Appendix D
Performance Requirements

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ACRONYMS AND ABBREVIATIONS

APA	American Plywood Association
BOD	Basis of Design
DL	Dead Load
ELW	Extreme Low Water
EHW	Extreme High Water
GPM	Gallons Per Minute
HDPE	High Density Polyethylene
IFC	Issued for Construction
KSI	Kilopound per Square inch
lb(s)	pound(s)
lbs/cy	pound per cubic yard
lbs/lf	pounds per linear foot
LL	Live Load
Mil	a unit of length equal to 0.001 of an inch (0.0254 millimeters)
NECA	National Electrical Contractors Association
NEMA	National Electrical Manufacturers Association
NETA	International Electrical Testing Association, Inc.
O&M	operations and maintenance
PSF	pounds per square foot
Psi	pounds per square inch
RFP	Request for Proposals
SS	Stainless Steel
UHMW	ultra-high molecular weight
UHMW-PE	ultra-high molecular weight polyethylene
USCG	United States Coast Guard
UTV	Utility Vehicle
UV	ultra-violet
VWL	Vehicle Wheel Loads

TABLES

1 SCOPE OF WORK

This Work of rebuilding of Floats A, G and H includes these performance requirements to provide a fully functional public harbor facilities with a service life of at least 50 years. The Work includes all labor, materials, tools, and equipment for fabrication, transport, delivery, and installation of floating docks, power, lighting, potable water, fire suppression, and safety equipment and all other appurtenances and hardware as stated in the Request for Proposals (RFP).

As a part of the City of Whittier's Harbor rebuild, the Design-Builder will need to address these following performance requirements as the project progresses from design to completion. The performance requirements include all labor, materials, tools, and equipment for engineering, design and construction, incorporating mandatory design features, under this RFP and other Contract Documents. All final engineering and design shall be performed by qualified Engineers, provided by the Design-Builder, and registered in the State of Alaska.

These performance requirements are provided to define the expectations of the City as to the materials, construction, quality, and functionality of the replaced float systems. The Design-Builder will be expected to meet or exceed these requirements; and to document their achievement of these requirements, which are consider necessary to meet long term needs of the Whittier based fishing fleet and the users of the rebuilt float systems. Design-Builder's proposals must address the approach they will employ to comply these performance requirements.

Construction methods and products not specifically mentioned shall utilize reasonable care and the highest quality construction practices and industry standards in Alaska. Final inspection and acceptance of all work and products will be made by the City. Approval will be based upon conformance to the Contract Documents, quality of workmanship, applicable industry standards, and pertinent fabricator's recommendations.

Construction surveying will be required by the Design-Builder to provide Vertical and Horizontal Control. All construction survey shall be performed by, or under the direct supervision, of a surveyor licensed in Alaska.

Design-Builder assumes full responsibility for any damages or losses resulting from the handling or transporting of all components during loading, shipping, transport, and delivery to/from the fabrication and/or project site, and the subsequent handling required on site for installation and until final acceptance. Any components damaged during transport and delivery and/or during any other handling operations before final acceptance shall be repaired or replaced by the Design-Builder at the discretion of the Engineer and at no additional cost to the Owner.

1.1 Service Life and Maintenance

The design service life of the new harbor facilities and utilities will be 50 years. The City expects realistic operations and maintenance (O&M) expectations for a typical 50-year service life on these facilities. A typical facility's performance level changes over time (i.e., meets or exceeds the design live loads and environmental loads, etc. at the newly installed, optimum performance level). The harbor facilities are expected to continue to deliver near-optimum performance—barring accidents/catastrophe and with proper use and normal O&M—at a fairly steady level for many years. But there inevitably begins a slow decline in performance due to wear, aging, and functional change. Eventually, performance falls to a

level that users judge to be the minimum acceptable, at which time the Owners will take action to renovate and/or plan for replacing the facilities. The design service life is the time required for performance deterioration to reach this minimum acceptable level. Design decisions and Owners' investment decisions typically are based on an assumption that adequate performance can be delivered for the 50-year service life. Rarely, however, does this period elapse without some periodic renewal or refurbishment or replacement. The City expects to replace bullrails and decking or anodes, for example—that increase performance during the service period and can effectively extend the service life beyond the 50 years.

Normal maintenance includes regular inspections (at least annual above water and 5 years below water) and associated repairs, prompt repair of damage from vessel impacts or other incidents, routine/annual repair of damaged decking, bullrails, and utilities, etc.

The following table lists some of the periodic major maintenance/renewal projects that are expected by the City for the float system, to help maintain high performance and extend the service life of the facility. The Proposer shall include all expected O&M for their Proposed Design floats and other facilities and equipment in the Proposal.

Table 1. Maintenance and Renewal Projects

COMPONENT	RENEWAL PERIOD (YEARS)
Detailed above/underwater inspection and routine maintenance	5
Underwater power-wash/clean marine growth	10
Timber Decking (if any), Rubboards & Bullrails	30
Anodes	20
LED light fixtures	5
Flex hose flanges, Hose bibs & fire valve handles	5-10

2 APPLICABLE DESIGN CODES STANDARDS AND REFERENCES

All work associated with furnishing, fabricating, and installing the multiple elements of rebuilding the South Harbor shall be conducted under these performance requirements, and the below listed design codes, standards, and references.

All references shall apply to the latest edition. This list may not be all inclusive; the intent of the Contract is for the Design Builder to provide a functionally complete Project consistent with good engineering practice applicable to a public harbor in Whittier, Alaska. Where conflicts exist between these references, the Design-Builder's Engineer of Record shall select the most appropriate governing standard, code, or specification and justify its use in the Basis of Design document. Engineer of Record may generate sealed, Project-specific special provisions or sheet notes which maintain or exceed these codes and specifications.

AASHTO LRFD Bridge Design Specifications, current edition

Alaska Administrative Code, AAC

Alaska DOT&PF Standard Specifications for Highway Construction, 2015 Edition, including Special Provisions

Alaska DOT&PF Test Methods Manual, 2016

Aluminum Design Manual, 2020

American Association of State Highway and Transportation Officials (AASHTO)

American Concrete Institute (ACI), ACI 318 Building Code Requirements for Structural Concrete and Commentary

American Institute of Steel Construction (AISC) 360, Specifications for Structural Steel Buildings

American Institute of Steel Construction (AISC), Steel Construction Manual

American Institute of Timber Construction (AITC) 200 Inspection Manual

American Society for Testing and Materials (ASTM) A27, A36, A123, A153, A307, A325, A572, A992, A500, A563, A780, C557-03, D-6662

American Society of Civil Engineers, "Planning and Design Guidelines for Small Craft Harbors," ASCE Manuals and Reports on Engineering Practice No. 50,

American Society of Civil Engineers, ASCE/SEI 7 Minimum Design Loads for Buildings and Other Structures

American Society of Mechanical Engineers (ASME) B18.2., B18.6.1

American Water Works Association (AWWA) C651, C901, others as appropriate

American Welding Society (AWS) C2.23, C2.16, D1.1, D1.2, D1.3, D3.6

American Wood Protection Association (AWPA) Standards

Americans with Disabilities Act 1003, "Recreational Boating Facilities"

ANSI C2, National Electrical Safety Code

ANSI, American National Standards Institute

ASCE 61 (Seismic Design of Piers and Wharves)

ASCE COPRI 61-14, Standards for Seismic Design of Pier and Wharves

ASME Pressure Vessel Code

AWWA M11 Steel Pipe Manual

CRSI (Concrete Reinforcing Steel Institute) Standards

Insulated Cable Engineers Association Standards (ICEA)

Institute of Electrical and Electronic Engineers Standards (IEEE)

Illumination Engineering Society Standards (IES)

Illumination Engineering Society of North America Standards (IESNA)

International Building Code (IBC), as amended by Title 13 of the Alaska Administrative Code

International Fire Code (IFC)

National Association of Corrosion Engineers (NACE) Corrosion Protection of Offshore Structures

National Design Specification (NDS) for Wood Construction

National Electrical Code (NEC)

National Electric Code (NEC)

NFPA 14: "Standard for the Installation of Standpipe and Hose Systems"

NFPA 70E: Standard for Electrical Safety in the Workplace

NFPA 303: Fire Protection Standard for Marinas and Boatyards"

NSF Standard 61 Drinking Water System Components

Occupational Safety and Health Act (OSHA)

OSHA: Walking-Working Surfaces, Subpart D 1910.23(e) 3

Prestressed Concrete Institute Standards (PCI)

Permanent International Association of Navigation Congresses (PIANC): Guidelines for the Design of Fender Systems

Tobiasson, B & R. Kollmeyer, Marinas and Small Craft Harbors

Unified Facilities Criteria (UFC)

UFC 4-150-06 United Facilities Criteria: Military Harbors and Coastal Facilities

UFC 4-152-01 Design: Piers and Wharves

UFC 4-152-07 Design: Small Craft Berthing Facilities

UFC 4-159-03 Moorings

UL Underwriters Laboratories

UPC Uniform Plumbing Code

United States Army Corps of Engineers (USACE), Coastal Engineering Manual

United States Army Corps of Engineers (USACE), "Small Craft Harbors: Design, Construction and Operation," Special Report No.2, December 1974.

West Coast Lumber Inspection Bureau (WCLIB)

WWPA, Western Wood Products Association

3 ENVIRONMENTAL CONDITIONS AND DESIGN LOADS

3.1 General

All dead loads, environmental loads, and other live loads and environmental conditions that affect the design of systems will be assessed by the Design-Builder using the data sources and methods outlined in applicable design guidelines to provide the facilities described in Harbor Rebuild Project RFP with a 50-year design service life. The methods and resulting design loads will be described in the Basis of Design document, sealed by the Engineer of Record.

All design forces and loads shall be borne by the float structure and transmitted to the piles through an adequate load path.

Design-Builder shall consider overall system loads under full occupancy with consideration for shielding factors and deflections of the system and its effects on pile loads.

Design-Builder is responsible to ensure that all necessary means and methods are properly designed, constructed, and maintained for the loads they are intended to support and the work they are intended to support.

3.2 Tides

Tidal elevations and Tidal current effects on the floats and other structures will be assessed by the Design- Builder.

3.3 Wind and Wave

Wind and wave data, and their environmental loading on the moored vessels and subsequent load on floats and other structures, will be evaluated during the design phase by the Design-Builder.

3.3.1 Wave

Design wave shall be determined using USACE Coastal Engineering methods, considering protection offered by the breakwaters.

In addition, consider locally generated waves from boat wakes 2-foot height, 2.5-second period.

Consider the effect on the pile collars and float system. Provide measures to minimize adverse pounding and to ensure long service life in the expected wave environment.

3.3.2 Wind

Wind load moored vessels: site specific 50-year return period wind, adjusted to 30 second duration (the amount required to energize a vessel per ASCE 50). Duration adjustment according to ASCE 7-10.

Calculations shall be performed for wind and current loads both parallel to and perpendicular to the slips. For mooring loads apply wind load on exposed over-water vessel profiles. Consider end, side, and 75 degree loading conditions. Consider shielding effect with 100 % slip occupancy in accordance with methods described in “marinas and small craft harbors” (Tobiassan and Kollmeyer).

3.4 Tsunami Procedures

ASCE 7 shall be used by Design-Builder to create recommendations for tsunami preparedness and evacuation plans in coordination with local tsunami guidelines.

3.5 Snow

ASCE 7, Whittier, Alaska Ground Snow Loads: Pg=100 lbs per square foot (PSF)

3.6 Dead Loads

Dead loads shall consist of the weight of all construction materials and permanent components including but not limited to the float framing, decking, floatation, bullrails, rub boards, pile restraint guides, ladders, gangways/ramps, transition plates, utilities (full), utility pedestals, safety equipment, moorage devices, and all other metal fabrications, hardware and attached appurtenances.

Allow at least 5 PSF for water absorption and marine growth.

Design-Builder shall exercise caution to ensure that all dead loads are accurately determined and included in buoyancy calculations. These loads shall include safety factors and any specific manufacturing considerations that may affect the final freeboard. Should freeboard adjustments be necessary after installation they shall be accomplished with supplemental flotation approved by the Design Engineer of record. Supplemental flotation shall be installed such that it shall not affect the performance or the longevity of the dock system.

Floats shall float level under dead loads. The decks of the floats shall be within the followings tolerances of being level:

A. Maximum transverse slope for main floats: one inch per ten feet of width.

B. Maximum longitudinal slope: one inch per ten feet of length.

3.7 Live Loads

The Design-Builder will use the following minimum live loads in their design. The required resulting freeboard of floats under various loading conditions are described in Section 4.1.

3.7.1 Moorage Float System

A. Floating docks Uniform Live Load: 40 PSF

B. Floating dock Concentrated Load: 400 lbs, distributed over 30 square inches, placed anywhere on floats

3.8 Mooring and Berthing Loads

Mooring and berthing loads shall be considered in the design of bullrails, cleats, floating docks, piles, and pile restraint/collars.

3.8.1 Mooring

Wind loads on moored vessels will be calculated using the site-specific wind speed and profile height of 15 feet for vessels currently using A Float. Current and inner harbor waves shall be considered in the mooring calculation.

3.8.2 Berthing

For moorage floats, assume forward velocity of 1.0 knots, vessel berthing angle of 20 degrees for largest boat normally using the slip, striking at the end of a finger or end of a main float and at the main float in the center of the berth.

A. UFC 4-159-03

B. Sustained Wind Speed as calculated by Engineer of Record

4 PRODUCTS

4.1 FLOATS

The float system shall be designed under the most current codes and applicable standards to provide public facilities with a 50-year design service life. The floats shall consist of either concrete or high-quality timber frame and polyethylene float units as required to meet the Performance Requirements and provide the stipulated configuration on the Conceptual Plan. Provide float system units and connections capable of meeting the design criteria. Design-Builders may submit proposals based on either type of float systems.

This facility is intended to remain in place permanently. Exception is the individual float modules shall be removable for replacement in the case of damage. This shall include removable pile guides and/or mooring hoops.

Besides sizing all members per the above referenced codes and specifications, the calculations shall be prepared as a minimum for the dock system:

A. Moorage points to ensure reactions shall be appropriately and rationally distributed throughout the system.

B. Anchorage (guide) piles to ensure reactions and performance shall be appropriately and rationally determined for the system.

C. Lateral loads from current and wind in the shielded and unshielded condition on the T-head and finger pier lengths.

D. Calculations shall provide transfer assumptions for both cantilever and non-cantilever type finger piers, including finger-to-main pier connections.

E. Lateral loads from waves for the T-head and finger pier lengths. Calculations shall include a copy of the written source from a published and recognized method for determining lateral loads due to waves on anchored floating bodies and shall be provided in such detail that clearly demonstrates the appropriateness and accuracy of the method used.

4.1.1 Layout and Configuration

The floats being replaced will be “Like for Like”. Design-Builder may deviate from the plans to the extent required to facilitate structural connections, placement of pile restraint guides, and location of utility and other items to ensure the functionality of the rebuilt South Harbor.

A. The float layout including fairways, aisle clearances, and float widths shall be in conformance with ASCE 50 and UFC 4-152-07.

B. The moorage float system shall be wheelchair accessible, including the minimum accessible routes and minimum number and size of accessible slips in accordance with ADA 1003.

C. The Design-Builder shall demonstrate, through use of materials, design, and other factors, that the float system should not lose noticeable freeboard over the design life with similar loading conditions.

D. Floats shall be fabricated in modules corresponding to the nominal length, widths, and geometric cross-sections.

E. Float modules shall be identified and labeled for assembly.

F. All exposed timber corners shall be chamfered by 3/8-inch.

G. The walking surfaces of the floats shall be flush with adjoining float units.

H. The gap between adjacent deck boards shall not be greater than 1/4-inch or less than 1/8-inch.

I. Design drawings for any utility attachments or appurtenance attachments such as ladders, HDPE potable and fire suppression water piping, life ring and fire extinguisher cabinets, power pedestals with lighting, emergency phone system, etc. as required to function with the final geometry of the float system.

J. Float walking surfaces shall be non-slip material.

K. To facilitate ease of access for first responders’ equipment the connection between the mainwalks and the headwalks shall incorporate a flared connection on both the east and west sides of each connection.

    1. The corner shall be three (3) feet on each side and unobstructed by any equipment except a bullrail.

L. Cover panels shall be provided as needed to maintain continuous walking surfaces. All cover panels shall be installed flush with adjacent surfaces.

M. All materials for float appurtenances shall be compatible with the marine environment with consideration of corrosion and dissimilar metal use. Use non-metallic insulators were applicable

to prevent bi-metallic corrosion issues.

N. Unless otherwise specified fendering shall weigh at least 0.9 lbs/lf and made from a fungus and UV resistant synthetic material.

O. Rubboards: UHMW-PE lumber shall be along the full length of both sides of the stall floats.

P. Corner bumpers shall be provided on all outside corners of stall floats and end floats.

Q. Vessel mooring cleats shall be provided on G/H floats. Cleats shall be cast iron, and of sufficient size designed to withstand calculated mooring loads.

R. Timber bullrails, designed for the applicable vessel mooring loads at each moorage area, shall be provided; full length on A Float.

S. Cleat bolts shall be recessed and mounted flush with the top surface of the cleat.

T. All steel materials shall be hot dip galvanized under ASTM A123, where applicable.

U. Walking surface of floats shall be level and flush regarding the adjacent floats. After installation, the height variation between adjacent module decks shall not exceed 1/4-inch.

4.1.2 Freeboard

A. The minimum free board for moorage floats under dead load conditions at least 20 inches and no less than 10 inches at 30 PSF live load (per ASCE 50). Additionally, they shall have at least 8 inches of freeboard at 40 PSF live load.

B. Minimum freeboard under DL+Snow Load to be 6 inches (+/- one inch).

C. When 200 lbs concentrated load is applied on one outer corner of any stall float, there shall be no more than 2 inches in freeboard change at that corner.

D. When 400 lbs concentrated load is applied at one foot from the outer end of the stall float, the end of the finger shall lose less than 4 inches of freeboard.

E. All floats shall be designed such that utility conduits under decking remain dry under applying DL + LL.

F. Freeboard shall not change over 2 inches between the initial installation and the end of the warrantee period. If freeboard changes more than this amount, it shall be considered a warranty issue and the manufacturer shall correct the deficiency at no cost to the City.

G. The Design-Builder shall design the float system buoyancy with the eventual load conditions considered including the gangway, electrical and other utilities, and specified live loads as stated herein. It is expected that minimal supplemental floatation will have to be installed to level the floats after installation.

H. The Design-Builder supplies additional leveling flotation billets along with attachment details and materials as required. Due to the wave environment at this site, leveling billets shall be attached to the floats. It is understood that temporary ballast (such as easily removable sandbags) may have to level some floats before the installation of utility panels and other heavy items.

4.1.3 Timber Materials

A. All timber shall be new and graded under provisions of West Coast Lumber Inspection Bureau (WCLIB), WWPA, or NLGA.

B. All timber shall be grade marked by a licensed grader or shipped under mill certificate.

C. All timber components, including but not limited to walers, bullrails, dimension lumber, decking, beams, and stringers, shall be Coastal Douglas Fir No. 1, or Douglas Fir (North) No. 1, or a better grade.

D. All timber shall comply with the provisions of WCLIB, Rule Book 16 for Douglas Fir.

E. Timber decking shall be S4S surfaced with a skid resistant milled finish.

4.1.4 Glue Laminated Timber

A. Provide factory-glued structural units complying with American Institute of Timber Construction (AITC) A190.1 "Structural Glued Laminated Timber," and produced by an AITC or American Plywood Association (APA) licensed firm.

B. Inspection shall be under AITC 200 Inspection Manual or applicable sections of American Wood Protection Association (AWPA) Standard M2.

4.1.5 Plywood

A. Plywood, if used, shall be a thin layer graded for severe moisture service and of APA designation Group 1 species, laid with exterior-rated adhesives. APA C-C, Plugged, Exterior, Structural 1 (all plies limited to Group 1 species).

B. Plywood shall bear the grade mark of the APA, certifying conformance to U.S. Product Standard PS 1.

4.1.6 Timber Treatment

A. Timber preservative treatment shall be in accordance with AWPA, as applicable for its use.

B. Creosoted timber is not allowed, unless otherwise approved by the Owner.

C. The edges of plywood panels shall be sealed with a marine grade paint or epoxy.

D. Timber members shall be cut to length, drilled, and dapped before pressure treatment.

E. All pressure treatment processes shall be performed under Best Management Practices for the specified treatment type as published by the WWPA.

F. All nicks, cuts, abrasions, and field drilled holes and saw cuts after pressure treatment shall be carefully trimmed and saturated in the field, in accordance AWPA-M4, with a copper naphthenate solution of not less than 2% copper metal shall be used in 3 applications.

G. Any unfilled holes bored after treatment, after being treated shall be repaired with copper naphthenate saturated plugs.

4.1.7 Fasteners

A. All metal to timber and timber to timber connection bolts shall be American Society for Testing and Materials (ASTM) A 307 grade C minimum.

B. Metal to metal connection bolts shall be ASTM A 325.

C. A hot dipped galvanized coating shall be required on all bolts, miscellaneous hardware, cleats, steel plates, angles, and shapes under either ASTM A-123 or ASTM A-153 as the process applies to the specific material.

D. All metal to timber and timber to timber connection bolts shall have double or jamb nuts and or a lock washer and nut.

E. All bolts in contact with wood members shall have economy heads and or malleable iron washers.

F. Counter bore all bolt heads facing decking or pedestrian areas by 3/8 inch.

G. Bolts shall conform to ASTM A307 or A36 with ASTM A563 heavy hex nuts.

H. Lag bolts shall conform to American Society of Mechanical Engineers (ASME) B18.2.1.

I. Minimum bolt and lag screw diameter shall be ½-inch.

J. Wood screws shall conform to ASME B18.6.1.

K. Malleable iron washers are always required (except economy head bolts) where lag heads or bolt heads or nuts would otherwise bear directly on wood.

L. Stainless steel type 316 fasteners are acceptable.

M. Alternative fasteners may be considered for removable decking. Removable decking fasteners have a history of seizing and breaking when removed for installation or maintenance of utilities. The Design-Builder may propose a system of alternative fasteners, modified hole size, coatings, lubrication, or other means to ensure proper function of removable decking.

N. Steel plates, shapes, bars, pipe, and tubing shall be at least 3/8-inch thick, unless otherwise noted.

O. Coatings: Hot dip galvanize all structural steel, miscellaneous steel, and steel hardware after fabrication under ASTM A123 or A153.

P. Repair areas left uncoated after hot-dip galvanizing, areas where the coating was removed for welding, galvanizing damaged by welding or handling, and field-damaged areas, including pile cut-off areas, must be repaired by spray metalize zinc methods under ASTM A780, American Welding Society (AWS) C2.23, and C2.16. Apply 10 mils of zinc coating.

4.1.8 Rubboards

Rubboard shall be provided throughout the float system, 2-inch x 12-inch nominal dimension.

A. The City's preference is for ultra-high molecular weight polyethylene (UHMW) Rubboards to be provided full length on the sides of floats where vessels may moor (i.e., slips and side tie moorage areas) and pressure treated timber elsewhere. Pressure treated timber rub-boards will be allowed in moorage areas if it results in a significant cost savings to the City.

B. UHMW material, if used, shall be of uniform color, shall be color-stabilized, and shall be resistant to ultra-violet deterioration, mechanical abrasion, chemical attack, detergents, and animals.

C. The material color shall be consistent throughout the facility, unless otherwise approved by the City.

D. Provide in 8-foot minimum lengths and installed to accommodate thermal expansion.

4.1.9 Utility Chase ways

Utilities will be under the decking of the float. Utility chase ways, handholes, and mounting holes, etc. to accommodate field-installed utilities shall be provided on the completed float products.

A. The Design-Builder shall coordinate locations of the in-float utilities (i.e., main utility runs, service runs, hose bib risers, power/light pedestals, safety equipment) and indicate these on a float system layout drawing, to be submitted to the City.

B. The Design-Builder shall design means of connection in the float structure to allow for field installation of electrical shore-tie pedestals, luminaries, electrical panelboards, and below deck HDPE potable water system with valves and fire suppression lines and connections.

C. A minimum electrical utility chase way 2 feet wide and 6 inches deep (clear space), centered in the floats A and G is required. This may consist of several chases that in combination are balanced across the center of the float. A single chase way provides the greatest flexibility for future use. The intent provides sufficient space for electrical and water utilities, centered in the float to ensure the floats remain balanced after future utility installation.

D. All conduits shall include a pull string for future use.

E. Embedded utility chase ways shall be ASTM F512, PVC utility duct with accommodations of designed utilities plus two additional future chase ways.

F. Consider nuisance animal protections.

G. Provide bushings at all penetrations to handholes.

H. Protect open conduits from the entrance of foreign materials.

I. Embedded conduit penetrations at the ends of interconnecting float modules shall be aligned within 1/4-inch after final connection.

J. Utility handholes shall be selected by the float Design-Builder.

K. The handholes shall be of high-density polyethylene or other non-corrosive materials as approved by the Owner.

L. Plastic materials shall be of UV resistant construction.

M. Lids shall be polymer-concrete with a permanent non-skid surface and shall include a water-resistant seal.

4.1.10 Removable covers

A. Removable decking or vaults with removable covers shall be provided at main float intersections and at the service panel locations to provide access for installation and maintenance of under deck utilities.

B. The Design-Builder coordinates exact location of the proposed removable covers on-float utilities on the shop drawings and finished products.

4.1.11 Flotation

Alternative flotation system may be proposed that equal the polystyrene system described below.

A. Float inner cores shall be closed-cell, expanded rigid cellular polystyrene under ASTM C-578.

B. The density of the polystyrene shall be between 0.90 and 1.15 lbs per cubic foot and a maximum absorption of 4 % by volume as tested by ASTM C-272.

C. Polystyrene shall be virgin new material throughout. Material that has exceeded the

manufacturer's recommended shelf life will not be allowed nor will molded, stuffed, or reground material be permitted.

D. Voids shall not exceed 1% by area as measured on any internal cross-sectional cut surface.

E. The knit or weld between the individual bead cells shall be such that at least 60% of the beads fracture rather than separate when subjected to bending stresses.

F. All flotation surfaces shall be encased by a rigid polyethylene float shell.

1. The shell material shall be ultra-violet (UV) stabilized, shall be partially or fully chemically cross-linked, and suitable for long-term exposure.
2. The material shall also be resistant to mechanical abrasion, chemical attack, ultraviolet deterioration, detergents, and animals.
3. Color shall be black or as approved by the City.
4. The minimum nominal wall thickness shall be 0.15 inches
5. Float shells shall meet or exceed the Hunt Falling Dart puncture and thickness test.

G. Flotation shell if used shall be sealed and resist design ice forces.

H. Permanently installed bungs or plugs shall be placed in all foam filling ports before installation of the tub in the float system.

I. All notches and cuts shall be performed with a hot wire or other approved methods.

J. Flotation encasement coatings, if required, shall be fuel resistant.

4.1.12 Float Corner Bumpers

A. Float corner bumpers shall be fabricated from UV stabilized HDPE. Bumpers shall be energy absorbing and non-marking.

B. Bumpers shall be Ultrapoly “Flexi Fend” or approved equal.

C. Bumpers shall be placed vertically at each outer corner of each finger and on corners of the main floats.

D. The size of the bumper shall match the energy absorbing characteristics of the bumper with the design berthing loads of the vessels for the particular size of the finger.

E. Color shall be pre-approved by the Owner.

F. Secure bumpers to the rubboards with galvanized screws or lag bolts under the bumper manufacturer’s recommendations.

4.2 CONCRETE FLOAT MATERIALS AND FABRICATION

If concrete floats are used, Design-Builder shall provide a concrete moorage float system capable of resisting all design loads and of providing a 50-year service life. Floats shall be manufactured to accommodate utilities including electrical power, pedestals with meters and lighting, potable water, and fire protection, and Safety equipment.

4.2.1 General Requirements

Floats layouts are shown on the Conceptual Drawings. Dimensions are approximate to edge of

the floats' framing and include no rubboards or bumpers. All aspects of the floats systems previously described apply for concrete floats, where applicable. In addition, the following apply specifically to concrete floats:

A. The float system shall consist of modular sections designed so concrete modules may be replaced with standard or similar modules if repairs occur.

B. Finger floats shall be made of single piece modules up to 60 feet in length.

C. Float modules shall be structurally connected by a waler system that shall allow replacement without affecting the float modules or the structural integrity of the system.

D. Concrete module connection methods that may cause structural failure of the float module when overstressed will not be allowed.

E. The floating dock systems shall be designed and constructed to include provisions where applicable for accommodating light bollards, power pedestals, fire extinguisher cabinets with integral life ring holders, water and fire standpipes, cleats, bull rails, rubboards, corner fenders, dock ladders, storage boxes, and other components.

F. The float deck surface shall be trowel finished with a steel trowel and a slip-resistant finish applied transversely to the walking surface.

G. Manufacturer shall establish finishing methods and procedures to ensure an even and consistent broom or screed finish on all deck surfaces.

H. All top edges shall have a 3/8-inch tooled radius with a minimum 1-1/2-inch-wide smooth hard steel finished face.

I. Outside top edges and corners shall be filed smooth.

J. All floats shall be of monolithic construction, using individual float sections of the maximum practical length.

K. Modular concrete systems utilizing a system of timber or composite walers and transverse through rods as the structural system shall not be allowed.

4.2.2 Structural Concrete

A. Concrete shall be standard weight, Portland cement and fly ash concrete, appropriately proportioned for durability, cold weather, and exposure to the marine environment.

B. Concrete mixtures shall be designed by a registered professional engineer licensed in Alaska for the float manufacturer under American Concrete Institute (ACI) A318 and ASTM C94 and shall have a proven record of accomplishment of successful performance for the intended service.

C. Concrete mixtures shall meet or exceed the following minimum requirements

1. Compressive Strength (28 Days), fc = 7,000 psi
2. Aggregates - Maximum Particle Size of 5/8 inches
3. Maximum Water to Cement Ratio = 0.30
4. Portland Cement - ASTM C150, Type III, Sulfate Resisting (8% maximum C3A content)
5. Minimum Cement Content = 658 lbs/cy
6. Pulverized Fly Ash = 172 lbs/cy

7. Entrained Air Content = 6% to 8%
8. Admixtures = As Determined by the Float Manufacturer, all to come from one admixture manufacturer. Calcium chloride not permitted
9. All fine and coarse aggregates shall be obtained from an approved source and appropriately tested for suitability under ASTM C33. Lightweight aggregate shall not be allowed

4.2.3 Concrete Reinforcing

A. Reinforcing steel shall be ASTM A706 deformed bars, Grade 60 and galvanized under ASTM A767.

B. Welded wire fabric used for reinforcement shall be provided in sheets (not rolls) and meet the requirements of ASTM A641.

C. All welded wire fabric shall be galvanized after fabrication. At least 1-1/2 inches of concrete cover over rebar and welded wire fabric shall be provided.

4.2.4 Fabrication

A. The precast concrete manufacturing plant shall be certified by the Precast/Prestressed Concrete Institute (PCI) Plant Certification Program.

B. Manufacturer shall be certified at the time of bidding. Certification shall be in the following product groups and categories: C3 or C4.

C. Written evidence may be required listing experience, plant facilities, quality control procedures, staff, and any other documentation needed to establish adequate qualifications for manufacture of the floats.

D. The casting facility shall provide adequate workspace, equipment, level casting surfaces, and protection from detrimental environmental conditions.

E. All corners of concrete shall be eased with chamfers or rounding. Transitions between thick and thin concrete sections or between horizontal and vertical sections shall be eased with chamfers.

F. Floats shall be cast in steel forms. All forms shall be treated with a release agent before casting to provide for ease of form removal and to provide a smooth concrete finish.

G. The concrete shall be mixed in a high shear, counter mixer capable of thoroughly and evenly distributing all ingredients of the low water/cement ratio concrete mix.

H. Aggregates shall be stored in covered bins to limit variations in moisture content.

I. The batching system shall have moisture sensing devices to control total final water in the mix from all sources. The concrete shall be placed in the forms within 30 minutes of the time water is added to the concrete mixture.

J. Concrete shall be vibrated internally and/or externally in the forms under ACI 309 to insure a smooth, dense finish.

K. Small surface holes caused by air bubbles, normal color variations, normal form joint marks and minor chipping and spalls shall be tolerated but shall be minimized using good industry practice of cleaning forms and placing concrete.

L. Major imperfections, large voids, cold joints, or other defects will not be permitted.

M. Acceptable cracks are those limited to hairline nature that show no tendency to open. The

engineer will inspect all imperfections and defects and determine if acceptable.

N. At Owners' discretion, a float may be rejected if any large void or imperfection appearing in the float exceeds the following criteria:

   1. The volumes of the voids appearing on the surface of any 1-float unit exceeds 360 cubic inches.
   2. The areas of any localized non-compacted concrete on a surface exceeds 120 square inches.
   3. The areas of concrete in which reinforcing bar and/or wire mesh is exposed exceeds 120 square inches.

O. All other imperfections shall be repaired with Sikatop 122 Plus, following the manufacturer's recommendations for the product. Submit repair procedure for approval.

P. Any floats cast with test cylinder results that have any average of three consecutive strength test results below the specified Fc by over 500 psi may be rejected.

Q. Any concrete with sample testing below 6 % air content shall be rejected.

R. All reinforcement shall be placed as noted on the approved shop drawings. The float manufacturer shall provide adequate means of securing the location of all reinforcing in the proper position before placing concrete.

S. All float tops and exposed horizontal surfaces shall be treated with an approved penetrating concrete sealer after curing and drying.

T. Concrete sealer shall be a VOC compliant blend of siloxane and silane ("CHEMSTOP" or approved equal) or a VOC compliant water-based siloxane sealer ("Burke Shield 244 WB" or approved equal).

U. All sealers shall be applied in strict accordance with the manufacturers' recommendations.

V. Each walkway shall have raceways embedded in the float modules as required for electrical and mechanical systems with access boxes embedded in the decks of the concrete modules.

W. Access boxes, where required, shall be as specified by floating dock manufacturer, unless otherwise required by specific state or local codes.

X. Access boxes shall be flush with the walking surface and shall have a 1-inch nominal concrete bottom with a smooth or light brushed, slip-resistant finish.

Y. All bolts for lids on access boxes shall be stainless steel.

Z. Raceway shall remain above the water surface under dead load conditions and shall facilitate installation, removal, and servicing of the utilities.

AA. Raceway Access openings shall be provided at convenient locations if required for special access.

4.2.5 Fasteners

A. All structural bolts, including cleat bolts, shall be through-bolted in concrete and shall be capable of developing their full allowable strength without causing damage to the concrete float.

B. Mild steel plate washers shall be used on all nut-bearing surfaces.

C. All bolt heads bearing on exposed concrete surfaces shall be low profile, economy head type and have a neoprene or polyethylene washer between the head of the bolt and the concrete deck.

D. Epoxy grouted or cast-in inserts are not acceptable for use as structural connections between floats. Bolts bearing on timber surfaces shall be economy head type.

E. Primary connection bolts shall be at least 3/4-inch diameter or as otherwise noted on the plans prepared by the Design-Builder.

F. Bolts for float connections and for attaching components directly to the concrete floats shall be ASTM F1554 GR50.

G. Fasteners connecting steel-to-steel in fabrications shall be ASTM A325.

H. All fasteners shall be hot dip galvanized after fabrication under ASTM A123.

I. Threaded inserts may be used for non-structural connections such as attaching rub strips to the floats.

J. Threaded inserts (if used) shall be non-corroding, zinc alloy and shall be accurately placed and held in position during float casting.

K. Sleeves shall be cast through concrete float flanges to allow for through bolting.

L. Sleeves shall be Schedule 40 PVC and shall be accurately placed and held in position during float casting.

M. Ultra-high molecular weight polyethylene (UHMW-PE) plastic components shall be made from materials conforming to ASTM 4020. The material shall be partially chemically cross-linked, ultra-violet light stabilized, and suitable for long-term environmental exposure.

N. All UHMW-PE shall be black or as otherwise approved by the Owner.

4.2.6 Curing, Handling and Storage

A. The Design-Builder shall select its own method of curing and be responsible for the result, except that all curing shall include the application of a curing compound as soon as practical after finishing and that the concrete modules shall be placed under cover with complete protection from direct sunlight, wind and freezing for three days.

B. Design-Builder shall provide temperature control and tracking processes

C. After placing concrete, cover forms with moisture-retaining cover and apply heat in uniform manner until concrete reaches sufficient strength to handle units without damage

D. Except as otherwise approved, floats shall be cured for at least 7 days or until the concrete has reached 70 % of its design strength before transporting or assembling.

E. Manufacturer shall take care in establishing handling methods to avoid damage to float modules during form removal, storage, assembly, and installation.

F. Storage of float modules shall be on level surfaces, and it shall be the responsibility of the Manufacturer to determine how high to stack modules to avoid damage. Care shall be taken to avoid damage caused by over-stacking.

G. Float modules shall be protected against damage from any cause. Any units damaged sufficiently to cause structural failure of the float module will be rejected and removed from the job.

H. Markings shall be permanent and be on one side and on one end for ease of field identification.

4.2.7 Cracks

A. It is typical for precast concrete to develop cracks. The structural nature of concrete is that the concrete must crack to mobilize the steel reinforcing.

B. Cracks determined to be structural by the float system Design Engineer and not in the deck of the module shall be V-cut out and patched with a non-shrink patching compound approved by the Owner.

C. Cracks determined to be structural by the Design Engineer located in the deck of the float module shall be patched under methods and materials approved by the Owner and the float system Design Engineer case-by-case.

D. The float system Design Engineer shall determine if excessive cracking in a single flotation unit shall be cause for rejecting that unit.

E. Rock pockets exceeding 1-inch in diameter and/or 1/2-inch in depth and/or honeycombing, shall be patched with an approved non-shrink grout of a color similar to the cured concrete.

F. Any pockets which expose mesh or rebar shall be chipped out, cleaned, and filled with an approved epoxy patching compound.

4.2.8 Concrete Testing and Quality Control

A. Quality control of float manufacturing operations shall be under the supervision of a registered professional engineer employed full time by the manufacturer.

B. A quality control plan shall be prepared and approved by the Owner before the manufacture of any floats.

C. A quality control inspector, who is not engaged in production of the floats, shall be assigned to the project during the fabrication process.

D. This inspector will be responsible for verification of concrete testing frequency and procedures and ensuring that all products are constructed under the approved shop drawings and materials specifications. The inspector must have, at minimum, a PCI Level 2 certification.

E. A checklist of conformance items of shall be prepared and submitted to the Owner for each float produced.

F. No floats may be produced absent the quality control inspector.

G. All concrete testing shall be performed by personnel trained and certified, at minimum, as PCI Level 2 Technicians.

H. All testing shall be performed under ACI 318 and applicable ASTM test standards for the specified tests.

I. At a minimum, the following sampling and testing procedures shall be performed:

1. 4 compressive test cylinders shall be taken for each float produced, each 10 cubic yards of concrete placed, or each production day.
2. 1 cylinder will be tested at 7 days, 1 at 14 days, and 2 at 28 days. Compressive test cylinders shall be cured in the same location and manner as the floats.
3. Cylinders to be tested at 28 days shall be moist cured. All compressive strength test cylinders shall be prepared and tested under ASTM C39 and C31.

4. Air entrainment tests shall be made for the first batch of concrete prepared for the project. In addition, air entrainment tests shall be taken from each batch used for the compressive test cylinders. Perform air testing under ASTM C173 or C231. Concrete found to be of non-conforming air entrainment shall not be incorporated into the product.
5. Results of compressive test cylinders shall be reviewed and interpreted for acceptability under ACI 214. Not over 10 % of the individual tests shall have an average compressive strength of less than the specified ultimate compressive strength. Failed strength tests may be cause for non-conformance and rejection of the representative float quantities produced.
6. Unit weight, slump, and entrained air tests shall be taken daily from the same material sample used for the compressive test cylinders.
7. All concrete testing shall be done at the Design-Builder's expense.

4.2.9 Float Connections

A. Float connections shall distribute loads based on the relative flexibility of the piling and dock assembly.

B. Connections shall be noiseless and non-wearing.

C. Connections shall be constructed of non-metallic flexible connection materials which will permit dampened vertical and torsional articulation without imposing concentrated or shock loads on the adjoining float units.

D. Connection designs shall consider joint rotation effects so contact, abrasion, or subsequent damage between unprotected float elements does not occur due to wave and other load effects.

E. Connections shall be specifically designed to function in the wave environment of Whittier Harbor.

F. Finger float connections shall transfer lateral berthing and vessel wind loads into the main floats.

G. Finger float connections shall be moment resting connections designed to accommodate the cantilever finger float loads. Connection designs shall consider joint rotation effects so contact, abrasion, or subsequent damage between unprotected float elements does not occur due to wave and live load effects.

H. Float connections shall incorporate a redundant bolt system that retains the full effective strength of the connection and becomes active only after failure of the primary bolt system.

I. The minimum dimension for all thru rods for structural attachment shall be 3/4-inch.

J. All thru rods shall be placed within PVC sleeves cast in the float units. The maximum inside diameter of PVC shall not exceed 7/8-inch for 3/4-inch thru rods.

K. Walers shall be securely fastened to the concrete floats using FRP high strength pultruded rods and injection molded nuts. Thru-rods shall be placed through each float unit within 6 inches of each end of that unit and within 6 inches of each wale splice.

L. No connecting device shall protrude beyond the fascia into the berth area.

M. Any connecting device protruding above the surface of the deck shall have a low, rounded profile.

N. Any connecting device cast into the concrete modules shall be stainless steel.

4.2.10 Basis of Design Document

Prepare a Basis of Design document with calculations validating all Key components including at a minimum:

A. Summary of features that will enable the float system to operate in the conditions present in the Whittier Harbor

B. Design Criteria of the Project elements

C. Design verification for all elements of the Work

D. Verification that various freeboard requirements and all other performance specifications

E. Load and load combination verification, including applicable standards, codes, and design guidelines used

F. The basis of design and all calculations shall bear the seal of the Engineer of Record

G. All engineering and calculations shall be done under these guidelines using the appropriate allowable capacities and safety factors

4.3 PILES

4.3.1 General

The Design-Builder is responsible for final pile design including determining lateral loads acting on design vessels and floating docks and applied to piles as well as embedment required to achieve fixity. A preliminary pile design is outlined in the conceptual drawings. The pile size and locations shown in the Conceptual plans are for reference only. Pile design including pile size, layout, and length/embedment is the responsibility of the Design-Builder.

A. Provide calculations supporting number of pilings, pile spacing, diameter, wall thickness, and embedment length.

B. Provide design drawings for the final pile design and layout sealed by an engineer registered in the State of Alaska.

Anchor the floating docks by connection to steel piling through free-sliding pile guides, designed to resist forces generated by the specified load combinations. All piling should be hot dip galvanized and should be provided in the longest practical lengths. Field splicing is not desirable or anticipated.

The final pile design should incorporate the results of the lateral load analysis on the float system and should optimize the size, number, and placement of the piling to work with the float system structural capacity as well as placement in a manner that does not inhibit proper berthing and mooring.

A. Socketing piling into bedrock may be required.

B. Design-Builder should incorporate any additional factor deemed necessary for the proposed float design.

Lateral capacity per pile should be limited by the pile material and section chosen by the Design-Builder. Perform lateral pile calculations based on pile guide elevation with tide at mean higher

high-water elevation.

Final pile wall thickness and spacing shall be designed by the Design-Builder and shall provide compatible lateral displacements of the floats throughout the harbor. Maximum deflection of the piling at the mudline under design wind/vessel loads shall be 2-inch.

A. Determine pile bending moments and deflections using Ensoft's "LPILE" or equivalent software, using soil properties based on soil boring information.

B. Soil properties for use with the software shall be based on the data provided by the planned project geotechnical site investigation or on a report sealed by a professional engineer, specializing in geotechnical engineering, who is registered in the State of Alaska.

C. Other exploratory operations may be made by the Design-Builder at no additional cost to the Owner, provided such operations are approved by the City and permitted by the USACE. It is the responsibility of the Design-Builder and the Design Engineer to determine if such additional borings or exploratory operations are required.

D. Design-Builder shall submit final pile size, embedment, and spacing design along with the Installation Package for the floats, in the 65% design submittal package. Pile guides shall be designed and provided within the floats.

4.3.2 PILE RESTRAINT GUIDES

A. Pile restraint guides and method of attachment to the floats shall be designed by the float manufacturer. These minimum requirements apply:

1. Pile locations, nominal pile diameter, and interior or exterior mounted pile guide designations are to be indicated on the plans.

2. Steel plates and shapes shall be ASTM A36. Fasteners connecting steel-to-steel shall be ASTM A325. All steel components shall be hot-dipped galvanized after fabrication under ASTM A153.

3. All surfaces exposed to the face of pile shall be protected with a full circumference of UHMW polyethylene. Minimum thickness of UHMW-PE shall be 3/4-inch. UHMW-PE liners shall be thru-bolted to a steel backing plate of not less than 1/2-inch thick. Bolts connecting the UHMW to the backing plate shall be countersunk 3/8-inch.

4. Minimum plate thickness for pile guide metal fabrications shall be 5/16-inch (or thicker as required by structural analysis).

B. Pile guides and connections to the floats shall transmit all anticipated loads from the float to the piles without failure of the float system. This load shall be not less than the maximum lateral capacity of the pile (at estimated high tide). All directions of load shall be considered.

C. Pile hoops shall minimize the effects of pounding due to float movement in wave environment found in Whittier Harbor.

D. Pile Hoop UHMW-PE material shall be ultra-high molecular weight (UHMW) polyethylene plastic meeting ASTM D4020 and containing 0.6% carbon black.

E. Provide at least 2 inches of clear space between pile and pile guides and provide a maximum of 4 inches of clear space between pile and pile guide, measured when the pile is centered in the guide fastener.

F. Anchor the float system by connection to steel piling through free-sliding pile guides, designed to

resist forces generated by the specified load combinations.

4.3.3 Pile Materials

A. Steel piles shall conform to ASTM A252, Grade 3, or other pipe material of similar strength.

B. Only one shop splice will be permitted in each pile length.

C. Pipe piles shall be round, spiral, or longitudinally welded.

D. Splices shall be full penetration butt weld using a 1/4-inch minimum backing ring and a single vee or single bevel groove weld.

E. Open root shop splices will be allowed if required to work with piling drilling equipment and if all provisions of AWS D1.1 are followed.

F. If the selected base metal is not listed in AWS, perform procedure qualification test under AWS D1.1 for each heat.

4.3.4 Pile Galvanizing

A. Steel piles shall be galvanized per ASTM A123. Piles too long for available galvanizing equipment may be galvanized in pieces and then spliced in the shop. Only one shop splice will be permitted in each pile length.

B. Repair all areas left uncoated after hot-dip galvanizing, areas where coating was removed for welding, galvanizing damaged by welding or handling, and field-damaged areas, including pile cut-off areas, by spray metalizing methods under ASTM A780, AWS C2.23, and C2.16. Apply 10 mils of zinc coating.

4.3.5 Cathodic Protection

Cathodic protection is required for all pile installed under this contract as described below:

A. Anodes Shall be Galvalum 3 or equal.

B. The required number and weight of anodes for pile size are listed in the conceptual drawings.

C. Weight shall be anode material not including mounting material.

D. Anodes shall be installed by an ADCI certified Diver. Wet weld to AWS D3.6 Class B standard.

E. The top of the anode or mounting plates, once installed, shall not come into contact with any part of the float, pile hoop, or other float attachments at extreme low tide.

4.4 POTABLE WATER SYSTEM

4.4.1 General

Provide potable seasonal water (April 15th through October 1) for all moorage floats.

A. Minimum HDPE water supply line to the floats and winter drain down valves.

B. Waterlines shall have flushing, draining, and flushing valves at the midpoint to allow for dewatering the system during winter.

C. Double 3/4-inch hose bibs riser at every four stalls inboard side of float only; final locations at every other slip to be approved.

D. Water risers shall be separate from electrical power pedestals.

E. Provide guards to protect from damage by vessel impacts.

F. Use HDPE SDR 11 pipe with heat fused joints to the fullest extent possible, or otherwise approved by ADEC for the water test pressures required.

G. Use corrosion resistant materials suitable for saltwater marine environment for valves fittings fasteners supports and other components.

H. Flexible water main supply hose shall have a minimum rated working pressure of 250 psi. It shall have an abrasion resistant cover that provides protection from UV deterioration and oil. Potable water supply hose shall be an NSF approved hose for use in potable water applications, or ADEC approval as an exception. Continental Vintner Food Hose has been approved in other projects.

   1. Hoses shall be equipped with threaded or flanged connections compatible with the pipe connections. Hose end connections shall be one of the following, or equal:

      a) PT Coupling Pro Grip C50 External Crimp System with PT C50HD Heavy Duty Ferrules.

      b) 316 SS pull mandrel internal expansion body with 316 SS pull mandrel ferrule.

      c) Nipples, ferrules, and all other associated steel hardware shall be constructed entirely of 316 SS.

   2. Manufacturer shall pressure test the flex hose with connections attached. Submit proof of testing prior to delivery.

   3. Tape Coat: Provide tape coat for all swaged ferrule fittings. A 65-mil cold applied coating designed to provide protection against corrosion and electrolysis in accordance with NACE SP0109 (Cold-Applied Laminate Polymeric Tapes) and American Water Works Association (AWWA) C209 (Type II).

I. Provide ANSI/NSF 61 approved components to the fullest extent possible. Exceptions from ADEC for non NSF61 materials will be the responsibility of the Design-Builder.

J. Commission water line in accordance with the ADEC permit.

4.5 FIRE SUPPRESSION SYSTEM

4.5.1 General

A Fire suppression system is required. The International Fire Code (IFC) and the National Fire Protection Association (NFPA) Fire code guide the requirements for the fire suppression systems for marinas and are the Projects compliance documents.

The Design-Builder shall coordinate with the City and the State Fire Marshal for a Fire, Life, and Safety Certificate, throughout the design phase to ensure compliance.

A. Risers with 1 ¾ inch hose connections, no further than every 100 feet on all main and headwalk floats.

B. Valves shall be hydrostatically rated for 300 psi, with a rising stem pattern and fixed handwheel operating nut. The outlet threads shall conform to NFPA #194 for national standard fire hose coupling screw threads.

C. Use corrosion resistant materials suitable for saltwater marine environment for valves fittings

fasteners supports and other components.

D. If the fire system distribution piping is above water, it shall be constructed of corrosion resistant metallic piping. HDPE piping is not allowed above water to ensure the system maintains its integrity during a fire.

E. If the fire system piping is below water, it may be constructed of fused HDPE piping.

F. Flexible fire main supply hose shall have a minimum rated working pressure of 250 psi. It shall have an abrasion resistant cover that provides protection from UV deterioration and oil. Fire system flex hose may be Plicord Super Black Flexwing or approved equal.

G. Flex hose fitting as described in potable water section above.

H. Any above water flexible hose connection used in the dry standpipe fire system shall have a fire protection sleeve rated as follows:

1. Continuous exposure 500-degree F
2. 15-minute exposure 2000-degree F
3. Momentary exposure to molten metals up to 3000 degrees F

I. Provide placards and signage to identify fire protection systems valves, clearly distinguishable from potable water valves.

4.6 ELECTRICAL

4.6.1 General

Provide an electrical system including power for shore-tie pedestals, and lighting. Electrical design shall be performed by an Electrical Engineer registered in the State of Alaska and in accordance with the following codes and standards:

- Alaska Administrative Code, AAC
- NFPA 70, National Electrical Code
- NFPA 303, Fire Protection Standard for Marinas and Boatyards
- Illuminating Engineers Society of North America, IESNA

4.6.2 Service

Provide service equipment for the harbor located in the uplands near to the top of Gangway.

A. 208Y/120 volts, three phase, four wire.

B. Padmount NEMA 3R/4X enclosure, 316 stainless steel with stainless steel fasteners and hardware.

C. Utility meter with current transformer compartment. Meter by Chugach Electric.

D. Customer digital meter reading voltages, currents, and power (KW, KVA, KVAR, & Power Factor); and recording energy (KWH).

E. Main service circuit breaker.

F. Ground current relay with alarm and trip functions. Trip the main circuit breaker with excessive ground currents.

G. Short circuit, arc fault current, and coordination calculations and analyses.

4.6.3 Distribution

Provide distribution panels on the floating docks with circuit breakers protecting the feeders to the shore- tie pedestals and lighting.

A. Deck mounted NEMA 3R/4X enclosure, 316 stainless steel with stainless steel fasteners and hardware. Mount on UHMW spacers and fasten to the deck.

B. 208Y/120 volts, three phase, four wire.

C. Main Distribution Panels (MDP's) rated for their loads with extra capacity to include four each, single sided, 100 ampere pedestals per RFP Section 3.6 B.

D. The MDP section feeder circuit breakers internally circuited to a separate section with terminal blocks for the cables installed within the floating docks to the shore-tie pedestals and lighting.

E. Seawater ground electrode at each MDP utilizing stainless steel rods.

F. Type W cables routed within the floats to the shore-tie pedestals and luminaires.

G. Lighting Control panel with "Hand-Off-Auto" controls and photoelectric sensor.

H. Ground current relay with alarm and trip functions for each feeder.

I. Short circuit, arc fault current, and coordination calculations and analyses.

4.6.4 Shore-Tie Pedestals

Provide shore-tie pedestals with features as follows:

A. Deck mounted NEMA 3R/4X enclosure, 316 stainless steel with stainless steel fasteners and hardware. Powder coat paint. Mount on UHMW spacers and fasten to the deck. Locate between stall floats on each side of the finger floats in accordance to the Project Drawings. Space for "side-tie" mooring along the main and finger floats in accordance with maximum boat lengths established by the Harbormaster.

B. 208Y/120 volts, three phase, four wire; and single phase, three wire with three phase feeder terminals.

C. Loop feed terminals in the base.

D. Predominantly duplex style with a utility meter, circuit breakers, and receptacles assigned to each side of the pedestal.

E. 30 ma ground fault protection for each receptacle.

F. Seawater ground electrodes to specific pedestals at approximately 200-foot intervals along the floating docks.

G. Protective hinged covers over all circuit breakers and receptacles while inactive and active for weather protection.

H. One 30 ampere, 120 volt, NEMA L5-30R marine grade receptacles in all pedestal shore-tie compartments.

I. One 50 ampere, 208/120 volt, single phase, NEMA SS2-50R receptacle in select pedestal shore-

tie compartments per the table below.

A Float	All duplex 30A and 50A
G Float	All duplex 30A

4.6.5 Lighting

Provide luminaires atop select shore-tie pedestals on the floating docks as needed for the specified amount of illumination.

SAFETY FEATURES

4.6.6 General

As needed, provide and install life rings, fire extinguishers enclosed in cabinets, signage, and egress ladders on main walks floats and shown in the maps in Appendix D.

4.6.7 Safety System Components

Provide safety system systems for the floating docks. Features shall include:

A. Fire extinguishers and cabinets

1. Portable fire extinguishers shall conform to Type 2A, 20-B:C, 20 lb capacity. Each fire extinguisher will be installed in an approved fiberglass or metal cabinet that is clearly marked, designed, and equipped for emergency access as further noted below. Fire extinguisher cabinets will be Cheyenne Manufacturing or equal. Cabinets shall be weather tight, red in color, and marked “Fire Extinguisher”.
2. Provide fire extinguishers at intervals no further than 150 feet apart throughout the new floating dock system. Provide 1 fire extinguisher near the bottom of each gangway or Transfer Bridge.

B. Life Rings

1. Life ring safety equipment shall consist of a United States Coast Guard (USCG) approved buoyant throw ring connected to a polypropylene rope. Life rings shall be 30 inches in diameter and orange in color. Rope shall be 100 feet long, 5/16-inch thick and yellow in color. Enclosures shall be weather tight, fiberglass materials as manufactured by Cheyenne Manufacturing, or as otherwise approved by the Engineer. Cabinets shall be yellow in color and marked “Life Ring”.
2. Provide life rings at intervals no further than 150 feet apart throughout the new floating dock system. Provide 1 life ring near the bottom of each gangway or Transfer Bridge.

C. Safety ladders

Furnish and install ladders as follows:

1. Retractable self-rescue ladders shall be Model SW 1448 “Up-N-Out” marina safety ladders or approved equal on the moorage system.

5 SUBMITTALS

5.1 Design Submittals

Submit the following as an electronic copy of design drawings 3 days before scheduled reviews at 35%, 65% and 95% phases of design development.

A. Basis of Design document summarizing all features codes and standards Design Criteria drawings and calculations

B. Payment and performance bond forms are in Appendix A Proposal Forms. When the successful Proposer delivers the fully executed agreement to the City, it shall be accompanied by such bonds

C. Drawings and calculations prepared under the direction of an engineer licensed in the State of Alaska

D. Design Quality Control plan

E. Work plan and schedule

F. Construction Cost estimate

G. ADEC potable water system construction approval

H. Provide design drawings for the proposed Work including plan view of the harbor layout, elevations, and sections typical float (i.e., Main floats and finger floats), and connection details sealed by an engineer registered in the State of Alaska

I. Final calculations and drawings at 95% for all project components shall be sealed and prepared under the direction of an engineer licensed in the State of Alaska

J. After City review of 95% submittal, prepare 100% Issued for Construction (IFC) documents

5.2 Fabrication Procurement and Construction Submittals

Prior to fabrication or procurement Design-Builder shall submit for City review:

A. Basis of Design (BOD)

1. Design criteria
2. Summary of features that will enable the float system to operate in the conditions present in the Whittier Harbor
3. Float system and pile design verification
4. Buoyancy calculations showing that the various freeboard requirements will be met

B. Pile driving plan to include pile size location and spacing

C. Quality control plans proposed for use during fabrication

D. Fabrication Shop Drawings:

1. All different type of float module
2. Misc. Steel fabrications
3. Anodes

E. Assembly and handling plans for off-site fabricated assemblies

1. Plans shall address fabrication sequence and schedule
2. Assembly and alignment of components
3. Coating application procedures
4. Written instruction and diagrams indicating acceptable lifting, stacking and storage procedures for all floats
5. A lifting, transport, and installation equipment and devices

Certifications and manufacture cutsheets shall be included with submittals:

A. Manufacturer's published literature for Metal Grating Deck product
B. Welding Procedures and Welder Certifications
C. Piling mill test and material certificates
D. Checklist of conformance for all floats produced
E. Timber Grading and Pressure treatment Certificates
F. Manufacturers published literature for project materials:
    1. Metal and fiberglass grating products
    2. Rubber bearing pads
    3. Ultra-High Molecular Weight (UHMW) products
    4. Anodes
    5. Substitute Materials, if any
G. Certificate of conformity with the Design Codes, Standards, and references noted in the introduction Section 2.0 of these performance requirements
H. Certification for all fabricated steel shall conform to the Contract Documents
I. Certificate of conformity for Anodes Chemical composition
J. A Final Schedule of Values for the purpose of processing progress payments shall be submitted for approval by the City within 30 calendar days of the Notice to Proceed. The City recognizes significant costs may be associated with material procurements which are in advance of installation; Material on Hand payment requests may be approved when accompanied by acceptable documentation

5.3 Calculations

Submit the following calculations with each design 35%, 65%, and 95%:

A. All engineering and calculations shall be completed in conformance with contract documents and the Loads specified in Sections 3 and 5.
B. All calculations shall bear the seal of a Registered Professional Engineer licensed in Alaska.

5.4 Close out

Before final acceptance of the Work, the Design-Builder shall submit:

A. Operation and Maintenance Manual: provide 3 bound copies and 1 electronic copy (PDF) of all

maintenance manuals, which shall include approved shop drawings, maintenance Schedule and data, parts lists, cut sheets.

B. Provide a copy of the 5-year warranty on materials and workmanship of the float system.

C. Provide a copy of the 10-year warranty on the core floats. Polyethylene shell and polystyrene core float, concrete float or steel pipe float.

D. Shop drawings, material certification and product data sheets conforming to the Standards, requirements, and codes in Section 2.

E. As-built drawing from the Engineer of Record developed from contractors redlines provided in AutoCAD and PDF.