SECTION 10120 – FLOATING DOCK SYSTEM

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

A. This section covers the requirements for furnishing and installation of engineered aluminum floating dock system, pile guides, cleats and appurtenances, including all materials, labor, equipment and services necessary to complete this work.

B. The successful Contractor shall be fully responsible for the design, furnishing, delivery and installation of the complete and fully functional new floating dock system with concrete pile anchor systems and appurtenances in accordance with the contract specifications and plans for Lahaina Small Boat Harbor Front Row Piers and Dingy Dock Repairs, Lahaina, Maui, Hawaii, Job No. B46CM71B.

The completed and ready to assemble floating dock system and appurtenances, as called for in the bid documents, shall be delivered to the Lahaina Small Boat Harbor, Maui, Hawaii. The floating dock system shall be fully assembled to the maximum extent possible prior to being transported to the project site to avoid impacting harbor activities. The Contractor will be provided with an area to unload the floating dock system and appurtenances at Lahaina Small Boat Harbor, Maui, Hawaii.

C. The design of the structures and components of the floating dock system shall comply with the minimum requirements of the Aluminum Association, Aluminum Construction Manual, latest edition or approved equal.

D. In the case of conflict between the drawings and the specifications, the more restrictive documents shall prevail.

E. A certified welder according to American Welding Society, AWS D1.2 – Structural Welding Code, Aluminum or approved equal, shall make all aluminum welding. Welders shall be currently certified to weld the various materials to be incorporated in the work, mainly aluminum.

F. The dock manufacturer/contractor after the bid opening and prior to the award of the contract shall submit the drawings showing the following:

1. Floating dock pier typical cross section;
2. Cleat details
3. Typical connection to concrete guide piles;
4. Details of floating unit, including thickness of floating unit;
5. Copy of the welder certification
6. Typical connection detail between the gangway and the concrete walkway.

G. Following the award of the contract, the dock manufacturer/Contractor shall furnish detailed drawings of the engineered floating dock system, float positions on the structures, accessories plus detailed installation and connection to the concrete guide piles and appurtenances; structural design calculations as available; specifications; installation instructions and catalog data to the State for review and approval. All drawings shall bear the seal of dock manufacturer's Professional Engineer and shall be reviewed, stamped and signed by a State of Hawaii licensed Structural Engineer. This cost shall be paid for by the dock manufacturer/Contractor.

The dock manufacturer/Contractor shall design and detail all floating structures such that there are no crevices and pockets where salt water can collect. Also, there shall be no part of the aluminum frame in direct contact with seawater.

The dock manufacturer/Contractor shall furnish to the satisfaction of the State a preliminary construction schedule done in the form of a bar graph and which identifies each major critical activity.

The dock manufacturer shall submit a qualified "Quality Control Program", which includes continual inspection and documentation.

H. With design drawing submittal, the dock manufacturer/Contractor must submit the following warranties:

1. Furnish a minimum two (2) year warranty guaranteeing that the structure shall be free of defects in materials, workmanship and/or design from the date of final acceptance by the State.

2. Furnish a minimum ten (10) year warranty guaranteeing the proper performance of the polyethylene float.

3. Furnish a minimum five (5) year warranty against pitting and corrosion of all the aluminum members.

I. Prior to final acceptance, the dock manufacturer/Contractor shall turn over to the State, the CADD files (.DGN), Microsoft Word (.DOC) or Microsoft Excel (.XLS) files version 2000 or higher in connection with the work performed under this section. The electronic files shall be submitted on a CD at no additional cost to the State.

J. Submittal of Plans and Specifications: The Contractor shall submit to the DLNR, the SER's (Structural Engineer of Record) complete calculations, plans and specifications for the floating dock system and concrete landing for their review and approval to ensure compliance with the plans and specifications, prior to the fabrication for these items. All documents submitted shall bear the professional seal and signature of the SER with the Statement: "This work was prepared by me or under my supervision and construction of this project will be under my observation." The SER shall be the Contractor's State of Hawaii Licensed Structural Engineer who will be the Structural Engineer of Records (SER) for the floating dock system and concrete landing.

K. Upon completion of construction, the successful bidder shall provide two (2) copies of written instructions in the form of a manual, defining the maintenance and operations for the floating dock system to the Engineer.

1.02 FLOATING DOCK SYSTEM

A. Experience: The floating dock system shall be manufactured by a firm with a minimum of ten (10) years experience designing, engineering, and manufacturing aluminum floating dock systems for use in ocean waters.

B. Pre-Qualified Manufacturers:

1. Blue Water Marine and Dock Specialies
   350 Ward Avenue, Suite 106
   Honolulu, Hawaii 96814
   Telephone Number: (808) 237-4504, Fax No. (808) 237-4545

2. METALU Industries international
   B P. 53-Les Prairies De Grand'Ville
   44250 St. Brevin Les Pins, France
   Telephone Number :(33)02 40 39 18 40, Fax No. (33) 02 40 27 02 47

3. Poralu Marine Inc.
   381 Boul. Industiel, Bur. 2
   St-Eustache, Quebec, Canada J7R 6C9
   Telephone Number: (450) 491-6506, Fax No. (450) 491-3379

4. Raven Marine, Inc.
   3295 Orange Avenue
   Kissimmee, FL 34744
   Telephone Number: (407) 935-9799, Fax No. (407) 935-9436

5. Technomarine Manufacturing, Inc.
   598 Leclerc
   Repentigny, Quebec, Canada J6A 2E5
   Telephone number: (450) 585-6114, Fax No. (450) 585-6840

6. Water Ventures USA
   23192 Alcalde Drive, Suite G
   Laguna Hills, CA 92653
   Telephone Number: (949) 470-3299, Fax No. (949) 470-3699
   Hawaii Representative Telephone number: (808) 352-6427, Fax No. (808) 953-2196

7. Shore Master
   1025 International Drive, P.O. Box 358
   Fergus Falls, MN 56538-0358
   Telephone Number: (218) 739-4641, Toll Free: 1-800-328-8945, Fax no. (218) 739-4008

8. Bellingham Marine
   5500 Nordic Way

Ferndale, WA 98248
Telephone Number: (360) 392-1432, Fax: (360) 384-8134

9. B.E. Engineering LLC
P.O. Box 817
Waialua, HI 96791
Telephone Number: (808) 373-0557

C. For Manufacturers other than those listed above who wish to have their floating dock system considered, the contractor shall have the system approved by completing all of the following:

1. Fifteen (15) working days (not including Saturday, Sunday or holidays) prior to the scheduled bid opening date, the Manufacturer/Contractor shall furnish and submit complete and detailed information describing their proposed floating structures applicable in salt water, including but not limited to the specifications and construction drawings. Submittal shall clearly demonstrate that the floating dock system shall respond to the specific requirements of this project. The burden of proof of merit of the proposed system is with the Manufacturer/Contractor. The Engineer's decision will be final. The Engineer's written approval, if given, will be issued in an addendum.

2. Evaluation of the floating dock system by the Engineer will include, but not be limited to the following factors:
   a. Dock dimensions
   b. Weight and Stability
   c. Safety
   d. Durability
   e. Maintenance requirements
   f. Aesthetics
   g. Company experience
   h. Warranty
   i. Compliance with specified design requirements
   j. Delivery dates

3. The Manufacturer/Contractor must submit the following:
   a. Drawing(s) showing the layout of the floating structure in salt water, gangway and gates.
   b. Catalogue data showing commercial equipment incorporated into the design.

c. List of completed projects. Include the name, location, date completed and description of the floating dock project in salt water.

d. Warranty

1) Furnish a minimum two (2) year warranty guaranteeing that the structure shall be free of defects in materials, workmanship and/or design from the date of final acceptance by the State.

2) Furnish a minimum ten (10) year warranty guaranteeing the proper performance of the polyethylene float.
3) Furnish a minimum five (5) year warranty against pitting and corrosion of all the aluminum members.
4) Furnish a minimum two (2) year warranty for polythylene floats, elastic mooring system and helical anchors.

1.03 SITE SURVEY

A. The Contractor shall retain a professional surveyer and survey all the existing conditions, including the locations of the existing, temporary and permanent gangway connection to the engineered aluminum floating dock and location of helical anchors.

1.04 ENGINEERING

A. Design Criteria:

1. Wind Load:

a. Basic wind speed shall be 95 mph, basic wind speed 3 second gust @33' height above ground. Importance factor I=1.0. Wind load forces shall be design in accordance with ASCE/SEI 7-05 "Minimum Design Loads for Buildings and other Structures," when vessels are moored to the docks.

b. Basic wind speed shall be 105 mph, basic wind speed 3 second gust @33' height above ground as defined in International Building Code 2006 and ACSE/ SEI 7-05 "Minimum Design Loads for Building and other Structures," when vessels are not moored to the docks."
   i. Importance factor I=1.0. Wind load forces shall be design in accordance with 2006 International Building Coad and SCSE/SEI 7-05 "Minimum Design Loads for Buildings and other Structures
   ii. The wind load includes the wind forces in the transverse or longitudinal direction
   iii. Shielding effects of berthed boats between adjacent rows of slips on the dock system may be included in determining the total wind load. Shielding coefficient for the windward most row of slips shall be 1.0. Wind load on the second row of slips (first shielded row) shall be calculated with a shielding coefficient of not be less than 0.5 Wind loads on subsequent rows of slips shall be calculated with a shielding coefficient of not less than 0.3

2. Wave Height:

a. The dock system shall be capable of sustaining continuous waves of up to 1-foot and occasional waves of up to 2-feet for a period of four (4) hours.
    i. Wave loads shall be determined for all portions of the dock system based on fully occupied slips with 1 foot waves with a return period between 1 and 3 seconds.
    ii. The wave load includes forces in the longitudinal and transverse directions to the considered dock or portion of dock

3. Surge Height: 8.0 feet MLLW. (8.0 Feet is the desired design surge height. The minimum acceptable design surge height will be 8.0 feet, this includes high tide. The manufacturer shall include the design surge height for the system with the submittal of construction details for the floating dock.)

4. Vertical Loads:

    a. Dock floatation shall be designed to support the dead weight of the complete dock, including any permanently attached accessories, plus an additional uniform live load of 30 pounds per square foot over the main walkway, 30 pounds per square foot over the finger pier, 100 pounds per square foot over knee brace deck and gangway, and meet the freeboard requirements identified in Section 1.4C.

    b. The deck and structural components shall also be designed to support dead load plus a uniform distributed live load of 50 pounds per square foot or concentrated vertical live load of 400 pounds applied at any point on the deck not closer than 12-inches from any edge. The dock frame shall be designed for torsional stability against concentrated vertical live load. The uniform and concentrated live loads need not be applied simultaneously.

    c. An additional vertical load from gangway shall be considered as an additional vertical dead load besides distributed live load and 400 pounds of concentrated additional live load.

    d. Main walkway frame shall be designed for a live load of minimum 50 pounds per square foot of deck area.

    e. Dead load: Actual dead load for floating dock to be provided.

5. Seismic Load: Zone 2A (Soil Profile Type SE)

6. Ocean Current: 1 mph.

7. Wave Forces: 40 psf acting on total vertical surface area (above and below water).

8. Horizontal Loads: 150 pounds per lineal feet acting simultaneously on the main walkway and finger piers or the combined loads from wind, surge and current acting simultaneously on the main walkway and finger piers, whichever is greater.

9. Connections: Connection between finger and main walkway shall be semi-rigid or hinged. Connections shall be designed to resist all external loads listed above.

10. Cleats: Shall resist a minimum of 5,000 pounds of force in all directions.

11. Design Vessel: Design vessels shall be determined based on slip length in accordanc with ACSE manual No. 50

B. Foundation Investigation Report: Available subsurface information within the project site is provided in a report entitled "Geotechnical Investigation: Port Allen Small Boat Harbor Peir Improvements, prepared by HIRATA & Assciates, Inc. dated Feburary 26,2014". This report is made available for Bidder's information only. The State does not guarantee that the borings and test results on consolidation and direct shear indicate actual soil properties except for the locations where and at the time the borings were taken. The Bidder is solely responsible for all assumptions, deductions or conclusions which the Bidder makes or derives from the examination of the subsurface information and data furnished in this report.

C. The Contractor shall be responsible for engaging and paying for the services of a geotechnical engineer and qualified divers to perform such subsurface exploration, investigation, testing and analysis as the Contractor deems necessary for the design and installation of the anchorage for the elastic mooring system.

D. Freeboard:

1. Nominal freeboard under combined dead and live load shall be greater than 10 inches.

2. Dead load freeboard of each pier shall be noted on the submittal drawings and at the end of the two (2) year warranty period shall be within 2 inches of that noted freeboard.

3. Actual dead load freeboard may vary plus or minus 1 inch from the average freeboard listed on the manufacturer's approved submittal drawings.

4. In addition to the above freeboard restrictions, the main walkway shall not slope more than 1 inch in 8 feet over their length or width at the time of acceptance or 1-½ inches in 8 feet at the end of the five (5) year warranty period.

5. Finger piers shall have their outer levels with, or no more than 2 inches higher than, the elevation of the main walkway, where they attach.

6. Deck surfaces between adjacent dock units shall be at the same elevation. A difference of 1/8 inch or more is unacceptable.

7. The outer corner ends of finger piers shall be as close as possible to being level with each other but in no case shall there be a difference of more than ½ inch for each 3 feet of width under dead load at the time of acceptance nor ¾ inch for each 3 feet at the end of the five (5) year warranty period.

8. The main walkway unit under the gangway shall have extra floatation provided so that the supporting dock unit is no less than the designated freeboard nor more than 2 inches above that designated freeboard under full dead load, including hanging utilities.

9. With a 400# load applied 1 foot from the end of the finger piers, at the center, the end of the finger pier shall lose no more than 4 inches of freeboard at the time of acceptance nor 5 inches at the end of the five (5) year warranty period.

10. With a 200# load on one outer corner of the finger pier, there shall be no more than 2 inches of difference in freeboard between the outer corners at the end of the finger piers at the time of acceptance nor 3 inches at the end of the two (2) year warranty period.

11. The deck of the float system on all sccessible routes shall not exceen 1:50 (2%) for any cross slope under any loading combination defined herin.

12. Water Surface Evaluation. The floating dock system should be designed for a water surface which varies between -0.98 feet and =3.67 feet Mean Lower Low Water (MLLW). The floating dock system shall not rest on the sea bed at any time when the water surface elevation is within this range. Sea bed elevation in the dock vicinity is approximately -10 feet MLLW.

1.05 SUBMITTALS

A. Submit under provisions of SECTION 01300 – Submittals.

B. Floating Dock System:

1. Drawings: The Contractor shall submit six (6) sets of drawings and structural design calculations, specifications, catalog data and details of installations of gangways, access gates and floating dock system and appurtenances to the Engineer for review and approval. All drawings shall bear the seal of a Professional Engineer of dock manufacturer and shall be reviewed, stamped and signed by a State of Hawaii licensed Structural Engineer. This cost shall be paid for by the Contractor.

2. Samples: The Contractor shall submit two (2) sets of samples for all the members and parts including one (1) each of four (4) feet long full size mock sample of gangway, finger pier and half width of main walkway and one (1) each of sample of power center, cleat and fender, etc. to the Engineer for review and approval.

3. Prior to the fabrication of the floating dock system components, the Dock System Supplier shall submit final diesng calculations along with shop drawings indicating layout and connecting details, sections and methods for attaching utlities and accessories. Submit shop drawings for all specially fabricated items and catalog sheets for all standard manuafactured items that are to be incorprated into the floating dock system. Final design calculations shall be as hereinafter described in the paraaph titled Design of System components in Part 3.

4. Submit certified test reports for the following:

a. Structural products and coatings
b. Floatation unit materials
c. Fasteners
d. Decking

PART 2 – PRODUCTS

2.01 GENERAL

A. Aluminum Members: Aluminum extrusions for dock and gangway structures shall be aluminum alloy 6061-T6 conforming to ASTM B 309, 6005-T5 conforming to the provisions in ASTM B 221or 6063-T6 conforming to the provisons in the ASTM B221. Welding of aluminum shall comply with AWS D1.2. Alloy 6061-T6 shall be extruded in accordance with the requirements of applicable sections of Federal Specification QQ-A-200.

B. Floating Units: The buoyant units of the docks shall be encased with polyethylene having a thickness of 0.15-inches. The floats shall conform to ASTM D 1238 and shall be manufactured in such a way as to be resistant to UV radiation from sunlight for 20 years. The floats shall be completely filled with expanded polystyrene. The expanded polystyrene shall be produced by a manufacturer who has been continuously engaged in production of expanded polystyrene for floatation for at least ten (10) years. The foam shall have a minimum density, in place, of 0.9 pounds per cubic foot; a maximum density of 1.5 pounds per cubic foot; compressive strength of 15 to 20 p.s.i; and maximum water absorption of 20% by volume, and shall pass Hunt Test.

C. Dock Fender:

1. Dock fendering shall be composed of non-marring, non-yellowing marine grade extruded OZC (PVC nitrite) with a durometer of eighty (80) plus minus five (5) and a minimum tensile strength of 700 pounds per square inch. The fender shall be fastened to the side member on two (2) dovetail grooves or by stainless steel fastener of Type A316.

2. Alternate dock fender shall be non-marring black PVC fender with ultra-violet light inhibitors and fungus additives: Edge Pro Deck Edging No. 5008 by K&R Manufacturing Company or approved equal.

D. Mooring Cleats: Cleats shall be composed of ALMAG 35 cast aluminum alloy meeting the requirements of the Federal Specification QQ-A-371F and QQ-A-601E. The mooring cleat shall support 5,000 pound of force in any direction. Remove burrs and rough spots. Grind smooth to prevent chafing of boat lines.

E. Bolts: Galvanized steel bolts shall not be used for any purpose for the floating dock system.

1. Aluminum Bolts: Aluminum bolts, rods, nuts, washers and screws shall be alloy 6061-T6 conforming to ASTM B 316.

2. Stainless Bolts: Stainless bolts, rods, nuts, washers and screws shall be Type 316.

F. Plates: Plates for gangways shall be Ultra High Molecular Weight (UHMW) polyethylene with black ultra-violet light inhibitors added and 1 inch minimum thickness.

2.02 TOP DECKING MATERIAL

A. Composite deck material shall be 1 inch thick Composite Deck “Moisture Shield” produced by A.E.R.T., Inc. or approved equal. The walking surface shal be smooth with a maximum deviation of 1/16-inch. Decking shall be set with a 1/8 inch joint.

B. Alternative Deck Materials:

1. IPE hardwood deck material shall be nominal size of 5/4 x 6.

2. Trimax - recycled plastic deck of 1¼ inch thick manufactured by Earth Safe, Inc.

3. Polypropylene Injection Molded Composite Decking of 23 inch × 19 inch × 2 inch manufactured by PORALU MARINE.

C. Utility Trench Cover:

1. Utility trench cover shall be Fiber Reinforced Plastic GLOBALGRID Decking, manufactured by FRP Resource, 11A El Dorado Street, Arcadia, CA 91006, Telephone: 626-698-6151, Fax: 625-445-2198 or approved equal.

2. It should be composed of molded fiberglass grating (5/8 inch thick) and an integral fiberglass cover plate (1/8 inch thick) with grit surface. With double thickness (patent pending) for cross bar and bearing bar at every 1 foot interval.

2.03 DISSIMILAR MATERIALS

A. Where dissimilar metals are in contact, or where aluminum is in contact with concrete. ,asonary, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protectted with a coat of bituminous paint to prevent galvanic action.

2.04 PONTOONS

A. Pontoon shells shall be black in color and manufactured as described in the following paragraph:

B. Encasement shall consist of concrete or linear, low , medium or high density polythylene shells consistent with the folloiwing standards:

Normal thickness	.150 inch
Construction	Rotational
Minimum Density	.937 gms/cc ASTM D1505-68
Stress Cracking F-50	800 hr- ASTM D1693-70
Tensile Strength	3600 psi-ASTM D638
Flexural Modulus	175,00 ASTM D790

C. Polythelene shells shall be of one-piece constrcution with six sides and completely filled with expanded polystrene. Foam core shall have a density between 0.95 and 1.10 pcf. Units shall be securly bolted to the structural frame. Expanded modified polystyrene floatation billets 1.0 lbs per cubic foot density. 100% virgin matterial securley fastened to the substructure. Water absorption shall not exceed 0.1lbs. per cubit foot, in 48 hours. At a 10 foot head. Floatation shall not support combustion without external heat source/

D. The pontoon used shall carry an unconditonal warranty for five (5) years after project acceptance.

2.08 FIRE EXTINGUISHER CABINETS

A. Fire extingusher cabinents shall be manufactured by Henderson Marine Supply (800-523-1586), or approved equal. Fire extinguisher cabinets shall be yellow in color to match existing fire extnguisher cabinents. Cabinents shall be supplied with , brass fittings rated at 150 psi, hose rack, a minium 100 feet of 1 1/2 lined hose, fog nozzle and 10 pound, ABC type fire extinguisher.

PART 3 – EXECUTION

3.01 FABRICATION REQUIREMENTS

A. Accessories:

1. Cleats on aluminum framed docks shall be bolted with stainless steel bolts, nuts and washers.

2. Any potentially corrosive installation of dissimilar materials shall be properly insulated to minimize or eliminate corrosion in a marine environment.

3. Lock washers shall be used on the main walkway and finger pier bolted connections.

4. Dock boxes shall be secured to top decking member with stainless steel bolt of Type 316.

B. Structures:

1. Floating docks shall be sequentially numbered in the shop, as shown on the shop drawing, prior to shipment.

2. Each floating dock unit shall be interchangeable and replaceable for maintenance and repair work.

3. The floating dock system shall be designed and constructed so that there are no crevices and pockets where salt water can collect and no galvanic corrosion.

4. The floating dock system and appurtenances shall be fully assembled to the maximum extent possible prior to being transported to the project site.

3.02 CONSTRUCTION REQUIREMENTS

A. Aluminum floating docks shall be restrained laterally by concrete guide piles. Floating docks must move freely vertically while remaining in nearly the same position horizontally during the entire cycle of water level.

B. The gangway, including the required connections shall be designed to move freely during changes in water surface levels. The gangway connections and supports shall be designed and supplied by the dock manufacturer/Contractor to be securely fastened to the gangway support concrete pad as shown on the plans. The Contractor shall submit anchoring details to the Engineer for approval.

C. Both seagrass and large coral heads are present in the waters at the construction site, in order to protect these species, a line with a weight attached to the end must be dropped in the water at the intended location of the helical anchor before the placing and drilling of said anchor. A diver must be present in the water in order to determine if the intended location of the anchor coincides with coral heads or seagrass. If the location of the anchor coincides with either coral heads or seagrass, the location of the helical anchor must be adjusted to avoid the coral heads and seagrass.

D. The Contractor is responsible to coordinate and pay for the shipping of the floating dock systems, and appurtenances. The floating dock system shall be fully assembled to the maximum extent possible prior to being transported to the project site to avoid impacting harbor activities. The Contractor will be provided an area to unload the floating dock system and appurtenances at the Lahaina Small Boat Harbor. The Contractor is responsible to repair and/or replace any of above items damaged during the shipping, unloading, and/or storage to the satisfaction of the State.

3.04 FLOATING DOCK SYSTEM PARTS LIST

A. Provide a floating dock system parts list for all manufactured components, in accordance with the following list. Parts shall be identical to those items used on the original construction?

1. Component name and descriptoon
2. Manufacturer
    i. Address
    ii. Telephone Number
3. Model number or Part Number
4. Local Supplier

3.05 PAYMENT

A. Payment will be full compensation for the work prescribed in this section and the contract documents.

B. After partial payment is made for furnishing material of floating dock, the Contractor is still responsible for storing, protecting and repairing, if necessary, of the material.

END OF SECTON