critical

Grounding System Repairs and Maintenance
Lighting System Repairs and Maintenance
Shore-tie Pedestal Repairs and Maintenance

3.5.2 Phase 1

Removal of Existing Damaged Float Modules
Removal & Salvage Existing Gangway
Demolish Section of Trestle
Furnish and Install New Gangway Floats
Furnish and Install 6' x 80' Aluminum Gangway
Furnish and Install New Float Modules
Replace Service Equipment
Replace and Add MDP Feeders
Replace and add MDP

3.5.3 Phase 2

Leveling Flotation, Furnished
Leveling Flotation, Installed
Furnish and Install HDPE Potable Water System on Floats
Furnish and Install HDPE Fire Protection System on Floats
Replace the Lighting System
Replace Shore-tie Pedestals
Upgrade Shore-tie Feeders

3.5.4 Phase 3

Replace the Utility Transformer

3.5.5 Harbor Staff

Furnish and Install Life Rings on Floats
Furnish and Install Safety Ladders on Floats
Through Bolts and Walers

3.6 Harbor Staff Equipment, Supplies, and Labor

The preliminary work that may be achieved by local harbor staff involves budgeting funds for equipment and supplies and training for the harbor staff. Equipment items include a McElroy HDPE fusion machine and some heavy-duty nail guns. Materials include a bulk order of treated timber for decking, rub strips, bullrails, and hardware. In addition, funds are budgeted for fasteners and HDPE pipe and fittings.

It is recommended that the harbor department hire part time local labor to complete a number of the repairs "in house". This should be a minimum of two semi skilled workers for about 4 months each summer. These maintenance personnel will replace decking, sideboards and bullrails and will perform other maintenance items.

4.0 Cost Estimates

Appendix E includes detailed preliminary cost estimates for the renovation of each harbor as well as costs for typical supplies that would be required to complete the harbor staff designated work. In addition, Appendix E includes a Cost Summary categorized by Critical, Phase 1, Phase 2, Phase 3, and Harbor Staff. The cost estimates are based on current market values for typical harbor projects. Unit costs were estimated based on a number of recent harbor expansion and renovation projects.

Mobilization is shown as 12% of the estimated construction costs. Actual mobilization will vary with the project. For example, mobilization for barge mounted pile driving and drilling can be expected to be significantly higher than a mobilization for the repair of timber decking. Contingency is shown as 20%, which is appropriate for a planning document.

It is recommended that the Critical, Phase 1, and Harbor Staff items be completed in the initial project. The critical items category includes items that should be completed at minimum. Therefore, the cost estimates show Critical items that may also be included in Phase 1 work and are not included in the total cost. For example, all of the electrical systems repairs and maintenance listed as Critical for the Fish and Game Float would not be necessary if the entire float system is replaced as part of the initial project because the float system replacement includes a new electrical system. The total preliminary costs (rounded to nearest thousand) for each harbor is summarized in Table 4.0-1.1

Table 4.0-1 Preliminary Costs for Each Harbor, Wrangell, Alaska

Harbor	Total Cost to Renovate	Phased Construction Costs				
		Critical	Harbor Staff	Phase 1	Phase 2	Phase 3
Reliance Harbor	$1,698,000	$38,000	$45,000	$ 408,000	$750,000	$38,000
Inner Harbor	$1,559,000	$11,000	$56,000	$ 176,000	$606,000	$300,000
Standard Oil	$ 635,000	$ 7,000	$23,000	$ 170,000	$262,000	$ 0
Fish & Game	$1,874,000	$11,000	$10,000	$1,372,000	$ 0	$ 0
Shoemaker Bay Harbor	$2,437,000	$20,000	$44,000	$ 343,000	$1,388,000	$ 8,000
Totals	**$8,203,000***	**$87,000**	**$184,000**	**$2,469,000**	**$3,006,000**	**$346,000**

*Total cost for all harbors assumes Critical, Harbor Staff, and Phase 1 are completed in one project/year.

5.0 Contracting Strategies

There are several different approaches that can be used for the float replacement project:

1.) Complete design and bidding the entire package, including float fabrication and installation as one contract.
2.) Award two separate bids, one for float procurement and the other for float installation, including all site civil work. If the floats are procured separately, there is the potential for saving money by eliminating the general contractor's mark-up on a relatively large purchase. This method also can ensure high quality by removing the float units from the pressures of the low bid environment. Or,
3.) Providing a performance specification for the float system and bidding the entire package to a single contact.

With regard to the float design itself, there are two ways this can be approached:

1.) Provide a fully designed float system, or
2.) Provide a schematic plan combined with a performance specification. In the fully designed float system all of the details required to fabricate and erect the float system are provided in the bid package. All bidders are required to bid on the identical system; nothing is left to the supplier's discretion. In the other approach, each supplier can use its standard details and methods to the extent that they meet the performance criteria contained in the specifications.

The specific contracting method to be used for this project will require further research and discussions with the City of Wrangell in order to meet the City's specific needs, which to some extent may be driven by funding and scheduling issues. As Engineer, our role is to provide technically sound advice so that the City can make an informed decision.

6.0 Conclusions, Recommendations, and Future Work

This document summarizes the needs and provides a prioritized list of projects for the renovation of the Wrangell Harbors. Budget cost estimates are also provided. Some $8.5 million worth or repairs, renovations, and replacements are identified.

It is recommended that the City begin with the Critical, Phase 1 and Harbor Staff modifications listed in this report. Of these items, several capital improvement projects could be advanced.

Some of the natural groups of projects that can be identified include:

- Fish and Game Float replacement.
- Harbor Staff equipment and bulk material purchase.
- A contract to furnish and install all required new gangways and gangway floats.
- A contract to furnish and install all required new electrical service from the shore to the gangway floats
- A contract to furnish and install all new main float replacements identified.

The recommended pan is to renovate the harbors from the landside working out. This will include installing a number of new gangways and at the same time installing new electrical service to the harbor. The electrical service will typically be placed under the gangway and to a distribution panel located on the gangway float. This will take care of a number of critical problems and will set the stage for future improvements at each harbor.

The Wrangell Harbor Department has indicated that it will be beneficial to wait until the new Heritage Harbor is completed prior to beginning replacement of the Fish and Game Float. This will provide a temporary moorage location for the vessels during construction. Based on this no work on this harbor will begin until late 2006. What follows is a proposed phase one construction scope of work.

6.1 Reliance Harbor – Phase One Scope of Work

Grounding System Repairs and Maintenance
Lighting System Repairs and Maintenance
Shore-tie Pedestal Repairs and Maintenance
Replace Utility Transformer
Replace Service Equipment
Replace Service Feeder to the MDP
Replace the MDP
Removal of the Existing Floats, Piling, and Utilities on Gangway and Approach Floats
Remove and Salvage Existing Gangway
Furnish and Install 12' Wide Timber Approach Float
Furnish and Install 20' x 20' Timber Gangway Float
Furnish and Install 6' x 80' Aluminum Gangway
Connection and Retrofit @ New to Existing Float Intersections

6.2 Inner Harbor – Phase One Scope of Work

Grounding System Repairs and Maintenance
Lighting System Repairs and Maintenance
Shore-tie Pedestal Repairs and Maintenance
Replace Utility Transformer
Replace Service Equipment
Replace the MDP and Feeder
Removal of the Existing Gangway Float
Remove and Salvage Existing Gangway
Demolish Section of Trestle
Furnish and Install 16' x 20' Timber Gangway Float
Furnish and Install 6' x 80' Aluminum Gangway

6.3 Standard Oil Float – Phase One Scope of Work

Grounding System Repairs and Maintenance
Lighting System Repairs and Maintenance
Shore-tie Pedestal Repairs and Maintenance
Replace Utility Transformer
Replace the MDP and Feeder
Replace Service Equipment
Removal of the Existing Gangway Float
Remove and Salvage Existing Gangway
Demolish Section of Trestle
Furnish and Install 20' x 20' Timber Gangway Float
Furnish and Install 6' x 80' Aluminum Gangway

6.4 Fish and Game Float – Phase One Scope of Work

Replace Feeder and Service Equipment to Tugboat Barge
Grounding System Repairs and Maintenance
Lighting System Repairs and Maintenance
Shore-tie Pedestal Repairs and Maintenance

6.5 Shoemaker Bay – Phase One Scope of Work

Grounding System Repairs and Maintenance
Lighting System Repairs and Maintenance
Shore-tie Pedestal Repairs and Maintenance
Replace Service Equipment
Replace and Add MDP Feeders
Replace and add MDP
Removal of Existing Damaged Float Modules
Removal & Salvage Existing Gangway

Demolish Section of Trestle
Furnish and Install New Gangway Floats
Furnish and Install New 6' x 80' Aluminum Gangway
Furnish and Install New Float Modules

7.0 Appendices

Appendix A -	**Electrical Report**
Appendix B -	**Geotechnical Memo**
Appendix C -	**E-mail Related to Valdez Harbor HDPE Fusing System**
Appendix D -	**Drawings**
Appendix E-	**Cost Estimates**

APPENDIX A

Wrangell Harbor Condition Assessment and Renovation Study

Draft Report

Volume 2
Electrical Systems

Prepared for

The City of Wrangell

January 2005

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Table of Contents

Introduction and Background 1

Scope and Approach of Work 1

Fish & Game Float 3

Standard Oil Float (Outer Harbor) 5

Reliance Harbor 7

Inner Harbor 10

Shoemaker Bay Harbor 13

Cost Estimate 18

City of Wrangell
Harbors Condition Survey
Electrical Systems

January 2005

INTRODUCTION AND BACKGROUND

In December of 2004, Ben Haight , Haight & Associates, Inc., a Juneau-based electrical engineering consulting firm, inspected the electrical systems at the Fish & Game Float, the Standard Oil (Outer Harbor) Float, Reliance Harbor, Inner Harbor, and Shoemaker Bay Harbor. The inspection was provided as part of the condition survey by Tryck, Nyman, Hayes, Inc. This is part of the joint report.

SCOPE AND APPROACH OF WORK

The harbors inspected were Fish & Game Float, the Standard Oil (Outer Harbor) Float, Reliance Harbor, Inner Harbor, and Shoemaker Bay Harbor. The inspection was limited to visual inspection, removal of some panel and electric service pedestal covers, and the measurement and recording of some feeder voltages and amperages. The inspection at the Fish & Game Float was limited to determining the condition of the present shore-tie pedestals, distribution equipment, and service equipment, since the present float will be replaced in the new future. These components may be useful for future projects.

The general purpose of the inspection was to assess the present condition of the electrical service and distribution system, shore-tie pedestals, and lighting at each harbor. An ancillary purpose includes noting where hazards existed, either of a personnel safety variety or in the nature of impacts to the reliability and continuity of electric power service. In addition, better design or construction methods that will improve the condition or the service of the electrical system, extend its life, lower it's cost of operation, or yield a more-easily maintained network are identified.

It is difficult to assess the history of the electrical system in the harbors. Many items are not clearly marked or the markings have worn away with time. Drawings for some of the original installations are no longer available, or are difficult to find. The subsequent projects to extend or renovate the systems do not show all of the systems. And many of the repairs or renovations are not documented. However, some component features are characteristic of certain construction eras. For example, in some of the harbors, the luminaires are installed on structural metal frames mounted to the top of the pilings. These are characteristic of a design popular in the 1960s, 1970s, and early 1980s. By cross referencing several features, approximate age of components is determined.

From an electrical point of view, it is not so important to know the history of these facilities, how they came to be, or how they got the way they are. The purpose of this report is to narrate a general description of the systems, define the conditions of the systems, and to make recommendations for cost effective renovations or replacements as required to resolve code compliance, safety, capacity, and maintenance problems.

The National Electrical Code (NEC) is the applicable code in force that oversees electrical installations for safety and standardization purposes. NEC where used here, refers to the latest edition (2002) of the National Electrical Code, NFPA 70.

The harbor power systems, which provide primarily shore-tie power to the vessels, are comprised of several elements. These elements include the service transformers, that are owned by the utility, master meters and disconnects, grounding, main distribution panels, cables from the shore to the floating docks, cables within the docks, and the shore-tie pedestals. The harbor lighting systems include service metering, circuit protection, controls, aerial configured cables, float mounted poles or piling mounted brackets, and luminaires. All of these elements are addressed in this report.

Cables:
Type W copper (Cu) cable is installed in all of the harbors, for nearly all of the circuits. Designated as portable power cable, it is a type usually seen in harbors and marinas because its outer jacket is oil-resistant and highly durable, and the individual conductors with insulation are very flexible. This cable typically has a life expectancy of thirty years with good, non-abrasive installation.

Assessing portable cable ampacities is difficult. Markings quickly disappear and older cables may have little aside from size to indicate their manufactured characteristics at all. Though the NEC allows for higher ampacities when using type W cable than for conventional power cable and conductors in raceway, the actual temperature rating of the cable is generally unknown.. It could be rated for 60 degrees or 75 degrees C. This is a significant factor in determining its ampacity.

The NEC does not address use of the cable in water. In situations like this, the ampacity of the cable should be derated to allow for these more stressful conditions in order to ensure that the cable's useful service life is met. For this report, the cable ampacities are estimated utilizing conservative values.

Shore-tie Pedestals:
The shore-tie pedestals are composed of feeder terminations points, utility metering for each vessel stall, circuit protection, and receptacles. The feeder terminations are configured to allow for looping the feeder cables from one pedestal to the next. These compartments are separate from the other compartments and are sealed by the utility. The shore-tie voltages are typically 120, nominal, single phase. There are a few 240 volt, single phase. The receptacles appear standardized for the 120 volt and 240 volt, single phase to a thirty ampere, twist lock type. The circuit protection for the 120 volt receptacles is both 20 ampere and 30 ampere.

Many of the original shore-tie pedestals utilize a welded steel frame with components mounted to the face. These shore-ties typically have a life expectancy of 15 to 20 years for the components, and thirty years for the stand. The pedestals composed of steel sheet metal posts and meter/shore-tie enclosures have a life expectancy of 15 years. As a note, currently, shore-tie pedestals are being constructed utilizing marine grade aluminum or stainless steel. With a more substantially constructed post, these shore-tie pedestals are expected to have a life expectancy of 20 years, or more.

Service and Distribution Components:
The service and distribution systems in each harbor are unique to that harbor. Each is specifically defined in the section addressing that harbor.

Lighting:
Much of the current lighting utilizes "barnyard" style luminaires which generally spread the light in a wide area. Many of the lamps are mercury vapor type, which have a low efficiency compared with the current lighting standards. The newer luminaires generally utilize high pressure sodium lamps (golden yellow colored light), which is more visible in inclement weather, and is nearly the most efficient with regard to energy consumption and lamp maintenance.

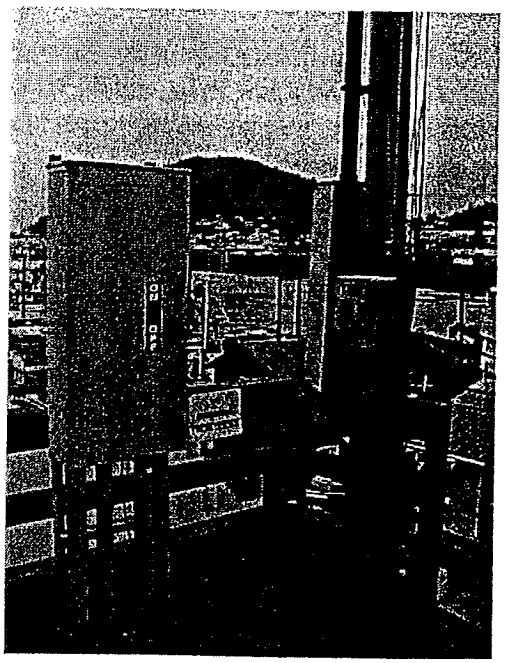
This report is divided into sections with each reporting on one particular harbor. In order, those are Fish & Game Float, Standard Oil Float, Reliance Harbor, Inner Harbor, and Shoemaker Bay Harbor. A plan view, photographs, material condition reports, recommendations, and repair or replacement cost estimates are included for each harbor.

FISH & GAME FLOAT

Description:
The Fish & Game Float is configured with a service routed from a shore based transformer to main circuit breakers at the end of the approach dock. From the circuit breakers, a feeder is routed up the utility pole at that location to an aerial cable system feeding power to the piling mounted lighting system. A second feeder is routed down the gangway to a main distribution panel (MDP) on the float near the lower end of the gangway. The MDP feeds power to shore-tie pedestals along the float with cables installed beneath the float deck.

A second service is routed from a single pole mounted transformer on the pole near the shore based transformer for the float pedestals to a meter center adjacent to the tugboat offices on the barge at the intersection of the gangway float and the main float. This service feeder utilizes aerial cables mounted to posts supported from the float.

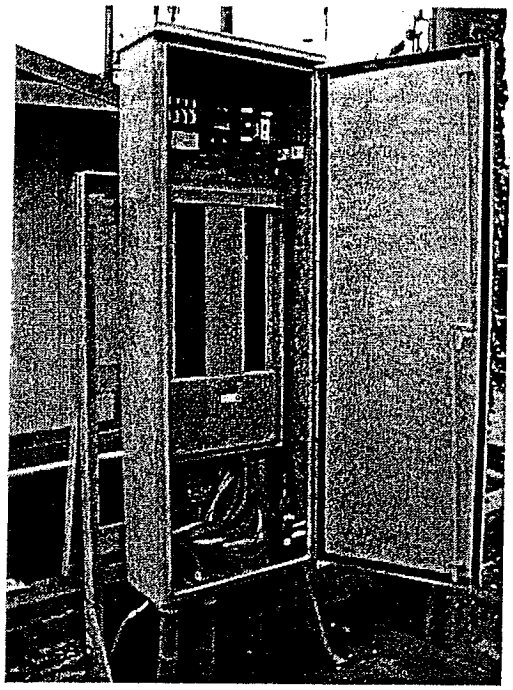
Power Service and Distribution:
The service to the power system for the float shore-tie pedestals and lighting system is configured with a pad mounted, 300 KVA, 208Y/120 volt, three phase transformer. This transformer is relatively new and appears to be in good condition with 20 years or more service life remaining.



The transformer feeds an 800 ampere, three pole, fused, main disconnect at the end of the approach dock near the top of the gangway. The disconnect appears to be in good condition with 15 to 20 years of service life remaining.

The MDP on the dock is rated 800 amperes with several feeder circuit breakers. It also includes a ground current monitoring relay with alarm light indicating excessive current in the electrode ground conductor. The ground monitoring system does not appear operative at this time. The panel is mounted

inside a galvanized enclosure, fastened to a hot-dipped galvanized steel angle stand. The panel is in good condition with 15 or more years of service life remaining.



The service feeder from the transformer to the main disconnect on the dock consists of single conductors inside rigid steel conduit routed directly from the transformer to the approach dock where they are supported on brackets. There are two sets of conductors and conduit connected in parallel. The conductors were not inspected, but the external appearances of the conduit indicate the feeder is in good condition with 20 years or more of service life remaining.

The feeder continues from the main disconnect, down the gangway to the MDP. This feeder consists of two type W cables with four conductors each connected in parallel. This feeder is quite susceptible to abrasion and strain due to the constant movement of the supporting gangway, typical to this type of facility. It is in fair condition with 5 years, or less life remaining.

The feeders from the MDP to the shore-tie pedestals consist of type W cables routed beneath the deck of the floats. The cables are configured with four conductors providing single phase, 208/120 volt power. The feeders are in fair condition with 10 years or more service life.

The grounding system consists of an electrode mounted to the float adjacent to the MDP, extending into the seawater. It is bonded to the neutral bus in the MDP, and extends to the shore-tie pedestals with the feeders noted above as one of the four conductors. The grounding system is in fair condition requiring cleaning and a new electrode.

The tugboat barge service transformer obtains three phase, 208Y/120 volt service from an aerial line routed from the shore side transformer via a riser conduit on the pole adjacent to the transformer. This was installed as a temporary service several years ago. It is in poor condition and potentially a safety hazard.

Shore-tie Pedestals:
The shore-tie pedestals appear to be approximately 15 to 20 years old. They were manufactured by Unicorn Manufacturing and consist of 8 inch x 8 inch metal posts mounted to the float deck with service heads mounted to the sides at the top. All of the metal appears to be marine grade stainless steel.

The service heads consist of single phase, 208/120 volt meter bases with circuit breakers and receptacles. The receptacles are located in the bottom of the service head enclosures minimizing water intrusion. All of the service heads include 20 ampere, 120 volt circuit breakers protecting 30 ampere, 125 volt rated receptacles. Five pedestals

also include 30 ampere, 208/120 volt, two pole circuit breakers protecting 50 ampere, 250 volt rated receptacles.

The posts contain power terminals for the circuits to the service heads and for the feeders from the MDP. These are configured for single phase, 208/120 volt, four conductor feeders.

The shore tie pedestals are in fair condition. Some have five or more years of service life remaining. The others need maintenance. With the exception of a few pedestals, the enclosures are in good condition, but the circuit breakers and receptacles need to be replaced. A few pedestals have been damaged due to normal mishaps and require additional repair to the enclosures. With repairs and maintenance, these have a remaining service life of 15 years or more.

Lighting:
The luminaires for the lighting system are "barnyard" style fixtures mounted on arms to "Hendricks" brackets at the top of the pilings. The brackets extend the elevation of the luminaires approximately 2 feet above the top of the pilings. The fixture assemblies are mounted on alternate pilings providing roughly 50 to 60 foot spacing.

The light source appears to be mercury vapor. Some of the fixtures are not operational. The lighting is controlled with photoelectric cells on the fixtures.

The luminaires are fed from aerial cable mounted to the brackets at the top of the piles, slightly below the fixtures. The cables are conventional "triplex" type with insulated aluminum conductors wrapped around a stranded steel messenger cable.

The fixtures and the feeder system are in poor condition.

Recommendations:
The longevity of the electrical systems at this harbor are greatly dependent on the condition of the floats and the direction taken toward replacing them. Elements of work categorized as Critical should be accomplished this year if the floats are not reconstructed. Additionally, some elements of the electrical systems may be retained for reuse at this harbor, or at other facilities.

<u>Critical:</u>

- Replace the temporary circuiting to the tugboat barge with a new feeder from the MDP.
- Grounding system maintenance
- Lighting system repairs

- Shore-tie pedestal repairs
- Repair feeder cable support system on gangway

Primary:

- Replace shore-tie pedestals
- Replace feeders
- Replace service equipment on approach and include master meter.

Secondary:

- Replace the MDP

STANDARD OIL FLOAT (OUTER HARBOR)

Description:
The Standard Oil Float power system consists of a pole mounted transformer located on the pole at the top of the gangway serving the lighting system and the shore-tie pedestals. Service equipment is located on the same pole with the transformer, and consists of a meter with main circuit breakers for the shore-tie power system and the lighting system. The power is distributed to the shore-tie pedestals from an MDP located on the main float.

Power Service and Distribution:
A single phase, 120-240 volt utility transformer is located on a pole at the end of the approach dock and adjacent to the top of the gangway. A feeder is routed from the transformer down the pole to the service equipment in a single enclosure with utility meter and two main circuit breakers. A 150 ampere circuit breaker protects the feeder to the MDP on the float and a 15 ampere circuit breaker protects the feeder serving the lighting system. The transformer and service equipment is in good condition with 15 years of service life remaining. The main circuit breakers are suspected to be in fair condition with less than 5 years of service life remaining.

The feeder to the MDP consists of a single type W cable with four no. 1/0 conductors routed down the gangway and beneath the decking of the floats. The cable is in good condition, but the supports are in fair condition.

The MDP is a single enclosure with circuit breakers protecting feeders to the shore-tie pedestals. It is rated at 120-240 volts,

single phase with a capacity for 225 amperes. The enclosure is galvanized steel and mounted to a hot-dipped galvanized angle steel frame. The MDP is in fair condition with five or more years of service life remaining.

The feeders to the shore-tie pedestals are type W cable with four no. 4 conductors routed from the MDP beneath the float deck. The cables lie in the water in some locations of the routes. The cables are in fair condition with approximately 10 years of service life remaining.

The grounding system incorporates a single electrode mounted to the float near the MDP, and extending into the seawater. The bond from the grounding bus in the MDP is broken. The feeders to the shore-tie pedestals include a conductor designated for grounding. A ground current monitor is installed in the MDP. The grounding system is in good condition with the exception of the ground current monitor and the electrode bonding. The ground current monitor was not carefully inspected to acknowledge it's operating status.

The distribution capacity for the harbor appears less than that required by the National Electrical Code for the number of shore-tie pedestals and their rating. The feeders may need to be replaced or supplemented with additional circuits to gain compliance.

Shore-tie Pedestals:
The shore-tie pedestals, manufactured by Circle AW, consist of 8 inch x 8 inch posts with service heads mounted at the top on two sides. The posts are mounted to the deck with brackets and to the bull rails. The enclosures utilize marine grade aluminum. The terminations are located in the posts, configured for single phase feeders and service heads.

The service heads include utility meter bases, circuit breakers, and shore-tie receptacles. The receptacles are rated 125 volt, 30 ampere, single phase on all service heads. Five pedestals are configured with 30 ampere, 250 volt receptacles. The 125 volt receptacles are protected with 15 ampere single pole circuit breakers while the 250 volt receptacles are protected with 20 ampere, two pole circuit breakers.

The pedestals are in poor condition due to their lighter structural strength and exposure to damage. They have a remaining service life of one to five years. With repairs their life may be extended to nearly ten years. The shore-tie capacities need to be upgraded to allow 30 amperes of current at 120 volts and 50 amperes of current at 240 volts.

Lighting:
The luminaires for the lighting system are "barnyard" style fixtures mounted on arms to "Hendricks" brackets at the top of the pilings. The brackets extend the elevation of the luminaires approximately 2 feet above the top of the pilings. The fixture assemblies are mounted on alternate pilings providing roughly 50 to 60 foot spacing.

The light source appears to be mercury vapor, although some may be high pressure sodium. Some of the fixtures are not operational. The lighting is controlled with photoelectric cells on the fixtures.

The luminaires are fed from aerial cable mounted to the brackets at the top of the piles, slightly below the fixtures. The cables are conventional "triplex" type with insulated aluminum conductors wrapped around a stranded steel messenger cable.

The fixtures and the feeder system are in poor condition.

Recommendations:
It appears that the structural rehabilitation to this harbor will have only moderate impact to the electrical systems. Some of the work noted in the Primary and Secondary categories may be addressed when the structural work is accomplished, however most of it may be completed at any time.

Critical:

- Grounding system maintenance
- Lighting system repairs
- Shore-tie pedestal repairs
- Repair feeder cable support system on gangway

Primary:

- Replace shore-tie pedestals
- Supplement and/or replace feeders
- Replace service equipment on approach.
- Replace the MDP.
- Replace the utility transformer with a larger size to match the upgraded capacity of the distribution system.
- Replace the lighting system with float mounted luminaires.

Secondary:

-

RELIANCE HARBOR

Description:
At Reliance Harbor, a bank of three transformers are mounted to a utility pole at the approach dock. Single phase service is provided from the transformers to the lighting system for the harbor and the seaplane float, as well as the harbor shore-tie pedestals. Three phase service is provided to the dock cranes.

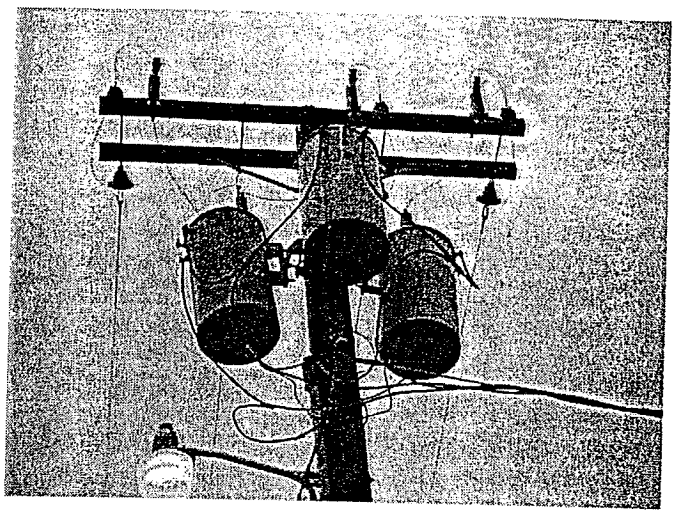
The service equipment is located on the approach dock and includes metering and main circuit breakers and fused disconnects.

The lighting system incorporates an aerial cable feeder routed from piling to piling serving piling mounted luminaires.

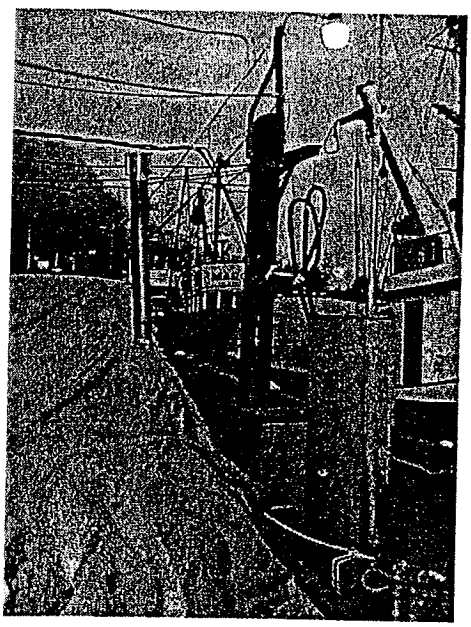
The power system to the float mounted shore-tie pedestals utilizes an aerial feeder from the approach dock to a single MDP mounted on the main float. Cables are routed in the floats from the MDP to the pedestals. The pedestals are located along the float system serving most of the vessel stalls.

It appears the electrical system for the harbor was installed in the early to mid 1970's. This is based on the style and condition of the system components. No documentation of the installation have been located to date.

Power Service and Distribution:
The utility transformers on the utility pole are connected in a delta configuration with a bulk of the power demand on one transformer for the lighting and shore-tie pedestals. The rating for the bank of transformers is 120-240 volts on one transformer and 240 volts on each of the others. The transformers appear to be in good condition with approximately 15 years of service life remaining. They are sized adequately for the present conditions, but may require replacement with larger units with a harbor upgrade.

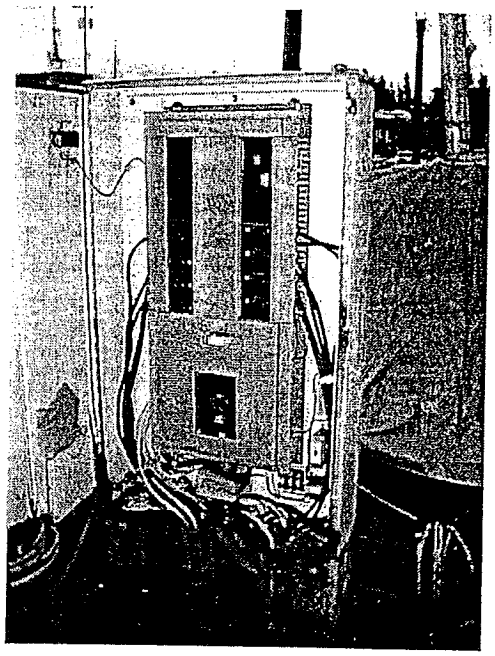


The transformers feed service equipment on a separate utility pole on the approach. The equipment includes a meter, circuit breakers, and controls for the lighting system; and a 400 ampere, two pole, fused disconnect for the power system to the shore-tie pedestals. The service feeder is routed aerially from the transformer pole to the service equipment pole. The lighting system utilizes two 30 ampere, 120 volt circuit breakers for protection. The service equipment is beyond its normal service life and in poor condition.



The feeder from the service equipment to the MDP on the float is routed back to the top of the service pole where it transitions to an aerial cable (Quadplex with steel messenger and three insulated 1/0 aluminum conductors). The aerial cable traverses to the pilings near the gangway float and then attaches to the line of pilings leading to one adjacent to the MDP. At the MDP piling, the aerial cable again splices to type W cable that is suspended from a bracket attached near the top of the piling. The suspended cable drops into a box on the float where it coils or uncoils with the tide changes. The cable then transitions from the "drop box" to the MDP across the surface of the float deck. This feeder is in poor condition and suspended below allowable elevations with high tide conditions, thus unsafe to people on the floats.

The feeder is undersized for present (and future) load demand. There is no service life remaining.

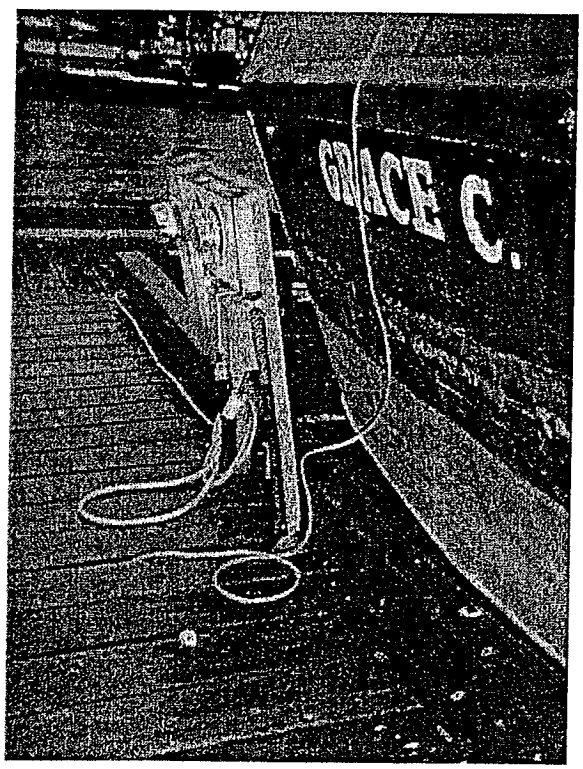


The MDP is a Square D I-line style panel rated 400 ampere, three phase in a painted metal enclosure. It includes a main 300 ampere circuit breaker with seven 70 ampere, two pole circuit breakers protecting the feeders to the shore-tie pedestals. It also includes a ground current monitoring system. The base of the enclosure is badly corroded with probability of structural failure in the very near future. The ground current monitor does not appear to be functional. And the panel is now inadequately rated for the shore-tie loads per the NEC. There is no service life remaining.

The feeders from the MDP to the shore-tie pedestals utilize four conductor no. 2 type W cables routed beneath the float deck. They are configured to provide single phase, 120-240 volt power. The feeders are in fair condition with 5 to 10 years of service life.

The grounding system incorporates a single electrode in the seawater bonded to the neutral bus in the MDP and extending to the shore tie pedestals via the feeder cables. The grounding electrode is in poor condition.

Shore-tie Pedestals:



The shore-tie pedestals consist of a hot-dipped galvanized angle steel stand supporting metering, circuit protection, and receptacles in separate enclosures. Each pedestal serves two vessels. Two meter bases are constructed into a single enclosure with bussing connecting incoming and outgoing feeder cables with the meters. Circuit breakers are installed in industrial rated device boxes with switch handle covers utilized for operation. Shore-tie receptacles located in separate industrial device boxes with hinged covers are fed from the circuit breakers.

The meter bases are contained in painted metal enclosures. Most of them are in fair condition with approximately five years of service life remaining. Some are corroded and need replacement.

Each shore-tie service is configured for 120 volt, single phase service only. Some

pedestals have been modified to yield 120-240 volt, single phase service. The circuit breaker ratings are undetermined, but anticipated to be 20 amperes or less. The receptacles are rated for 30 amperes at 125 volts. The circuit breakers and receptacles are in poor condition with less than five years of service life remaining.

The stands are fastened to the float deck and the bullrails. In most cases the stands are in fair to good condition with 15 years or more service life remaining. Some stands have been bent by vessels.

Lighting:
The luminaires for the lighting system are "barnyard" style fixtures mounted on arms to "Hendricks" brackets at the top of the pilings. The brackets extend the elevation of the luminaires approximately 2 feet above the top of the pilings. The fixture assemblies are mounted on alternate pilings providing roughly 50 to 60 foot spacing.

The light source appears to be mercury vapor, although some may be high pressure sodium. Some of the fixtures are not operational. The lighting is controlled with photoelectric cells on the fixtures.

The luminaires are fed from aerial cable mounted to the brackets at the top of the piles, slightly below the fixtures. The cables are conventional "triplex" type with insulated aluminum conductors wrapped around a stranded steel messenger cable.

The fixtures and the feeder system are in poor condition with no service life remaining.

Recommendations:

Critical:

- Grounding system maintenance.
- Lighting system repairs.
- Shore-tie pedestal repairs.
- Replace service feeder to MDP with gangway and float supported type.
- Replace the MDP.

Primary:

- Replace shore-tie pedestals
- Supplement and/or replace feeders
- Replace service equipment on approach.
- Replace the utility transformer with a larger size to match the upgraded capacity of the distribution system.
- Replace the lighting system with float mounted luminaires.

Secondary:

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INNER HARBOR

Description:

At Inner Harbor, a single transformer is mounted to a utility pole at the approach dock. Service is provided from the transformer to the lighting system for the harbor and the harbor shore-tie pedestals.

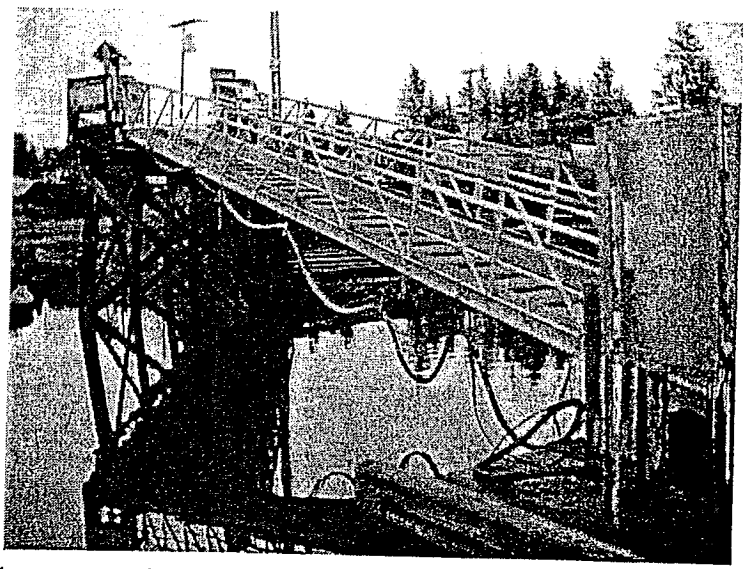
The service equipment is located on the approach dock and includes metering and main circuit breakers and fused disconnects.

The lighting system incorporates an aerial cable feeder routed from piling to piling serving piling mounted luminaires.

The power system for the float mounted shore-tie pedestals utilizes cable supported from the gangway and beneath the float deck to a single MDP mounted on the main float. Cables are routed in the floats from the MDP to the pedestals. The pedestals are located along the float system serving most of the vessel stalls.

It appears the electrical system for the harbor was installed in the early 1980's. This is based on the style and condition of the system components, and the documentation located for this harbor.

Power Service and Distribution:
The utility transformer on the utility pole is rated to provide 120-240 volt power. The transformer appears to be in good condition with approximately 15 years of service life remaining. It is sized adequately for the present conditions, but may require replacement with a larger unit with a harbor upgrade.



The transformer feeds service equipment on the approach dock via a separate utility pole also located on the approach. The equipment includes a meter for the harbor; a main circuit breaker for the shore-tie power system; and a meter, circuit breakers, and controls for the lighting system. The service feeder is routed aerially from the transformer pole to the service pole. It transitions from the aerial cable to single conductors in conduit from the pole to the main meter and disconnect. The main meter and circuit breaker are in fair condition with less than five years of service life remaining.

The lighting system utilizes a second meter and a separate panel of circuit breakers and controls for two circuits. The meter is in line with the main meter for the harbor thus measuring the energy consumption for the lighting system twice. The service and control equipment is in fair condition with 5 to 10 years of service life remaining.

The feeder from the service equipment to the MDP on the float is routed from the main circuit breaker on the approach utilizing 3 conductor, no. 4/0, type W cable. The cable is

fastened beneath the approach dock and the side of the gangway, and then routed beneath the float deck. The cable does not include a ground conductor and is poorly supported from the gangway creating stress on the conductor insulation. This feeder is in poor condition and may be unsafe to people on the floats. The feeder is undersized for present (and future) load demand. There is little service life remaining.

The MDP is a Square D I-line style panel rated 200 ampere, single phase in a painted metal enclosure. It includes a main 200 ampere circuit breaker with six 100 ampere, two pole circuit breakers protecting the feeders to the shore-tie pedestals. It also includes a ground current monitoring system. The base of the enclosure is slightly corroded. The ground current monitor does not appear to be functional. And the panel is now inadequately rated for the shore-tie loads per the NEC. There are 5 to 10 years of service life remaining.

The feeders from the MDP to the shore-tie pedestals utilize four conductor no. 2 type W cables routed beneath the float deck. They are configured to provide single phase, 120-240 volt power. The feeders are in fair condition with 10 to 15 years of service life remaining.

The grounding system incorporates a single electrode in the seawater bonded to the neutral bus in the MDP and extending to the shore tie pedestals via the feeder cables. The grounding electrode is in poor condition. The neutral is not bonded to ground at the main circuit breaker on the approach in violation of the NEC. The connection to the electrode has been removed.

Shore-tie Pedestals:
The shore-tie pedestals consist of a hot-dipped galvanized angle steel stand supporting metering, circuit protection, and receptacles in separate enclosures. Each pedestal serves two vessels. Two meter bases are constructed into a single enclosure with bussing connecting incoming and outgoing feeder cables with the meters. Circuit breakers are installed in industrial rated device boxes with switch handle covers utilized for operation. Shore-tie receptacles located in separate industrial device boxes with hinged covers are fed from the circuit breakers.

The meter bases are contained in painted metal enclosures. Most of them are in fair condition with 5 to 10 years of service life remaining. Some are corroded and need replacement.

Each shore-tie service is configured for 120 volt, single phase service only. Some pedestals have been modified to yield 120-240 volt, single phase service. The circuit breaker ratings are undetermined, but anticipated to be 20 amperes or less. The receptacles are rated for 30 amperes at 125 volts. The circuit breakers and receptacles are in poor condition with less than five years of service life remaining.

The stands are fastened to the float deck and the bullrails. In most cases the stands are in fair to good condition with 15 years or more service life remaining. Some stands have been bent by vessels.

Lighting:
The luminaires for the lighting system are "barnyard" style fixtures mounted on arms to "Hendricks" brackets at the top of the pilings. The brackets extend the elevation of the

luminaires approximately 2 feet above the top of the pilings. The fixture assemblies are mounted on alternate pilings providing roughly 50 to 60 foot spacing.

The light source appears to be mercury vapor, although some appear to be high pressure sodium. Some of the fixtures are not operational. The lighting is controlled with photoelectric cells on the fixtures.

The luminaires are fed from aerial cable mounted to the brackets at the top of the piles, slightly below the fixtures. The cables are conventional "triplex" type with insulated aluminum conductors wrapped around a stranded steel messenger cable. One of the power conductors has reportedly failed in the recent past and the luminaires are now all on one circuit.

The fixtures and the feeder system are in poor condition with no service life remaining.

Recommendations:

Critical:

- Grounding system repairs and maintenance.
- Lighting system repairs.
- Shore-tie pedestal repairs.
- Re-support the service feeder to MDP on the gangway.

Primary:

- Replace shore-tie pedestals
- Supplement and/or replace feeders
- Replace the MDP.
- Replace service equipment on approach.
- Replace the utility transformer with a larger size to match the upgraded capacity of the distribution system.
- Replace the lighting system with float mounted luminaires.

Secondary:

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SHOEMAKER BAY HARBOR

Description:
At Shoemaker Bay Harbor, a padmount transformer is located on the shore midway between the two gangways serving the harbor. It is fed by an underground primary circuit from the aerial line along the highway. Three phase service is fed from the transformer to a main disconnect and lighting control panel adjacent to the transformer.

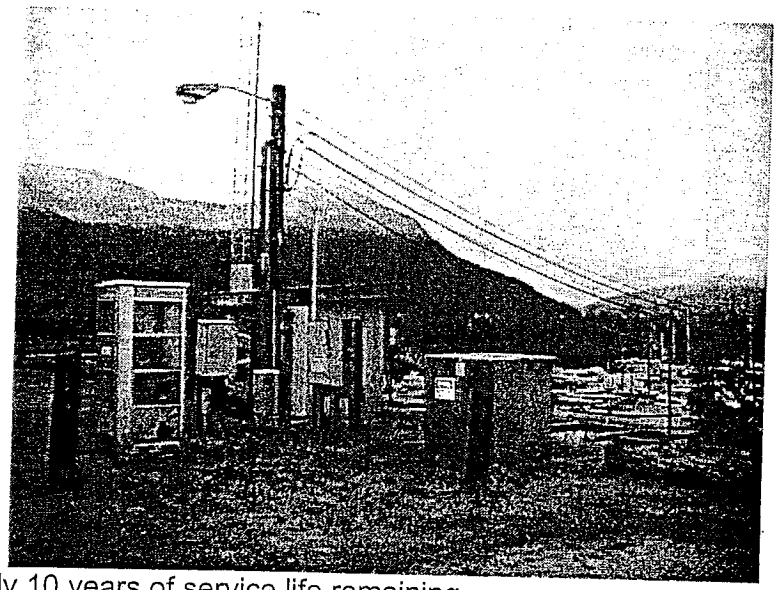
The lighting system incorporates an aerial cable feeder routed from a utility pole on the shore to the harbor piling system. The feeder is routed from piling to piling as required to serve the piling mounted luminaires.

The power system to the float mounted shore-tie pedestals utilizes an aerial feeder from the utility pole on the shore to a single MDP mounted on the main float. Cables are

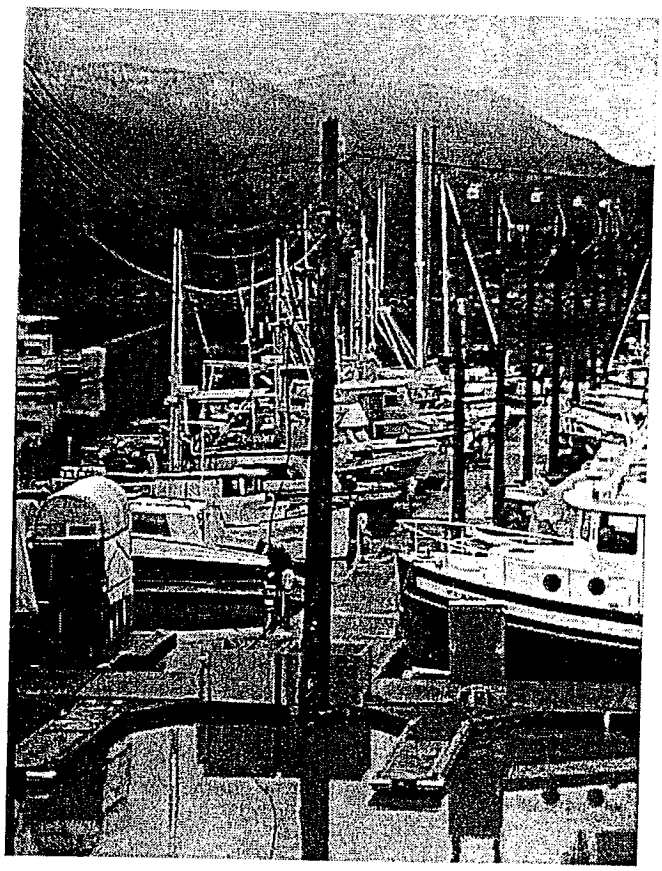
routed in the floats from the MDP to the pedestals. The pedestals are located along the float system serving most of the vessel stalls.

It appears the electrical system for the harbor was installed in the mid 1970's. This is based on the style and condition of the system components, as well as documentation located for this harbor.

Power Service and Distribution:
The service to the power system for the float shore-tie pedestals and lighting system is configured with a pad mounted, 208Y/120 volt, three phase transformer. This transformer appears to have a capacity of 150 KVA and to be in good condition with approximately 20 years of service life remaining.



The transformer feeds an 400 ampere, three pole, fused, main disconnect nearby on the shore. The disconnect appears to be in fair condition with approximately 10 years of service life remaining.



The MDP on the dock is rated 400 amperes with several feeder circuit breakers. The circuit breakers are all rated 100 ampere with two pole control for single phase feeders. It also includes a ground current monitoring relay with alarm light indicating excessive current in the electrode ground conductor. The ground monitoring system does not appear operative at this time. The panel is mounted inside a galvanized enclosure, fastened to a hot-dipped galvanized steel angle stand. The panel is in fair condition with 5 to 10 years of service life remaining.

The service feeder from the transformer to the main disconnect consist of single conductors inside rigid steel conduit routed directly from the transformer. There are two sets of conductors (4 no. 4/0) and conduit connected in parallel. The feeder

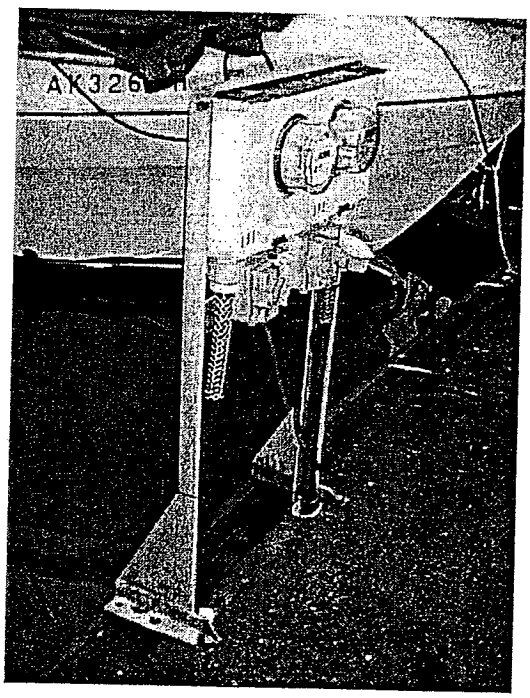
appears to be in good condition with 20 years or more of service life remaining.

The feeder continues from the main disconnect to the MDP utilizing a set of conduits and conductors rising the adjacent utility polwe to two sets of aerial cable. The aerial cables traverse on pilings to the main float near the MDP. At the MDP piling, the aerial cable again splices to type W cable that is suspended from a bracket attached near the top of the piling. The suspended cable drops into a box on the float where it coils or uncoils with the tide changes. The cable then transitions from the "drop box" to the MDP across the surface of the float deck. This feeder is in fair condition, but is undersized for present (and future) load demand. There is less than five years service life remaining.

The feeders from the MDP to the shore-tie pedestals consist of type W cables routed beneath the walers along the edges of the floats. The cables are configured with four conductors, no. 2 providing single phase, 208/120 volt power. The feeders are in fair condition with approximately10 years service life remaining.

The grounding system consists of an electrode mounted to the float adjacent to the MDP, extending into the seawater. It is bonded to the neutral bus in the MDP, and extends to the shore-tie pedestals with the feeders noted above as one of the four conductors. The main disconnect does not appear to include neutral bonding to ground, and a grounding conductor is not included in the feeders from the shore to the MDP. The grounding system is in fair condition requiring cleaning and a new electrode.

Shore-tie Pedestals:
The shore-tie pedestals consist of a hot-dipped galvanized angle steel stand supporting metering, circuit protection, and receptacles in separate enclosures. Each pedestal serves two vessels. Two meter bases are constructed into a single enclosure with bussing connecting incoming and outgoing feeder cables with the meters. Circuit breakers are installed in industrial rated device boxes with switch handle covers utilized for operation. Shore-tie receptacles located in separate industrial device boxes with hinged covers are fed from the circuit breakers.

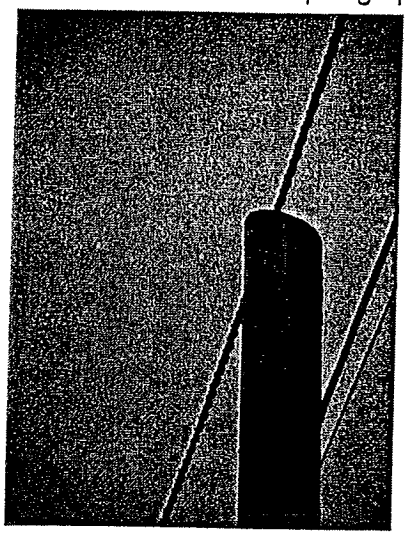


The meter bases are contained in painted metal enclosures. Most of them are in fair condition with 5 to 10 years of service life remaining. Some are corroded and need replacement.

Each shore-tie service is configured for 120 volt, single phase service only. Some pedestals have been modified to yield 120-240 volt, single phase service. The circuit breaker ratings are undetermined, but anticipated to be 20 amperes or less. The receptacles are rated for 30 amperes at 125 volts. The circuit breakers and receptacles are in poor condition with less than five years of service life remaining.

The stands are fastened to the float deck and walers. In most cases the stands are in fair to good condition with 15 years or more service life remaining. Some stands have been loosened from the deck by vessels.

Lighting:
The luminaires for the lighting system are "barnyard" style fixtures mounted on arms to "Hendricks" brackets at the top of the pilings. The brackets extend the elevation of the luminaires approximately 2 feet above the top of the pilings. The fixture assemblies are mounted on alternate pilings providing roughly 50 to 60 foot spacing.



The light source appears to be mercury vapor, although some may be high pressure sodium. The lighting is controlled with photoelectric cells on the fixtures.

The luminaires are fed from aerial cable mounted to the brackets at the top of the piles, slightly below the fixtures. The cables are conventional "triplex" type with insulated aluminum conductors wrapped around a stranded steel messenger cable. The cables rub against some of the interest pilings, possibly abrading their insulation.

The fixtures and the feeder system are in fair condition with approximately five years of service life remaining.

Recommendations:

Critical:
- Grounding system repairs and maintenance.
- Lighting system repairs and maintenance.
- Shore-tie pedestal repairs and maintenance.

Primary:
- Replace shore-tie pedestals to gain greater capacity for each vessel.
- Supplement and/or replace feeders to gain more system capacity.
- Replace the MDP to gain a greater capacity. It may be necessary to install a second MDP and feeder from the shore.
- Replace service equipment to gain a greater capacity.

Secondary:
- Replace the utility transformer with a larger size to match the upgraded capacity of the distribution system.
- Replace the lighting system with float mounted luminaires.

City of Wrangell
PRELIMINARY
ESTIMATE
Electrical Systems

Summary

Group	Location	Total
Critical	Shoemaker Bay	$19,800
	Fish and Game	$11,100
	Standard Oil Float	$6,700
	Inner Harbor	$11,150
	Reliance Harbor	$38,100
	Subtotal	***$86,850***
Primary	Shoemaker Bay	$590,000
	Fish and Game	$200,000
	Standard Oil Float	$111,600
	Inner Harbor	$226,000
	Reliance Harbor	$253,800
	Subtotal	***$1,381,400***
Secondary	Shoemaker Bay	$38,000
	Fish and Game	$24,400
	Standard Oil Float	$0
	Inner Harbor	$20,400
	Reliance Harbor	$0
	Subtotal	***$82,800***
Harbor Staff	Shoemaker Bay	$0
	Fish and Game	$0
	Standard Oil Float	$0
	Inner Harbor	$0
	Reliance Harbor	$0
	Subtotal	***$0***

Total	$1,551,050
Mobilization	$186,126
Survey	$75,000
Contingency 20%	$362,435
Total Harbor	**$2,174,611**

City of Wrangell
PRELIMINARY ESTIMATE
Electrical Systems

Shoemaker Bay

Group	Work Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Total Price for Item
Critical	Grounding System Repairs and Maintenance	1	LS	$3,000	$3,000
	Lighting System Repairs and Maintenance	20	EA	$150	$3,000
	Shore-tie Pedestal Repairs and Maintenance	92	EA	$150	$13,800
	Subtotal				***$19,800***
Primary	Replace Shore-tie Pedestals	92	EA	$3,000	$276,000
	Upgrade Shore-tie Feeders	6000	LF	$40	$240,000
	Replace and add MDP	2	EA	$7,000	$14,000
	Replace and add Service Feeders	2	EA	$20,000	$40,000
	Replace Service Equipment	1	EA	$20,000	$20,000
					$0
					$0
					$0
					$0
	Subtotal				***$590,000***
Secondary	Replace the Utility Transformer	1	EA	$8,000	$8,000
	Replace the Lighting System	20	EA	$1,500	$30,000
					$0
	Subtotal				***$38,000***
Harbor Staff					$0
					$0
					$0
					$0
	Subtotal				***$0***

Total	$647,800
Mobilization	$77,736
Survey	$15,000
Contingency 20%	$148,107
Total Harbor	**$888,643**

City of Wrangell
PRELIMINARY ESTIMATE
Electrical Systems

Fish & Game Float

Group	Work Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Total Price for Item
Critical	Replace Feeder and Service Equipment to Tugboat Barge	1	Ea	$5,000	$5,000
	Grounding System Repairs and Maintenance	1	LS	$1,000	$1,000
	Lighting System Repairs and Maintenance	12	EA	$150	$1,800
	Shore-tie Pedestal Repairs and Maintenance	22	EA	$150	$3,300
					$0
					$0
					$0
	Subtotal				***$11,100***
Primary	Replace Shore-tie Pedestals	22	EA	$3,000	$66,000
	Replace Shore-tie Feeders	3100	LF	$40	$124,000
	Replace Service Equipment	1	EA	$10,000	$10,000
	Subtotal				***$200,000***
Secondary	Replace MDP	1	EA	$10,000	$10,000
	Replace Lighting	12	EA	$1,200	$14,400
					$0
	Subtotal				***$24,400***

Total	***$235,500***
Mobilization	$2,928
Survey	$15,000
Contingency 20%	$55,566
Total Harbor	**$333,394**

City of Wrangell
PRELIMINARY ESTIMATE
Electrical Systems

Standard Oil Float

Group	Work Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Total Price for Item
Critical	Repair Feeder Support on Gangway	1	LS	$1,500	$1,500
	Grounding System Repairs and Maintenance	1	LS	$1,000	$1,000
	Lighting System Repairs and Maintenance	8	EA	$150	$1,200
	Shore-tie Pedestal Repairs and Maintenance	15	EA	$200	$3,000
	Subtotal				***$6,700***
Primary	Replace Shore-tie Pedestals	15	EA	$3,000	$45,000
	Replace Shore-tie Feeders	1000	LF	$40	$40,000
	Replace Service Equipment	1	EA	$7,000	$7,000
	Replace the MDP	1	SF	$7,000	$7,000
	Replace Utility Transformer	1	EA	$3,000	$3,000
	Replace Lighting	8	EA	$1,200	$9,600
					$0
					$0
	Subtotal				***$111,600***
Secondary					$0
					$0
	Subtotal				***$0***
Harbor Staff					$0
					$0
					$0
					$0
	Subtotal				***$0***

Total	$118,300
Mobilization	$14,196
Survey	$15,000
Contingency 20%	$29,499
Total Harbor	**$176,995**

City of Wrangell
PRELIMINARY ESTIMATE
Electrical Systems

Inner Harbor

Group	Work Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Total Price for Item
Critical	Repair Feeder Support on Gangway	1	LS	$2,000	$2,000
	Grounding System Repairs and Maintenance	1	LS	$1,000	$1,000
	Lighting System Repairs and Maintenance	17	EA	$150	$2,550
	Shore-tie Pedestal Repairs and Maintenance	28	EA	$200	$5,600
	Subtotal				***$11,150***
Primary	Replace Shore-tie Pedestals	2	EA	$3,000	$6,000
	Replace Shore-tie Feeders	5000	LF	$40	$200,000
	Replace Service Equipment	1	EA	$10,000	$10,000
	Replace the MDP	1	SF	$7,000	$7,000
	Replace Utility Transformer	1	EA	$3,000	$3,000
					$0
					$0
	Subtotal				***$226,000***
Secondary	Replace Lighting	17	EA	$1,200	$20,400
					$0
	Subtotal				***$20,400***
Harbor Staff					$0
					$0
					$0
					$0
	Subtotal				***$0***

Total	$257,550
Mobilization	$30,906
Survey	$15,000
Contingency 20%	$60,691
Total Harbor	**$364,147**

City of Wrangell
PRELIMINARY ESTIMATE
Electrical Systems

Reliance Harbor

Group	Work Description	Estimated Quantity	Unit	Estimated Unit Price	Estimated Total Price for Item
Critical	Grounding System Repairs and Maintenance	1	LS	$1,000	$1,000
	Lighting System Repairs and Maintenance	19	EA	$200	$3,800
	Shore-tie Pedestal Repairs and Maintenance	29	EA	$200	$5,800
	Replace Service Feeder to the MDP	350	LF	$50	$17,500
	Replace the MDP	1	EA	$10,000	$10,000
	Subtotal				***$38,100***
Primary	Replace Shore-tie Pedestals	2	EA	$3,000	$6,000
	Replace Shore-tie Feeders	5000	LF	$40	$200,000
	Replace Service Equipment	1	EA	$15,000	$15,000
	Replace Utility Transformer	1	EA	$10,000	$10,000
	Replace the Lighting System	19	EA	$1,200	$22,800
					$0
					$0
	Subtotal				***$253,800***
Secondary					$0
					$0
	Subtotal				***$0***
Harbor Staff					$0
					$0
					$0
					$0
	Subtotal				***$0***

Total	$291,900
Mobilization	$35,028
Survey	$15,000
Contingency 20%	$68,386
Total Harbor	**$410,314**

APPENDIX B

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

SEATTLE
RICHLAND
PORTLAND
FAIRBANKS
ANCHORAGE
DENVER
SAINT LOUIS

RECEIVED
FEB 02 2005
Tryck Nyman Hayes Inc.

January 26, 2005

Tryck Nyman Hayes, Inc.
911 West Eighth Avenue
Anchorage, Alaska 99501

Attn: John Daley, P.E.

Fax: (907) 276-7679
Phone: 279-0543

RE: PRELIMINARY FINDINGS FOR PROPOSED HARBOR IMPROVEMENTS, WRANGELL, ALASKA

This letter presents preliminary findings related to the proposed harbor rehabilitation in Wrangell, Alaska. Shannon & Wilson has met with you regarding this project and you have provided us with preliminary site plans and historical pile driving information for the existing Wrangell harbor. We were also provided with contact information for Mr. Gary Allan, a pile buck in the local Wrangell area. Shannon & Wilson has also performed several exploration programs in the immediate Wrangell area and are somewhat familiar with the general upland conditions. It should be noted that no subsurface information (onshore or offshore) from the project site was reviewed or available for consideration in the enclosed preliminary findings. From our meeting, we understand that you need a couple of pieces of information to be able to talk with your client regarding pile replacement at the harbor. First, will the piles need to be driven into bedrock to achieve the design lateral loads? Second, if the piles are driven into bedrock, how should it be done?

Assumed Subsurface Conditions:

First, after reviewing the available pile data and talking with Gary Allen, it seems like the soil/rock conditions in the harbor areas most likely consist of roughly 5 to 10 feet of soil over bedrock. This is evident by refusal notes on pile records and the experience of Gary Allen. Mr. Allen noted that there are places in the general vicinity of the harbor that he has attempted to drive piles with a conventional hammer, but was unable to get any penetration due to bedrock at the sea floor surface. According to Mr. Allen, he typically encounters a shale bedrock or "harder stuff" which is likely a metamorphic rock (typical to the Wrangell area) that is significantly more competent than the shales.

5430 FAIRBANKS STREET · SUITE 3
ANCHORAGE, ALASKA 99518
907·561·2120 FAX 907·561·4483

Pile Embedment:

To estimate if piles need to be embedded in bedrock, we ran some simplified models with the lateral loading criteria provided. The model included pile geometry and applied loading that was consistent with the critical conditions supplied by you. A 10 kip lateral load was applied to a 16 inch (0.375-inch wall thickness) pile approximately 32 feet above mud line. Assuming a medium dense sand and gravel beneath the sea floor, total pile penetration to achieve fixity under these loads is approximately 23 feet below mud line. In soils we typically recommend driving 5 feet beyond the point of fixity to be conservative. Given the existing driving data and our experience in the area, it is likely that bedrock is shallower than this depth. Hence, pile embedment in bedrock will likely be required to resist the proposed lateral loading.

Installation Technique:

According to Gary Allen, the typical method of embedding piles into bedrock includes drilling a single core hole in the rock at the center of the pile location and loading it for blasting. When the rock is blasted, it breaks up bedrock at the pile location enough so that the pile may be driven with an impact hammer. It is our opinion that this most closely results in a pile embedded in a very dense crushed rock fill. Typical pile socketing has also taken place in the area where the pile is over drilled, embedded in the rock, and socketed with concrete. Conventionally socketed piles may also be reinforced with tendons below the pile tips if required for uplift capacity.

It is our opinion that either option could work for this project each with its own advantages/disadvantages. According to Gary Allen, the blasting technique is probably favored among local contractors as it is less expensive and they are practiced in doing it. Our analyses show that this will likely require deeper embedment (up to 20 feet for fixity assuming no soil overburden) and may pose some permitting problems. Additionally, because of the unconventional method, prediction of actual capacities may be difficult without field scale tests causing a rather conservative design.

Conventional sockets could result in shorter piles (probably around 5 to 7 feet embedment assuming no soil overburden), however, construction costs could be higher in the

long run especially if tendons are required for uplift support. Actual capacities will be a little easier to predict in this situation also.

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Sincerely,

SHANNON & WILSON, INC.

Kyle Brennan, P.E.
Senior Geotechnical Engineer

STATE OF ALASKA
49TH
KYLE BRENNAN
CE - 11122
1-26-05
REGISTERED PROFESSIONAL ENGINEER

KLB/wsb

Encl: Important Information About Your Geotechnical/Environmental Report

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

32-1-01731

Date: January 2005
To: TNH, Inc.
Re: Harbor Restoration, Wrangell, Alaska

Important Information About Your Geotechnical/Environmental Report

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors, which were considered in the development of the report, have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

SEATTLE
RICHLAND
PORTLAND
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SAINT LOUIS

January 26, 2005

Tryck Nyman Hayes, Inc.
911 West Eighth Avenue
Anchorage, Alaska 99501

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Kyle Brennan, P.E.
Senior Geotechnical Engineer

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Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors, which were considered in the development of the report, have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

APPENDIX C

John Daley

From: ALAN SORUM [asorum@ci.valdez.ak.us]
Sent: Monday, February 07, 2005 12:56 PM
To: JohnD@tnh-inc.com
Subject: Pipe Welder

Valdez Harbor replaced the majority of the waterline installed on its "B" through "G" floats with High Density Polyethylene (HDPE) pipe and fittings in 2001. Using a design developed by Tryck, Nyman & Hayes for our "A" float, a standard design was adopted for the Harbor which provided common parts for the whole water system and the ability for employees to easily repair future problems in-house, without divers or other outside contractors. Valdez Harbor purchased a HDPE pipe welder and training in its use for City employees. About 15 employees from the Public Works and Harbor Departments participated in the training.

The welder purchased was a McElroy No. 14 Pitbull butt fusion unit equipped with a face cutter, heater, stand, manual and with the following accessories:

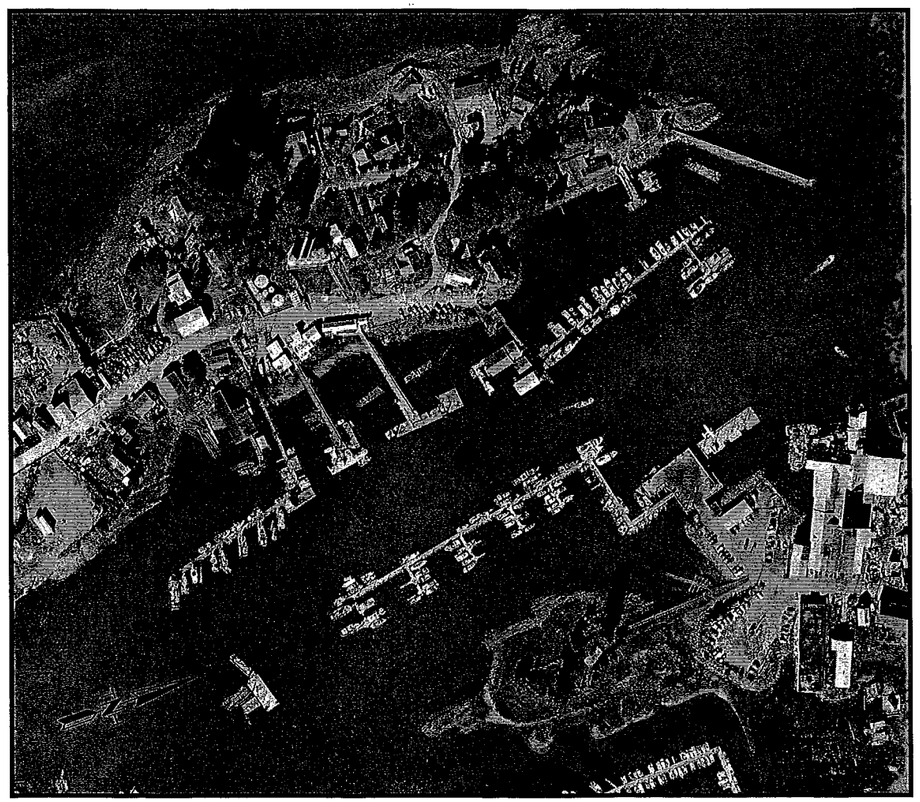
- 3" IPS clamp insert jaws
- 2 ½" IPS clamp insert jaws
- 2" IPS clamp insert jaws
- 1 ½" IPS clamp insert jaws
- 1 ¼" IPS clamp insert jaws
- 1" IPS clamp insert jaws

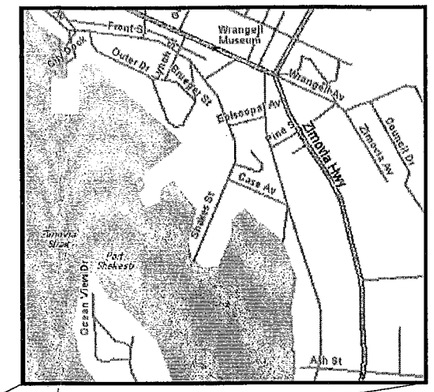
Bids ranged from $2,800 to $3,000 in 2001 for the welder. Training on the welder was around $1,500 for the entire group. It turns out we bought the same welder used by Harris Sand & Gravel for their dock construction contracts.

APPENDIX D

CITY OF WRANGELL

WRANGELL HARBORS CONDITION ASSESSMENT





VICINITY MAP

SCALE: NOT TO SCALE

DRAWINGS

REF. NO.	SHEET NO.	SHEET TITLE
T01	1 OF 15	TITLE SHEET, VICINITY MAPS AND SCHEDULE OF DRAWINGS
CIVIL		
C01	2 OF 15	OVERALL HARBORS
C02	3 OF 15	EXISTING CONDITION – RELIANCE HARBOR
C03	4 OF 15	EXISTING CONDITION – INNER HARBOR
C04	5 OF 15	EXISTING CONDITION – FISH AND GAME FLOAT
C05	6 OF 15	EXISTING CONDITION – STANDARD OIL FLOAT
C06	7 OF 15	EXISTING CONDITION – SHOEMAKER BAY
C07	8 OF 15	HARBOR MODIFICATIONS – RELIANCE HARBOR
C08	9 OF 15	HARBOR MODIFICATIONS – INNER HARBOR
C09	10 OF 15	HARBOR MODIFICATIONS – FISH AND GAME FLOAT
C10	11 OF 15	HARBOR MODIFICATIONS – STANDARD OIL FLOAT
C11	12 OF 15	HARBOR MODIFICATIONS – SHOEMAKER BAY
STRUCTURAL		
S01	13 OF 15	6'x80' ALUMINUM GANGWAY
S02	14 OF 15	UTILITY DETAIL
S03	15 OF 15	LIFE SAFETY DETAILS

03-04-05
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FAX: (907) 276-7579

FIELD BOOKS
DESIGN: –
DRAWING: –
AS-BUILT: –
SHEET: –

No.	DATE	DESCRIPTION

REVISIONS:
VERTICAL DATUM:

CITY OF WRANGELL
WRANGELL HARBORS CONDITION ASSESSMENT
LOCATION AND VICINITY MAPS AND SCHEDULE OF DRAWINGS
WRANGELL, ALASKA

PROJECT No: 04099.000
DATE: 03/04/05
DESIGNED: BP
DRAWN BY: BP
CHECKED BY: –
CAD DWG FILE: 4099_G01.DWG
SCALE:
HORIZONTAL: –
VERTICAL: –

SHEET 1 OF 15

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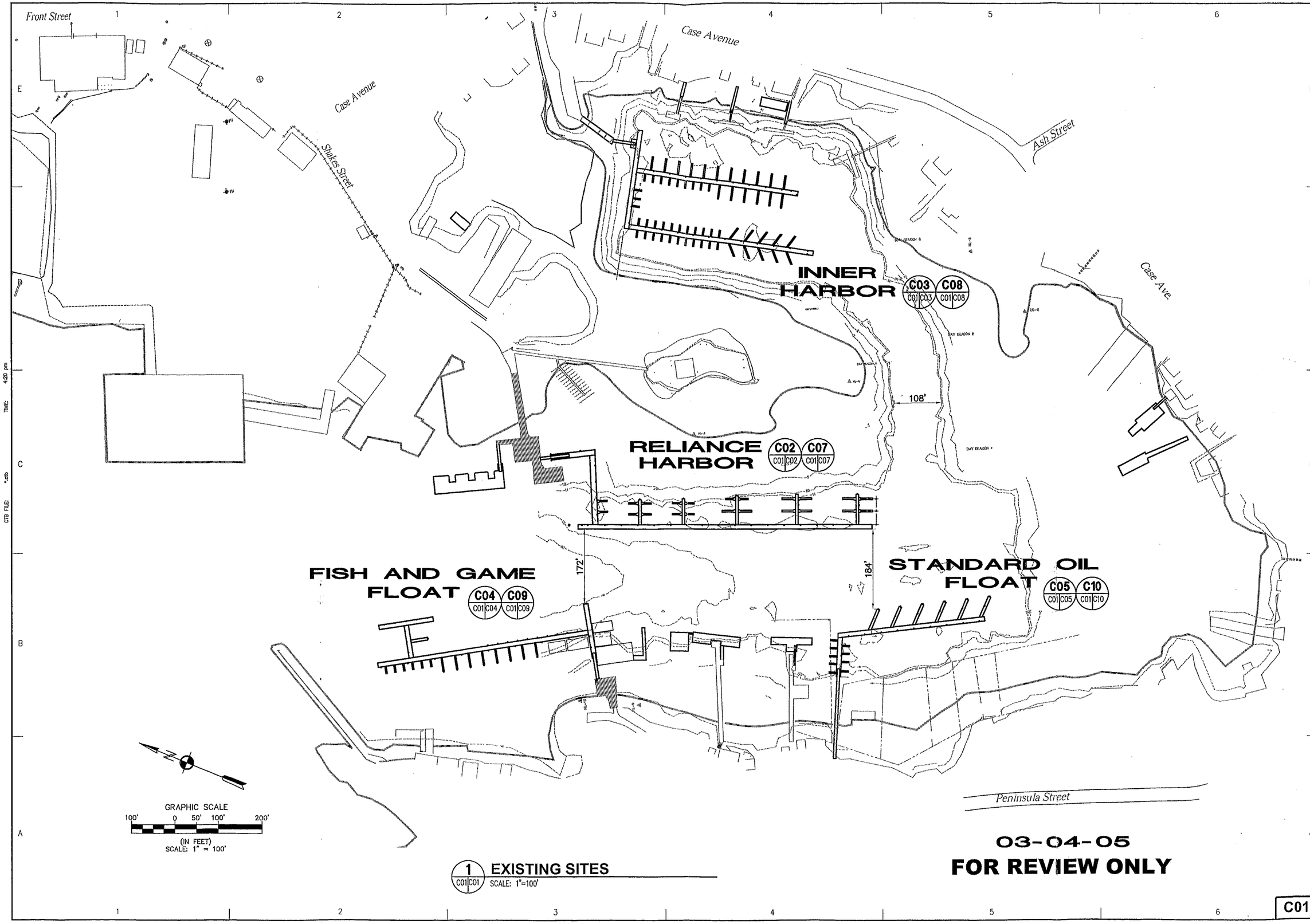

1 C01 C01 EXISTING SITES
SCALE: 1"=100'

03-04-05
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C01

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FIELD BOOKS
DESIGN:
STAGING:
AS-BUILT:
GRID:

No.	DATE:	DESCRIPTION:

REVISIONS:
VERTICAL DATUM:

CITY OF WRANGELL
WRANGELL HARBORS CONDITION ASSESSMENT

OVERALL HARBORS

WRANGELL, ALASKA

PROJECT No:	04099.000
DATE:	03/04/05
DESIGNED:	BP
DRAWN BY:	BP
CHECKED BY:	JCD
CAD DWG FILE:	04099_RELIANCE.dwg
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SHEET 2 OF 15

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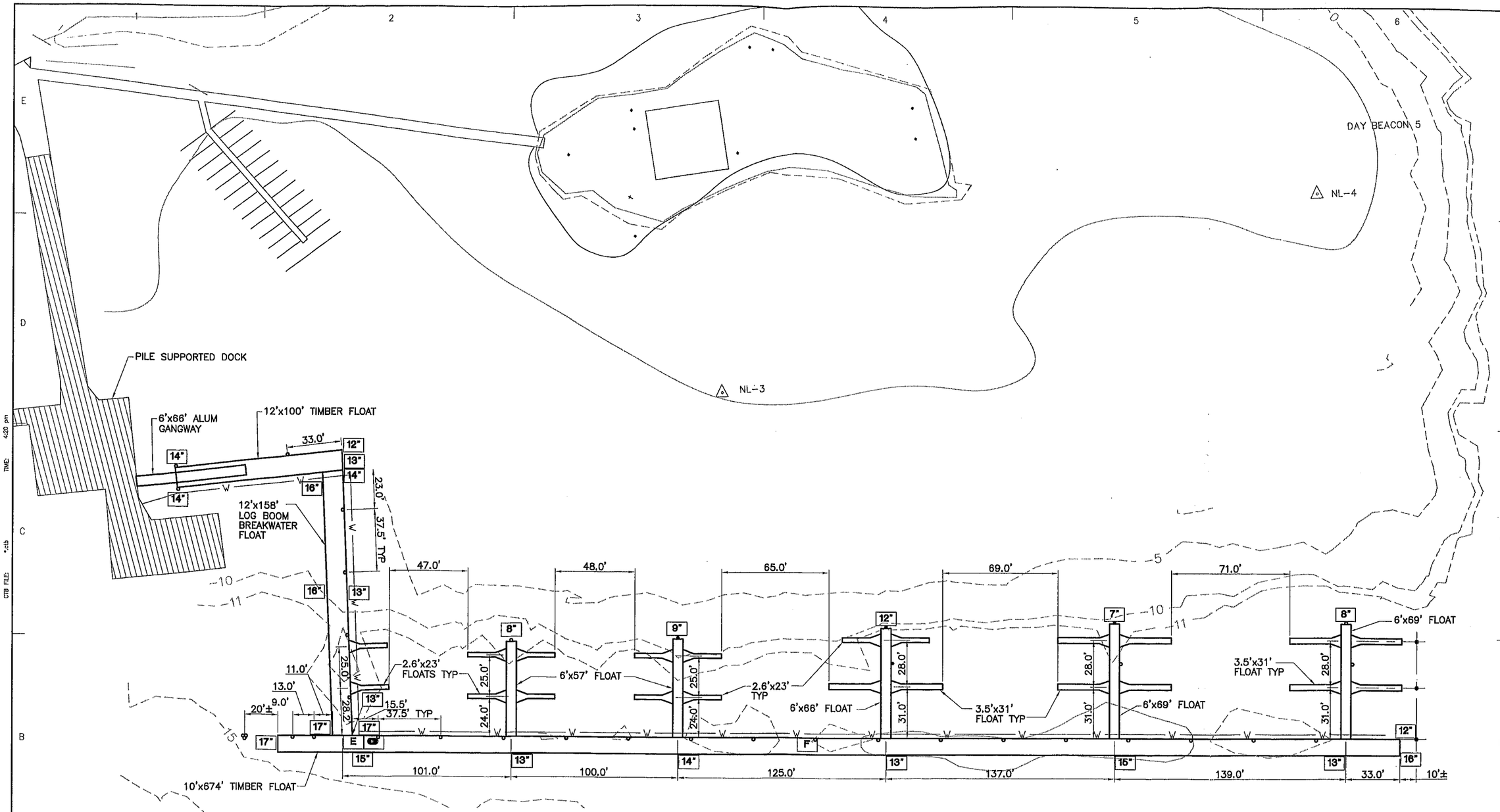

1 RELIANCE HARBOR

C02 C02 SCALE: 1"=30'

GRAPHIC SCALE

30' 0 15' 30' 60'

(IN FEET)
SCALE: 1" = 30'

03-04-05

FOR REVIEW ONLY

NOTE:

ALL FLOATS TIMBER U.O.N.

LEGEND:

▼	POTABLE WATER RISER
F	FIRE EQUIPMENT
●	12"ø STEEL PILE
○	TIMBER PILE
E	ELECTRICAL PANEL
—W—	POTABLE WATER LINE
FC	FISH CLEANING STATION
◉	ELECTRICAL LINE CONTAINER
14"	INCHES OF FREEBOARD

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FIELD BOOKS

No.	DATE:	DESCRIPTION:

REVISIONS:

VERTICAL DATUM:

CITY OF WRANGELL
WRANGELL HARBORS CONDITION ASSESSMENT

EXISTING CONDITION RELIANCE HARBOR

WRANGELL, ALASKA

PROJECT No:	04099.000
DATE:	03/04/05
DESIGNED:	BP
DRAWN BY:	BP
CHECKED BY:	JCD
CAD DWG FILE:	04099_RELIANCE.dwg
SCALE:	
HORIZONTAL:	20
VERTICAL:	N/A

SHEET 3 OF 15

C02

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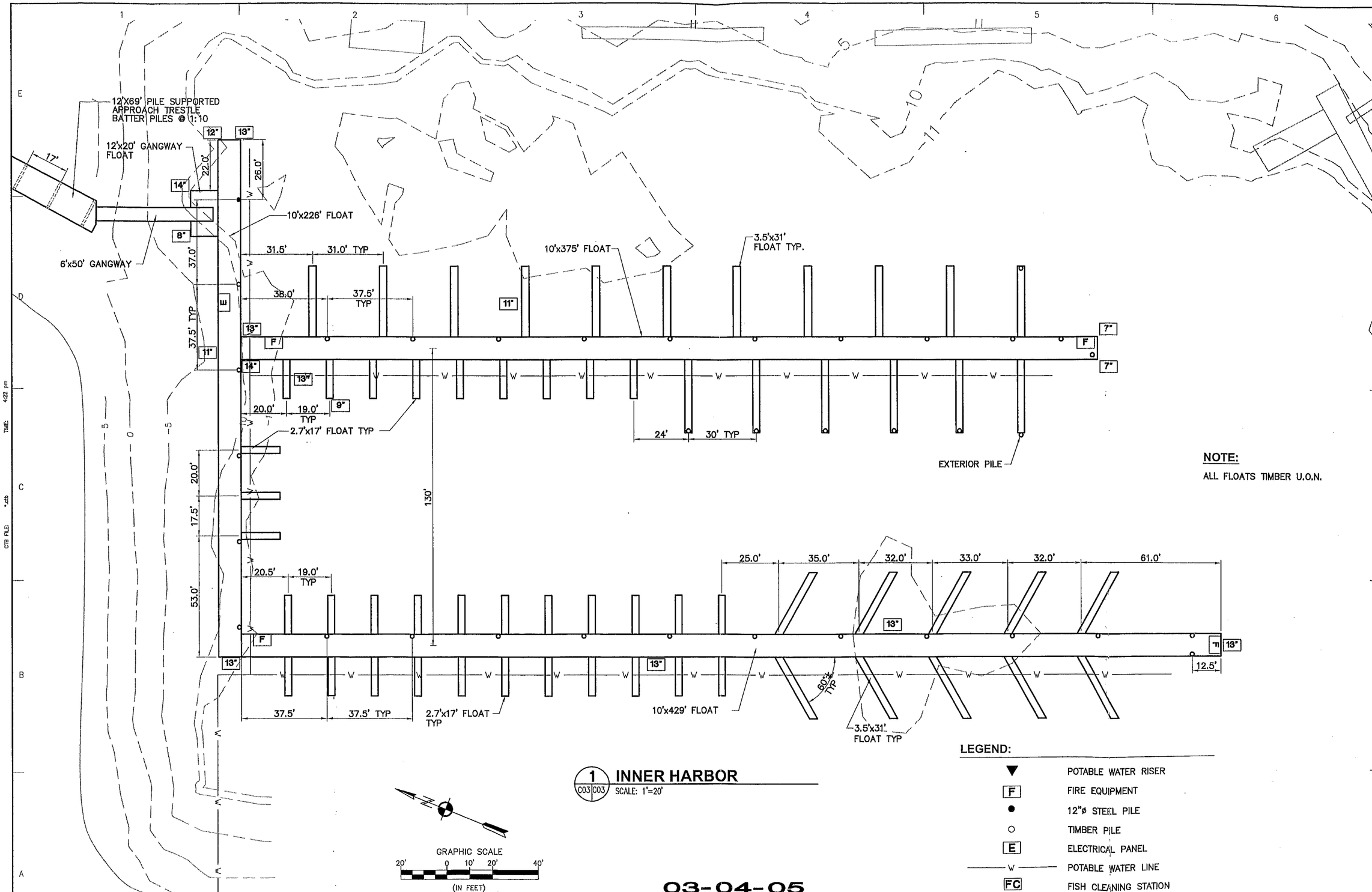

NOTE:

ALL FLOATS TIMBER U.O.N.

1 INNER HARBOR

C03 C03 SCALE: 1"=20'

LEGEND:

▼	POTABLE WATER RISER
F	FIRE EQUIPMENT
●	12"ø STEEL PILE
○	TIMBER PILE
E	ELECTRICAL PANEL
—W—	POTABLE WATER LINE
FC	FISH CLEANING STATION
⊖	ELECTRICAL LINE CONTAINER
14"	INCHES OF FREEBOARD

03-04-05

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FIELD BOOKS

No.	DATE:	DESCRIPTION:

REVISIONS:

VERTICAL DATUM:

CITY OF WRANGELL
WRANGELL HARBORS CONDITION ASSESSMENT

EXISTING CONDITION INNER HARBOR

WRANGELL, ALASKA

PROJECT No:	04099.000
DATE:	03/04/05
DESIGNED:	BP
DRAWN BY:	BP
CHECKED BY:	JCD
CAD DWG FILE:	04099_INNER.dwg
SCALE:	
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SHEET 4 OF 15

C03

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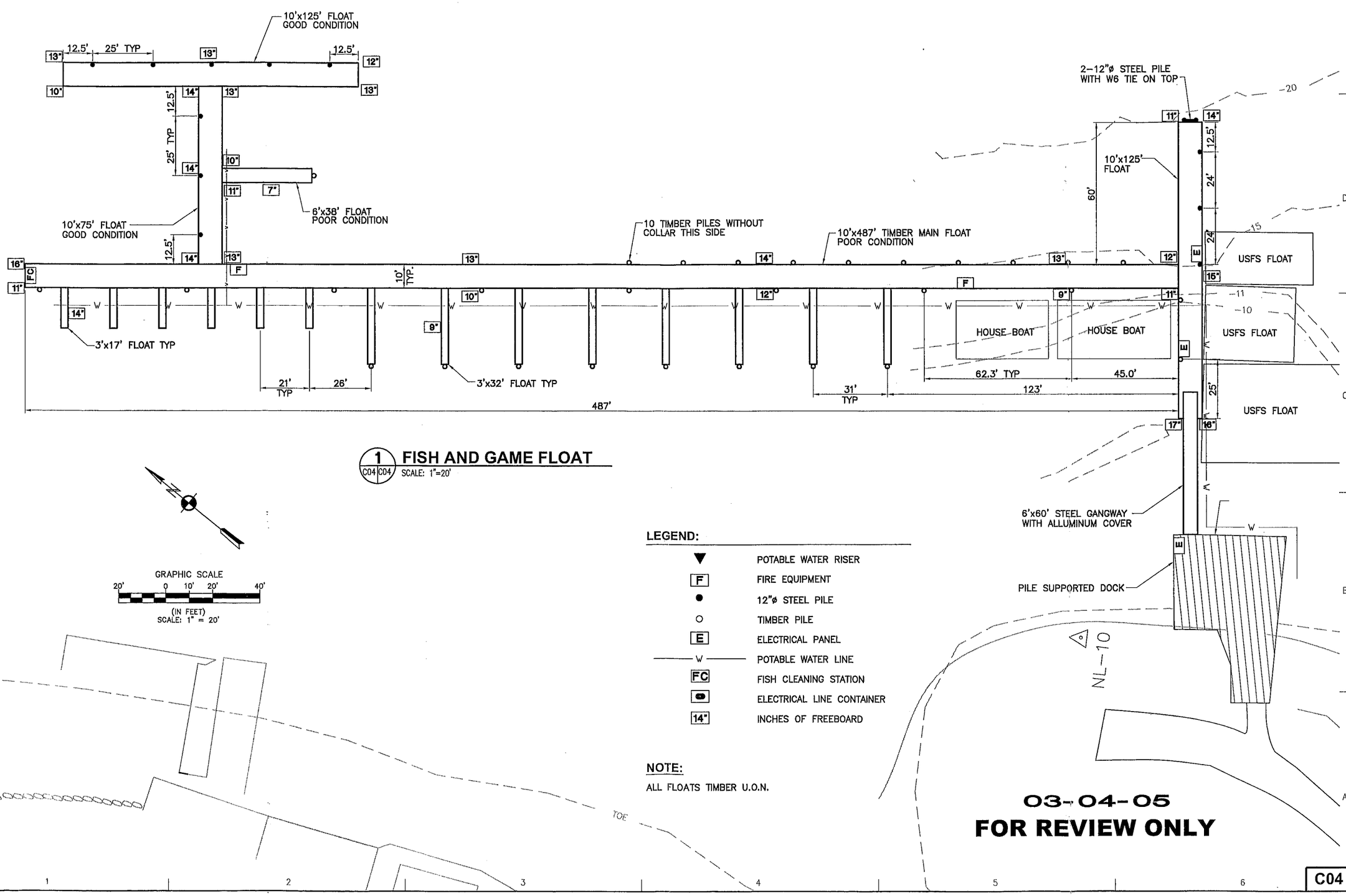

1 FISH AND GAME FLOAT

C04 C04 SCALE: 1"=20'

GRAPHIC SCALE

20' 0 10' 20' 40'

(IN FEET)
SCALE: 1" = 20'

LEGEND:

▼	POTABLE WATER RISER
F	FIRE EQUIPMENT
●	12"ø STEEL PILE
○	TIMBER PILE
E	ELECTRICAL PANEL
—— W ——	POTABLE WATER LINE
FC	FISH CLEANING STATION
⊖	ELECTRICAL LINE CONTAINER
14"	INCHES OF FREEBOARD

NOTE:

ALL FLOATS TIMBER U.O.N.

03-04-05

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FAX: (907) 276-7979

FIELD BOOKS

No.	DATE:	DESCRIPTION:	DESIGN:	DRAWN:	AS-BUILT:	CHKD:
		REVISIONS:				

VERTICAL DATUM:

CITY OF WRANGELL
WRANGELL HARBORS CONDITION ASSESSMENT

EXISTING CONDITION FISH AND GAME FLOAT

WRANGELL, ALASKA

PROJECT No:	04099.000
DATE:	03/04/05
DESIGNED:	BP
DRAWN BY:	BP
CHECKED BY:	JCD
CAD DWG FILE:	04099_FISH & GAME.dwg
SCALE: HORIZONTAL:	20
VERTICAL:	N/A

SHEET 5 OF 15

C04

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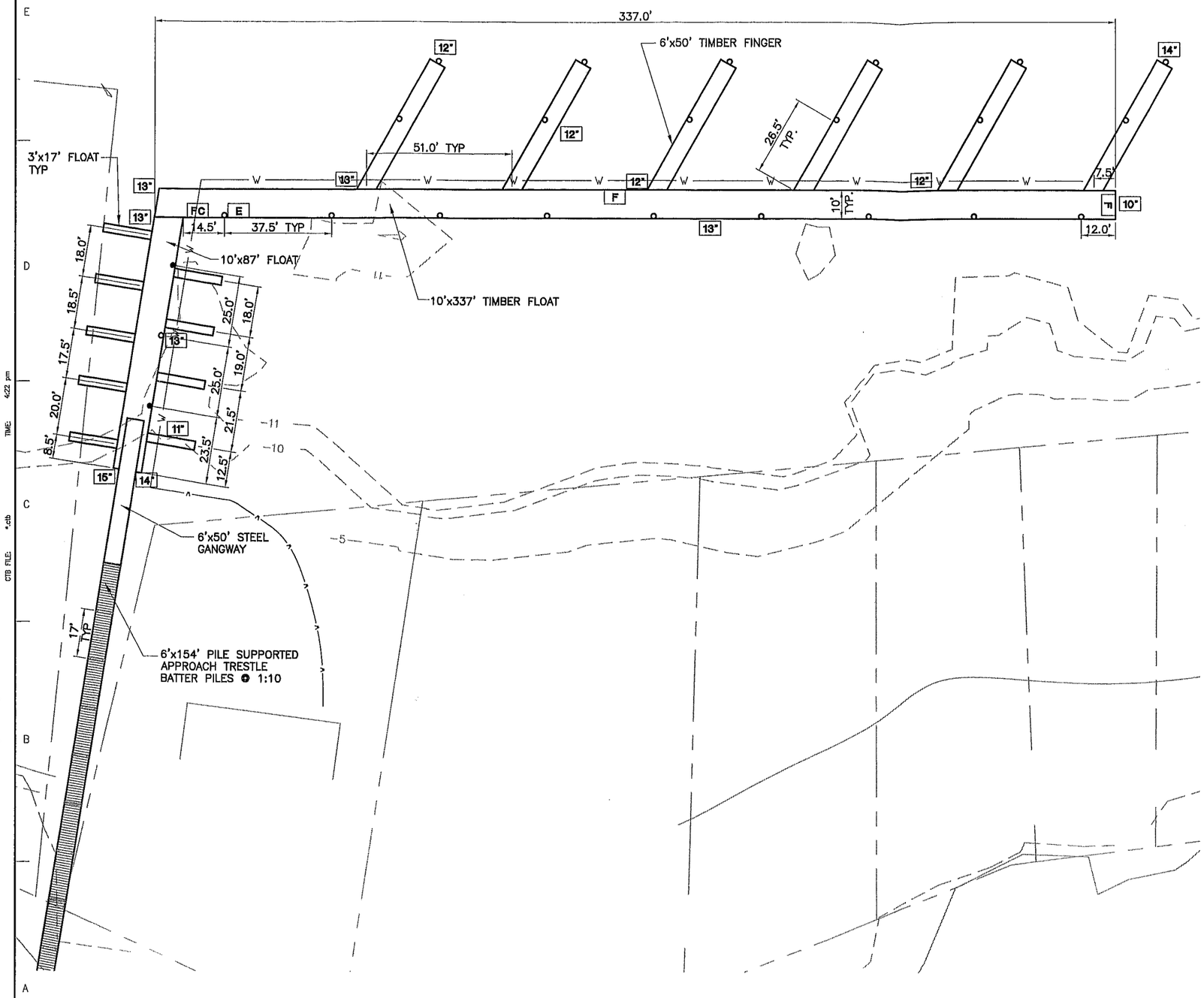

1 STANDARD FLOAT

C05 C05 SCALE: 1"=20'

LEGEND:

- ▼ POTABLE WATER RISER
- F FIRE EQUIPMENT
- ● 12"ø STEEL PILE
- ○ TIMBER PILE
- E ELECTRICAL PANEL
- —W— POTABLE WATER LINE
- FC FISH CLEANING STATION
- ELECTRICAL LINE CONTAINER
- 14" INCHES OF FREEBOARD

GRAPHIC SCALE

20' 0 10' 20' 40'

(IN FEET)
SCALE: 1" = 20'

NOTE:

ALL FLOATS TIMBER U.O.N.

03-04-05

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FAX: (907) 276-7679

FIELD BOOKS

DESIGN:
STAMING:
AS-BUILT:
CKD:

No.	DATE:	DESCRIPTION:

REVISIONS:

VERTICAL DATUM:

CITY OF WRANGELL
WRANGELL HARBORS CONDITION ASSESSMENT

EXISTING CONDITION
STANDARD OIL FLOAT

WRANGELL, ALASKA

PROJECT No:	04099.000
DATE:	03/04/05
DESIGNED:	BP
DRAWN BY:	BP
CHECKED BY:	JCD
CAD DWG FILE:	04099_STANDARD.dwg
SCALE:	
HORIZONTAL:	20
VERTICAL:	N/A

SHEET 6 OF 15

C05

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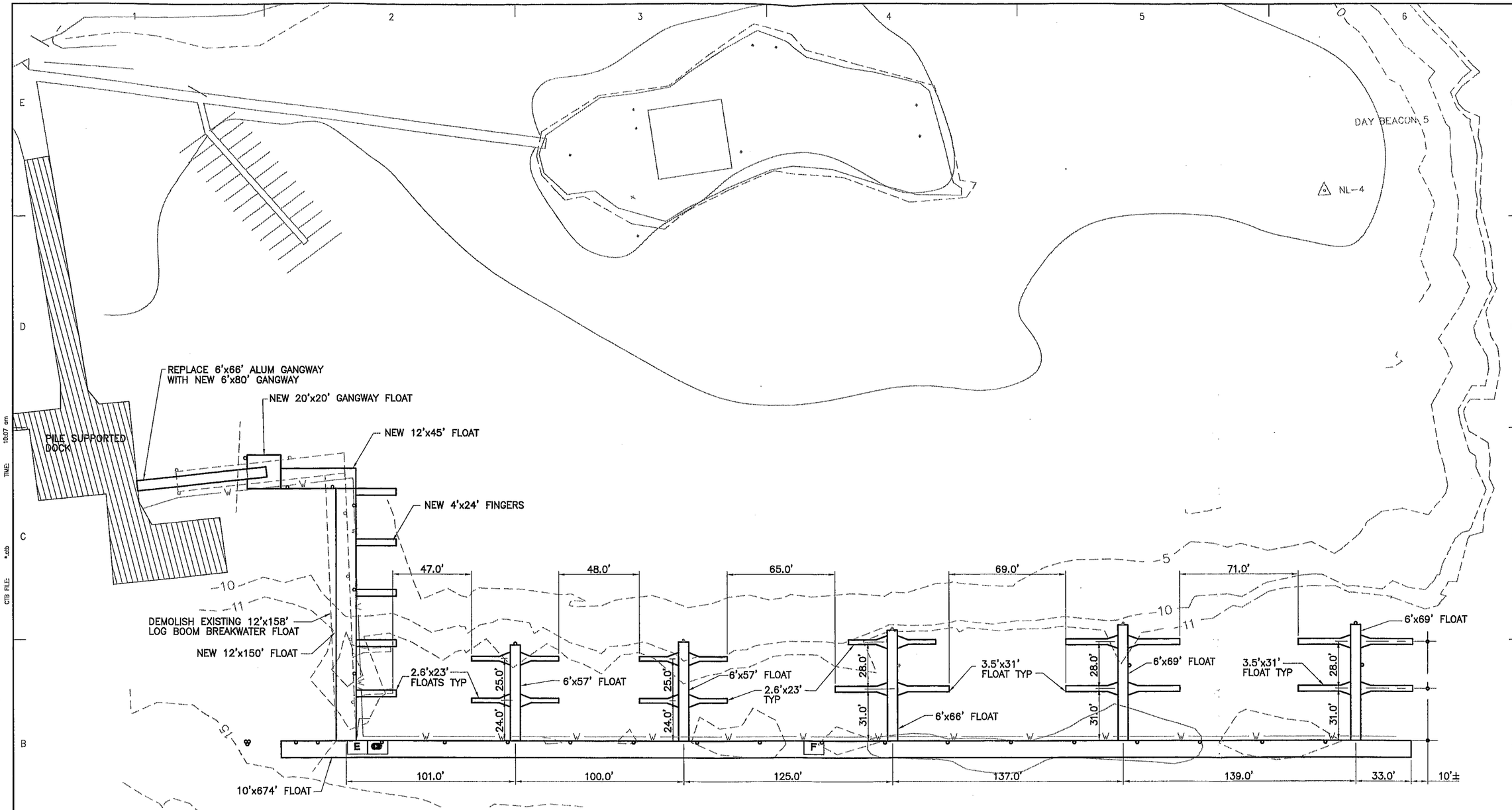

1 RELIANCE HARBOR

C07 C07 SCALE: 1"=30'

LEGEND:

▼	POTABLE WATER RISER
F	FIRE EQUIPMENT
●	12"ø STEEL PILE
○	TIMBER PILE
E	ELECTRICAL PANEL
—W—	POTABLE WATER LINE
FC	FISH CLEANING STATION
	ELECTRICAL LINE CONTAINER
14"	INCHES OF FREEBOARD

03-04-05

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FAX: (907) 276-7679

FIELD BOOKS

DESIGN:
STAKING:
AS-BUILT:
GRID:

No.	DATE:	DESCRIPTION:

REVISIONS:

VERTICAL DATUM:

CITY OF WRANGELL
WRANGELL HARBORS CONDITION ASSESSMENT

HARBOR MODIFICATIONS RELIANCCE HARBOR

WRANGELL, ALASKA

PROJECT No:	04099.000
DATE:	03/04/05
DESIGNED:	BP
DRAWN BY:	BP
CHECKED BY:	JCD
CAD DWG FILE:	04099_RELIANCE.dwg
SCALE:	
HORIZONTAL:	20
VERTICAL:	N/A

SHEET 8 OF 15

C07

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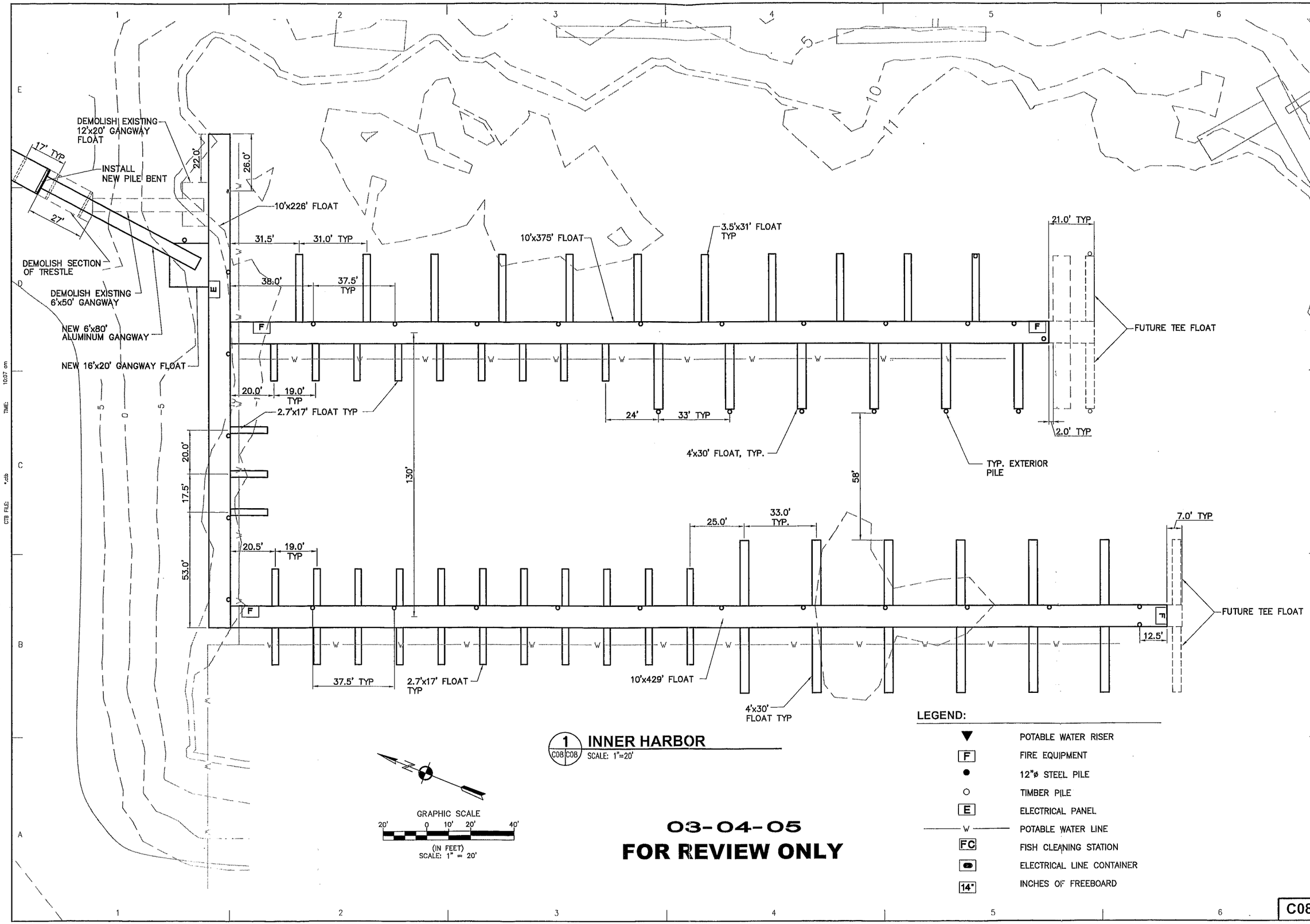

1 C08 C08 INNER HARBOR
SCALE: 1"=20'

LEGEND:

▼	POTABLE WATER RISER
F	FIRE EQUIPMENT
●	12"ø STEEL PILE
○	TIMBER PILE
E	ELECTRICAL PANEL
—W—	POTABLE WATER LINE
FC	FISH CLEANING STATION
	ELECTRICAL LINE CONTAINER
14"	INCHES OF FREEBOARD

03-04-05
FOR REVIEW ONLY

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FAX: (907) 276-7679

FIELD BOOKS
DESIGN:
STAKING:
AS-BUILT:
GRID:

No.	DATE:	DESCRIPTION:

REVISIONS:
VERTICAL DATUM:

CITY OF WRANGELL
WRANGELL HARBORS CONDITION ASSESSMENT
HARBOR MODIFICATIONS
INNER HARBOR
WRANGELL, ALASKA

PROJECT No: 04099.000
DATE: 03/04/05
DESIGNED: BP
DRAWN BY: BP
CHECKED BY: JCD
CAD DWG FILE: 04099_INNER.dwg
SCALE:
HORIZONTAL: 20
VERTICAL: N/A

SHEET 9 OF 15

C08

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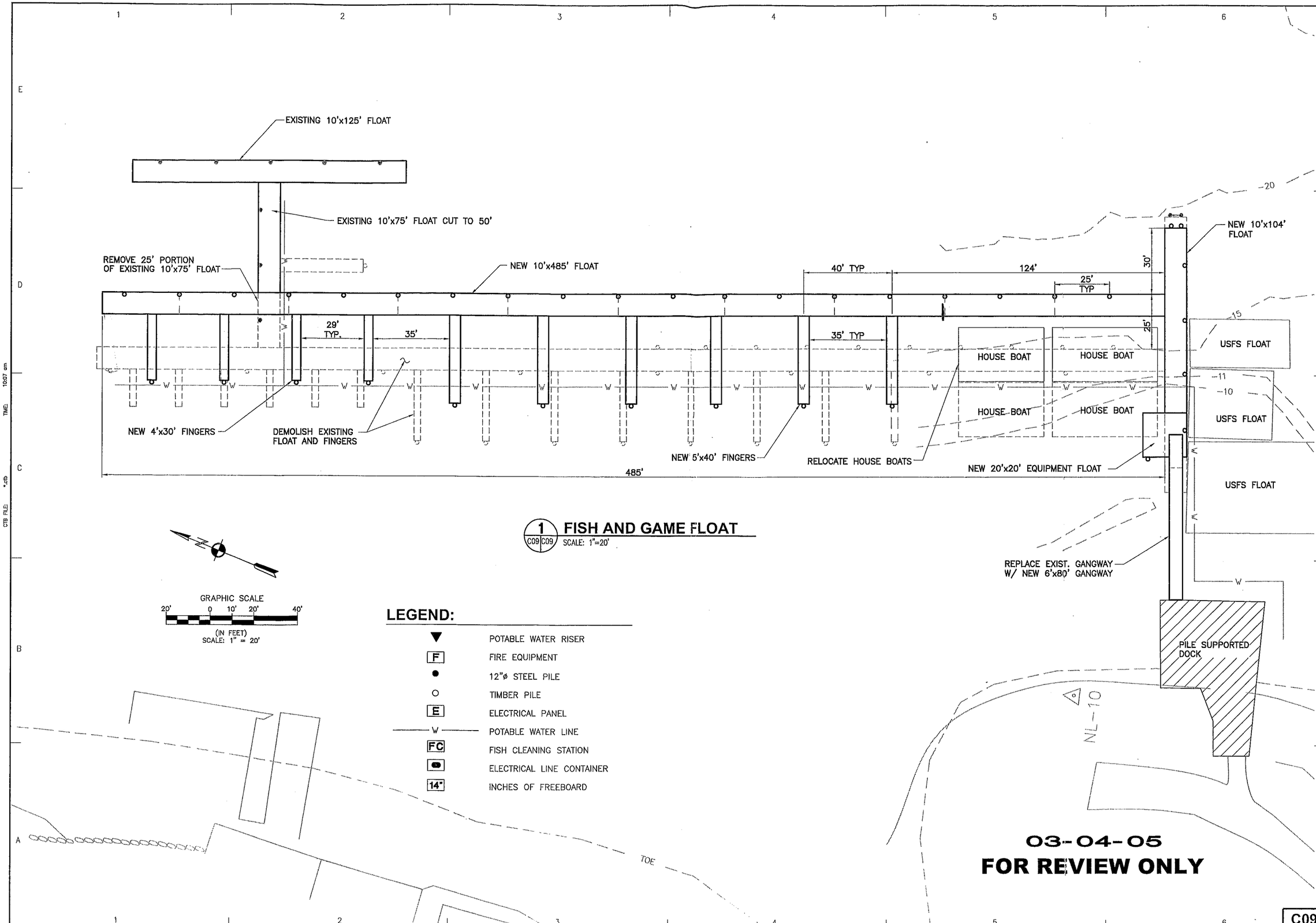

1 C09 C09 FISH AND GAME FLOAT
SCALE: 1"=20'

LEGEND:

▼	POTABLE WATER RISER
F	FIRE EQUIPMENT
●	12"ø STEEL PILE
○	TIMBER PILE
E	ELECTRICAL PANEL
—W—	POTABLE WATER LINE
FC	FISH CLEANING STATION
	ELECTRICAL LINE CONTAINER
14"	INCHES OF FREEBOARD

03-04-05
FOR REVIEW ONLY

C09

ENGINEERING/SURVEYING & LANDSCAPE ARCHITECTURE
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FAX: (907) 276-7679

FIELD BOOKS
DESIGN:
STAKING:
AS-BUILT:
GRID:

No.	DATE:	DESCRIPTION:

REVISIONS:
VERTICAL DATUM:

CITY OF WRANGELL
WRANGELL HARBORS CONDITION ASSESSMENT

HARBOR MODIFICATIONS FISH AND GAME FLOAT

WRANGELL, ALASKA

PROJECT No:	04099.000
DATE:	03/04/05
DESIGNED:	BP
DRAWN BY:	BP
CHECKED BY:	JCD
CAD DWG FILE:	04099_FISH & GAME.dwg
SCALE:	
HORIZONTAL:	20
VERTICAL:	N/A

SHEET 10 OF 15

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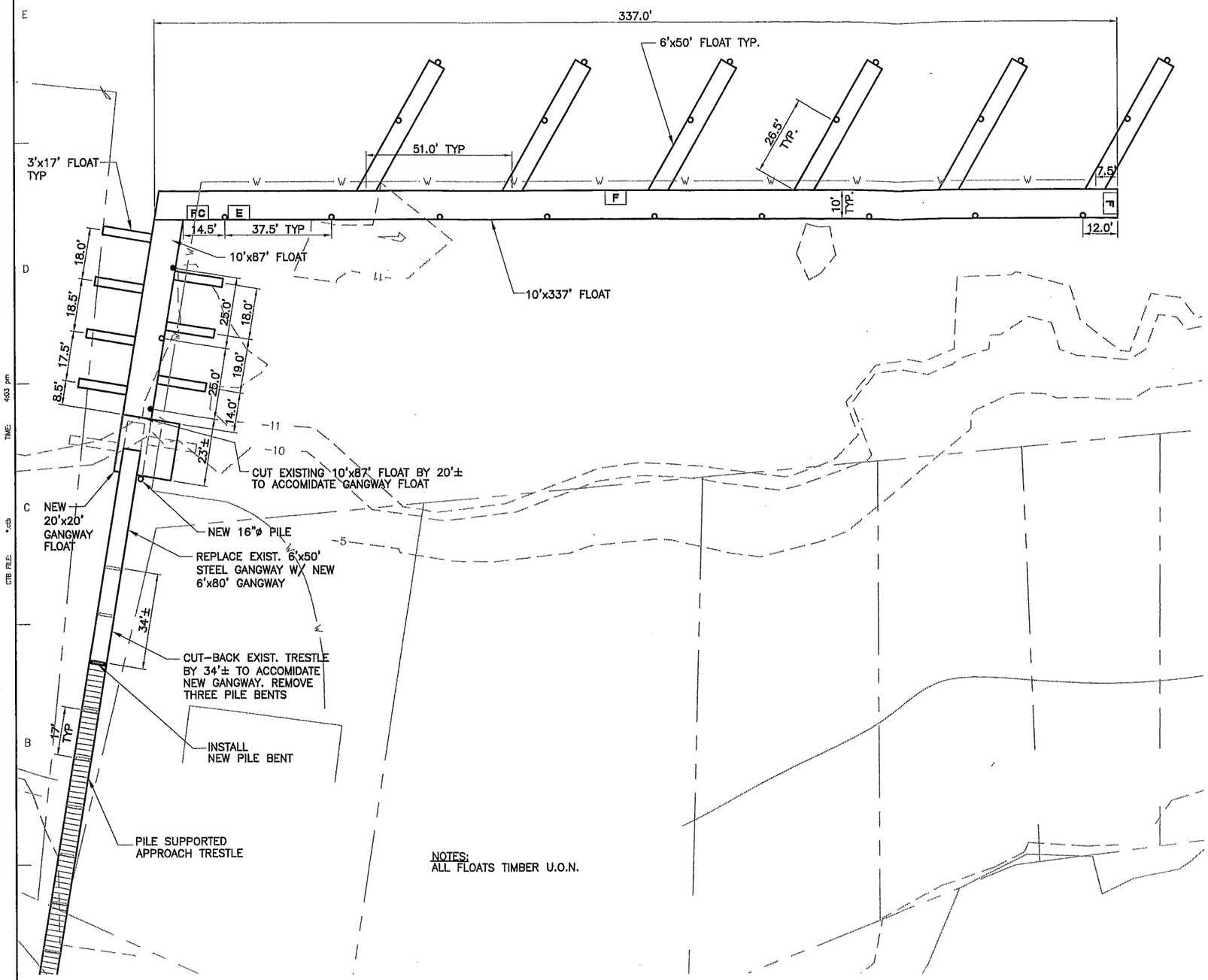

NOTES:
ALL FLOATS TIMBER U.O.N.

LEGEND:

▼	POTABLE WATER RISER
F	FIRE EQUIPMENT
●	12"ø STEEL PILE
○	TIMBER PILE
E	ELECTRICAL PANEL
—W—	POTABLE WATER LINE
FC	FISH CLEANING STATION
	ELECTRICAL LINE CONTAINER
14"	INCHES OF FREEBOARD

GRAPHIC SCALE
20' 0 10' 20' 40'
(IN FEET)
SCALE: 1" = 20'

03-04-05
FOR REVIEW ONLY

1 C10 C10 **STANDARD FLOAT**
SCALE: 1"=20'

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Tryck Nyman Hayes, Inc.
911 W. 8th AVENUE, SUITE 300
ANCHORAGE, ALASKA 99501-1997
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FAX: (907) 276-7679

FIELD BOOKS
DESIGN:
DRAWN:
AS-BUILT:
CHK:

No.	DATE:	DESCRIPTION:
		REVISIONS:
		VERTICAL DATUM:

CITY OF WRANGELL
WRANGELL HARBORS CONDITION ASSESSMENT
HARBOR MODIFICATIONS
STANDARD OIL FLOAT
WRANGELL, ALASKA

PROJECT No:	04099.000
DATE:	03/04/05
DESIGNED:	BP
DRAWN BY:	BP
CHECKED BY:	JCD
CAD DWG FILE:	04099_STANDARD.dwg
SCALE:	
HORIZONTAL:	20
VERTICAL:	N/A

SHEET 11 OF 15

C10

XREF's/IMAGES USED FOR THIS DWG:
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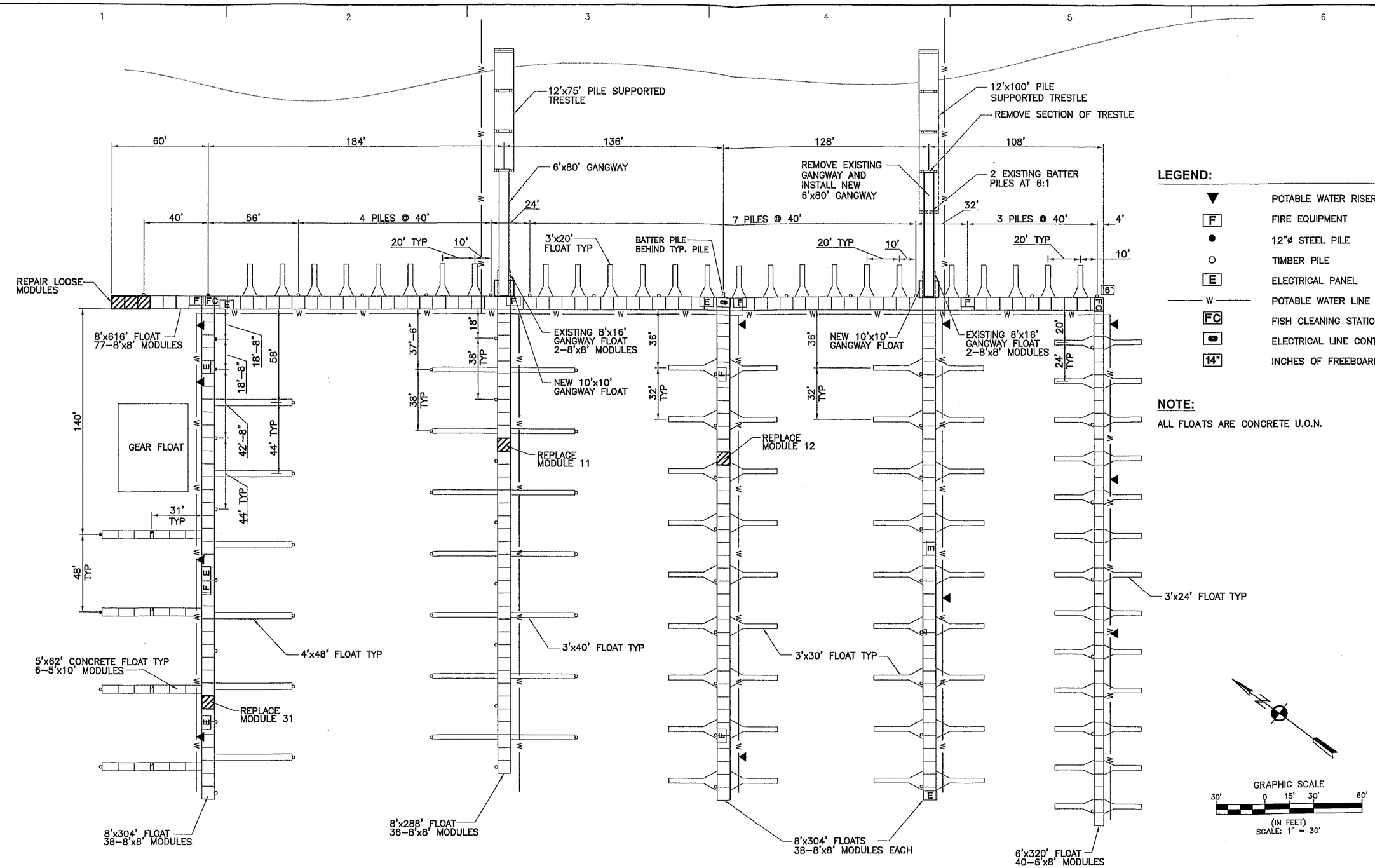

LEGEND:

▼	POTABLE WATER RISER
F	FIRE EQUIPMENT
●	12"ø STEEL PILE
○	TIMBER PILE
E	ELECTRICAL PANEL
—— W ——	POTABLE WATER LINE
FC	FISH CLEANING STATION
▭	ELECTRICAL LINE CONTAINER
14"	INCHES OF FREEBOARD

NOTE:

ALL FLOATS ARE CONCRETE U.O.N.

1 C11|C11 **SHOEMAKER BAY**
SCALE: 1" = 30'

03-04-05
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4 LAND DEVELOPMENT
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No.	DATE:	DESCRIPTION:

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VERTICAL DATUM:

CITY OF WRANGELL
WRANGELL HARBORS CONDITION ASSESSMENT
HARBOR MODIFICATIONS
SHOEMAKER BAY
WRANGELL, ALASKA

PROJECT No:	04099.000
DATE:	03/04/05
DESIGNED:	BP
DRAWN BY:	BP
CHECKED BY:	JCD
CAD DWG FILE:	04099_INNER.dwg
SCALE:	
HORIZONTAL:	N/A
VERTICAL:	N/A

SHEET 12 OF 15

C11

XREF's/IMAGES USED FOR THIS DWG:
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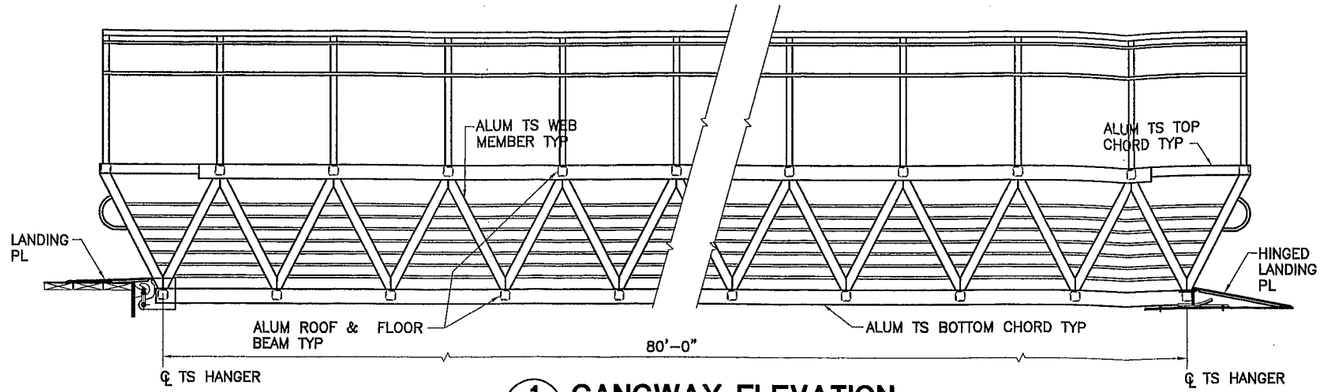
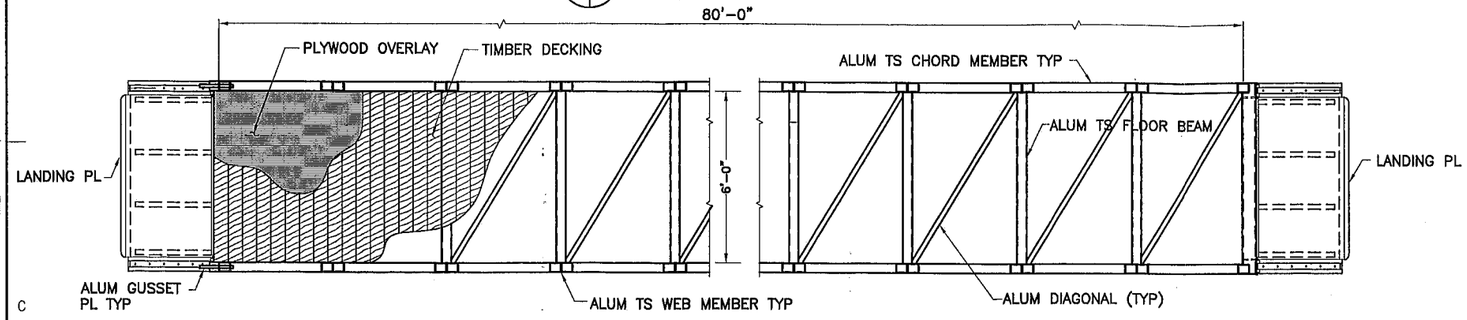


1 GANGWAY ELEVATION
S01|S01 SCALE: 3/8" = 1'

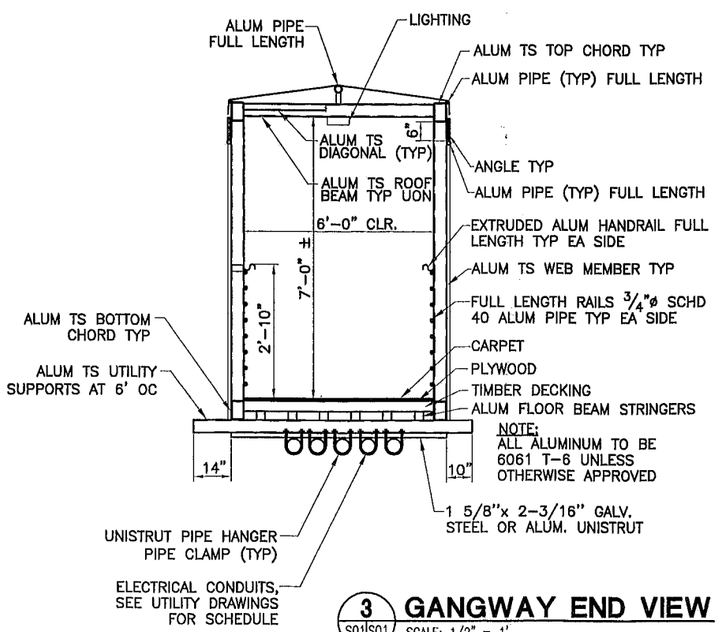


2 GANGWAY PLAN
S01|S01 SCALE: 3/8" = 1'

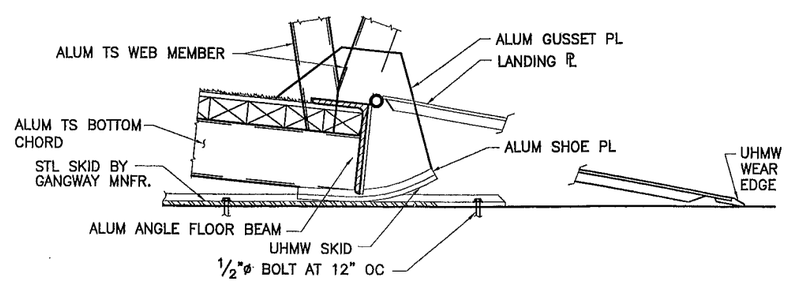
GRAPHIC SCALE
32 0 16 32 64
(IN INCHES)
SCALE: 3/8" = 1'

GRAPHIC SCALE
24 0 12 24 48
(IN INCHES)
SCALE: 1/2" = 1'

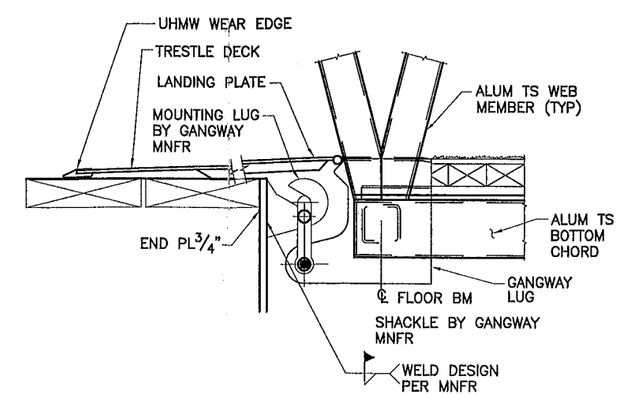
GRAPHIC SCALE
8 0 4 8 16
(IN INCHES)
SCALE: 1 1/2" = 1'



3 GANGWAY END VIEW
S01|S01 SCALE: 1/2" = 1'



4 GANGWAY SKID DETAIL
S01|S01 SCALE: 1 1/2" = 1'



5 GANGWAY/TRESTLE CONNECTION DETAIL
S01|S01 SCALE: 1 1/2" = 1'

NOTES:

GENERAL
ALL GANGWAY DETAILS ARE NOT SHOWN. DESIGN OF GANGWAYS SHALL BE THE RESPONSIBILITY OF THE MANUFACTURER. ALTERNATIVES TO THE GENERAL FEATURES AND MATERIALS NOTED MAY BE PROPOSED FOR APPROVAL BY THE ENGINEER. SUPPORTING DOCUMENTATION AND STRUCTURAL CALCULATIONS SHALL BE PERFORMED BY A REGISTERED ENGINEER IN THE STATE OF ALASKA. DETAILED SHOP DRAWINGS AND CALCULATIONS SHALL BE PROVIDED FOR REVIEW PRIOR TO FABRICATION.

DESIGN CRITERIA
ALL DESIGN AND FABRICATION SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING CODES:

1. CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS
2. UNIFORM BUILDING CODE, 1997 EDITION
3. ALUMINUM DESIGN MANUAL, CURRENT EDITION
4. AASHTO GUIDE SPECIFICATIONS FOR THE DESIGN OF PEDESTRIAN BRIDGES, 1997
5. AISC STEEL CONSTRUCTION MANUAL (LATEST EDITION)
6. AWS D1.1 & D1.2, STRUCTURAL WELDING CODE (LATEST EDITION)
7. APPLICABLE ASTM STANDARDS

LOADS
DEAD LOADS – ALL
LIVE LOADS – UNIFORM, 85 PSF,
CONCENTRATED, 1,000 LBS
WIND LOAD – 100 MPH, EXPOSURE D
ROOF SNOW LOAD – 60 PSF
ELECTRICAL UTILITY SUPPORTS – 150 LBS/LF
WATER/SEWER UTILITY SUPPORTS – 50 LBS/LF

MATERIALS
ALUMINUM – ASTM 6061-T6

STRUCTURAL STEEL – PLATES AND SHAPES SHALL BE ASTM A36. PIPE SHALL BE ASTM A53, GRADE B.

HARDWARE – ALL BOLTS AND HARDWARE SHALL BE ASTM A325 AND HOT DIP GALVANIZED IN ACCORDANCE WITH ASTM A123.

DECKING – THE DECKING SHALL BE PRESSURE TREATED TIMBER WITH A TREATED PLYWOOD OVERLAY. THE DECKING SIZE SHALL BE DETERMINED BY THE MANUFACTURER TO MEET ALL LOADING REQUIREMENTS.

LIGHTING – PROVIDE 50 WATT HIGH PRESSURE SODIUM LIGHTS SUITABLE FOR SERVICE IN WET MARINE LOCATIONS. PROVIDE 4 LIGHTS AND ASSOCIATED CONDUIT. PREWIRE.

TRANSITION PLATES – TRANSITION PLATES SHALL BE FULL SIZE ALUMINUM SHEET STOCK WITH A "SLIP-NOT" FINISH OR APPROVED EQUAL.

UHMW PLASTIC – ULTRA HIGH MOLECULAR WEIGHT PLASTIC SHALL BE MADE FROM MATERIALS CONFORMING TO ASTM 4020. MATERIAL SHALL BE CHEMICALLY CROSS LINKED, ULTRA-VIOLET LIGHT STABILIZED, AND SUITABLE FOR LONG TERM EXPOSURE. UHMW SHALL BE YELLOW IN COLOR.

03-04-05

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FIELD BOOKS
ISSUAL
STAMING
AS-BUILT
DWG:

No.	DATE:	DESCRIPTION:

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CITY OF WRANGELL
WRANGELL HARBORS CONDITION ASSESSMENT

6'x80' ALUMINUM GANGWAY

WRANGELL, ALASKA

PROJECT No:	04099.000
DATE:	03/04/05
DESIGNED:	BP
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CAD DWG FILE:	04099_INNER.dwg
SCALE:	
HORIZONTAL:	N/A
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SHEET 13 OF 15

S01

XREF's/IMAGES USED FOR THIS DWG:
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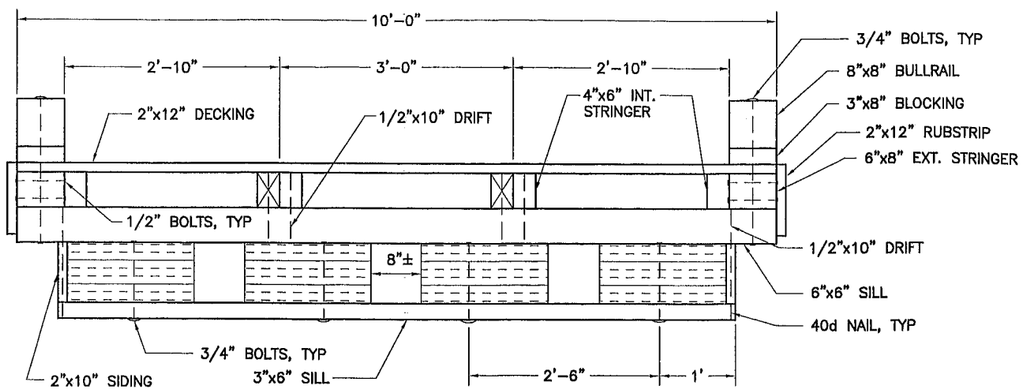
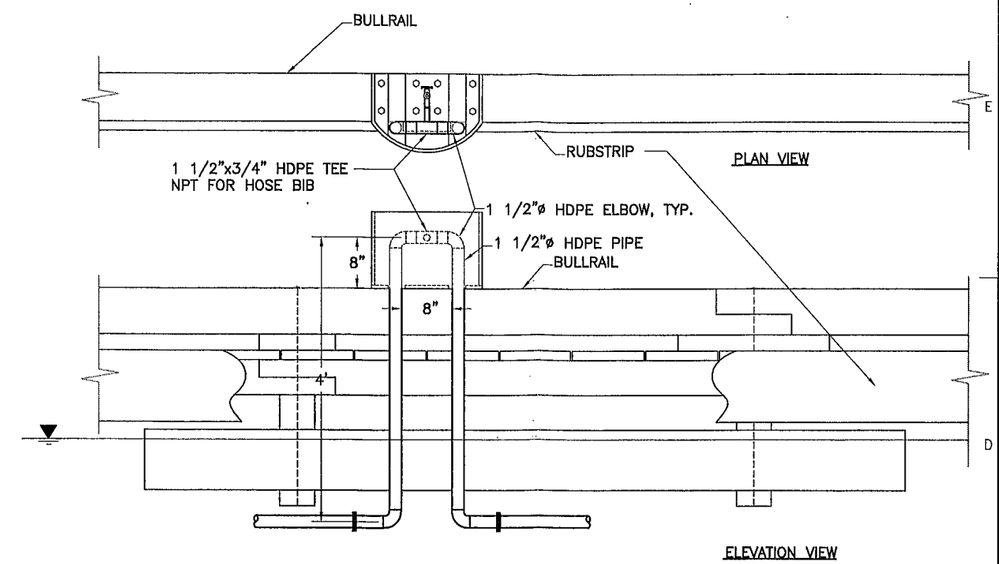


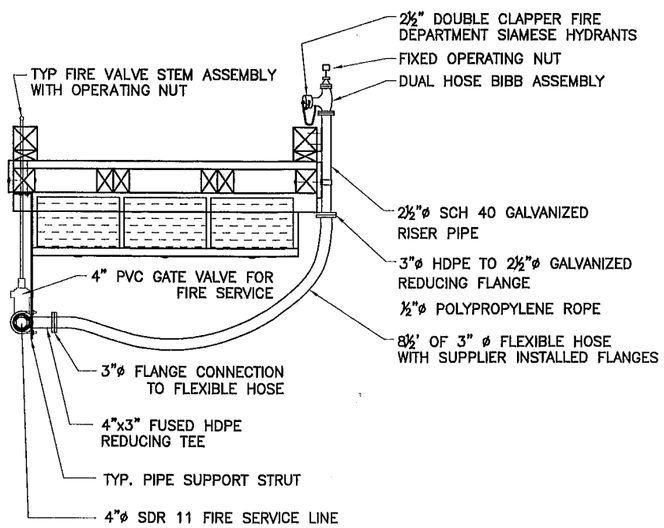
1 TYP. 10' FLOAT SECTION

S02 S02 SCALE: 1" = 1'



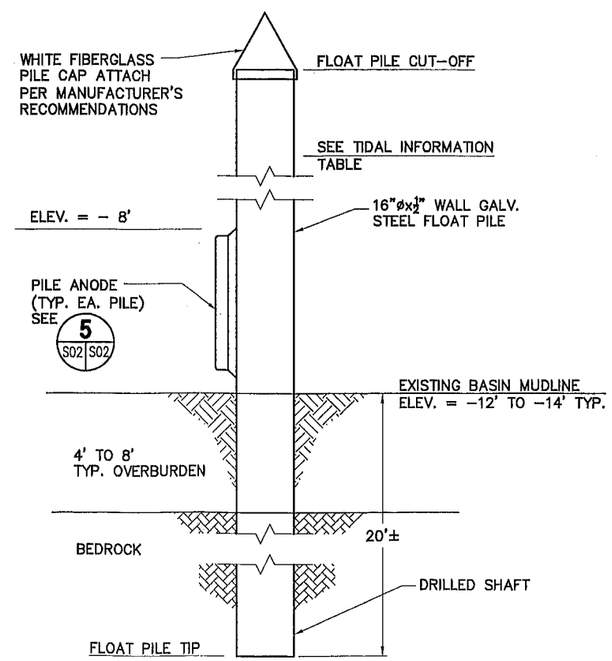
2 UTILITY DETAIL

S02 S02 SCALE: 1" = 1'



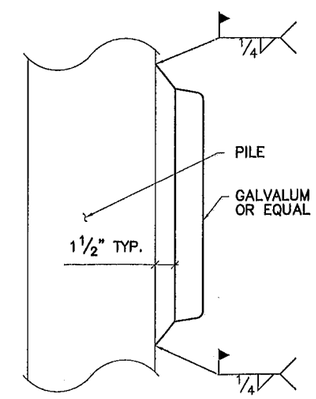
3 FIRE STAND PIPE

S02 S02 SCALE: NTS



4 STEEL FLOAT PILE DETAIL

S02 S02 SCALE: NTS



1. PROVIDE ONE ANODE PER PILE AS FOLLOWS:
   16"ø PILE – 130 lb
   THE ABOVE WEIGHT SHALL BE ANODE MATERIAL NOT INCLUDING THE CORE.
2. THE MAXIMUM LENGTH, NOT INCLUDING THE MOUNTING TABS, SHALL BE 36". TOP OF INSTALLED ANODE SHALL BE NO HIGHER THAN –8' FROM MLLW.
3. ANODE SHALL BE GALVALUM 3 OR EQUAL BEND TABS AS SHOWN AND INSTALL BY DIVER. WET WELD TO AWS D3.6–93 CLASS B STANDARDS.

5 ANODE DETAIL

S02 S02 SCALE: NTS

GRAPHIC SCALE

12 0 6 12 24

(IN INCHES)

SCALE: 1" = 1'

03-04-05

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S02

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GRID:

No.	DATE:	DESCRIPTION:

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CITY OF WRANGELL
WRANGELL HARBORS CONDITION ASSESSMENT

UTILITY DETAIL
HARBOR MODIFICATIONS

WRANGELL, ALASKA

PROJECT No:	04099.000
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HORIZONTAL:	N/A
VERTICAL:	N/A

SHEET 14 OF 15

XREF's/IMAGES USED FOR THIS DWG:
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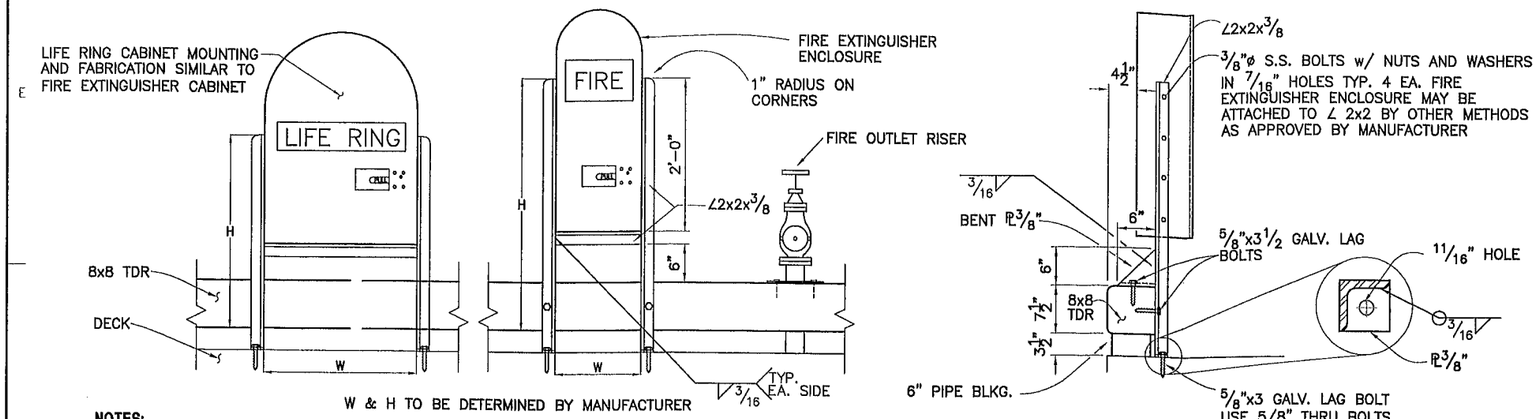
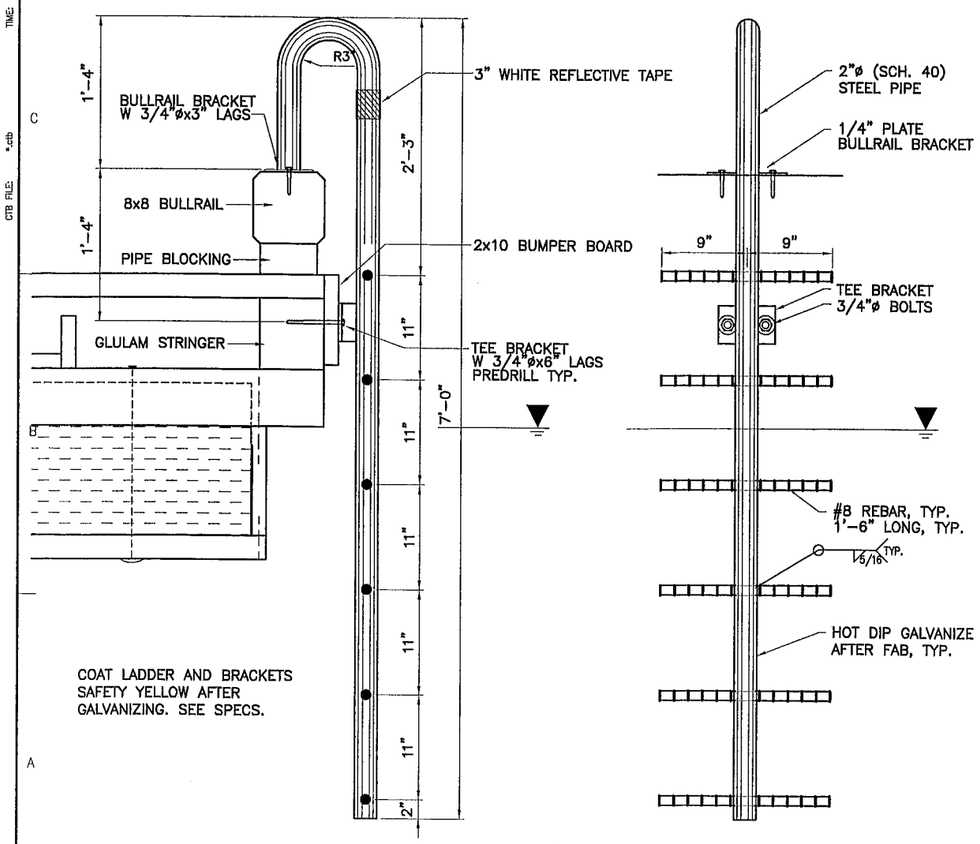


NOTES:

PROVIDE 20lb FIRE EXTINGUISHERS RATED FOR 2A, 20-B:C AT EACH HOSE STATION. EXTINGUISHERS SHALL BE INSTALLED IN AN APPROVED ENCLOSURE WITH A LOCKABLE "BREAK GLASS" INTERNAL HANDLE DEVICE. CHEYENNE PRODUCTS # FEH-L OR EQUAL. HOT DIP GALVANIZE FRAME AFTER FABRICATION.

1 FIRE EXTINGUISHER AND LIFE RING ENCLOSURE

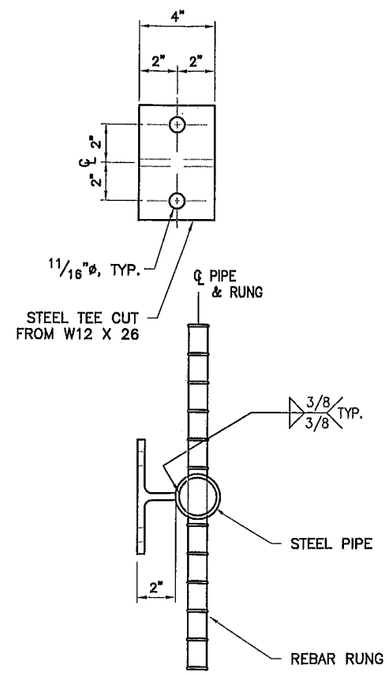
S03 S03 SCALE: N.T.S.



COAT LADDER AND BRACKETS SAFETY YELLOW AFTER GALVANIZING. SEE SPECS.

2 SAFETY LADDER

S03 S03 SCALE: N.T.S.



3 TEE BRACKET DETAIL

S03 S03 SCALE: N.T.S.

03-04-05

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FIELD BOOKS

No.	DATE:	DESCRIPTION:

REVISIONS:

VERTICAL DATUM:

CITY OF WRANGELL
WRANGELL HARBORS CONDITION ASSESSMENT

LIFE SAFETY DETAILS

WRANGELL, ALASKA

PROJECT No:	04099.000
DATE:	03/04/05
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CAD DWG FILE:	4099_G01.DWG
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VERTICAL:	–

S03

SHEET 15 OF 15

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