

PROJECT MANUAL
FOR
**BERTH 1 BULKHEAD REPLACEMENT
ADVANCED MATERIAL ORDER
FLOATING MARINE FENDERS**
FOR
**PORT OF PALM BEACH DISTRICT
RIVIERA BEACH**



Prepared by:

Kimley-Horn and Associates, Inc.
1920 Wekiva Way, Suite 200
West Palm Beach, FL 33411

Request for Proposal

March 10, 2019

Project No. 140577000

TABLE OF CONTENTS

BIDDING REQUIREMENTS, CONTRACT, FORMS, AND CONDITIONS OF THE
CONTRACT

Invitation to Bid
Proposal Form – Lump Sum
Consumer’s Certificate of Exemption

TECHNICAL SPECIFICATIONS

35 59 13 FLOATING MARINE FENDER SYSTEM

DETAILS

Sketch 1 – Fender Details

140577000 BERTH 1 BULKHEAD REPLACEMENT
ADVANCED FENDER ORDER
PORT OF PALM BEACH DISTRICT

MATERIAL ORDER RFP
MARCH 10, 2019

PAGE LEFT INTENTIONALLY BLANK

**REQUEST FOR PROPOSAL
INVITATION
FOR**

**BERTH 1 BULKHEAD REPLACEMENT
ADVANCED MATERIAL ORDER – FLOATING MARINE FENDERS
PORT OF PALM BEACH DISTRICT
RIVIERA BEACH, FLORIDA**

1. Sealed Proposal for Berth 1 Bulkhead Replacement – Advanced Material Order – Fenders at the Port of Palm Beach will be received by the Owner, PORT OF PALM BEACH DISTRICT, until 2:00 p.m., local time on **Friday, March 22, 2019**, at One East 11th Street, Riviera Beach, Florida 33404, 6th Floor Conference Room. Proposals received after this time will be returned unopened. As applicable, the Purchasing Department is no longer holding public/proposal openings due to the provisions of Section 119.071 (1) (b) F.S., the Florida Public Records Law. Therefore, the Port is not required to provide information until the earlier of the Port providing notice of an intended decision, or until thirty (30) days after opening the proposals. Further, if the intended decision is to reissue the solicitation, the Port is not required to provide information until notice of an intended decision concerning the reissued solicitation or until the reissued solicitation is withdrawn.
2. Project consists of the fabrication and delivery of Floating Marine Fenders and appurtenances freight on board (FOB) to the Port of Palm Beach, Riviera Beach, Florida.
3. Electronic Request for Proposal (RFP) Documents will be available for download no later than **Tuesday, March 12, 2019**, from the Port of Palm Beach District website: <http://www.portofpalmbeach.com/bids.aspx>.
4. RFP Documents may be examined at the Port of Palm Beach District offices at One East 11th Street, Riviera Beach, 6th Floor, during regular business hours through the closing of the proposal period. Contact number is (561) 842-4201 for the Port Engineer.
5. Each Proposal shall be accompanied by Bid Security in the form of a surety company Bid Bond, cashiers or certified check, drawn upon any State or National Bank in Florida, payable to the Port in an amount not less than five percent (5%) of the amount of the Berth 1 Bulkhead Replacement – Advanced Material Order – Steel Sheet Piles Base Proposal Amount. Any Proposal received without Bid Security will be rejected and returned. Bid Security will be returned to all except the three lowest Proposer within **seven (7) days** after the opening of Proposals, and the remaining Bid Securities will be returned within **seven (7) days** after the Port and the awarded Bidder have executed the Contract, or if no Contract has been awarded, **within ninety (90) days** after the date of opening of Proposals, or upon demand of Proposer at any time thereafter, so long as it has not been notified of acceptance of its Proposal. The Bond executed by the Proposer shall be issued by a Surety Company licensed to do business in the State of Florida. If the Proposal to whom the Contract is

- awarded does not execute the Contract and furnish the required documentation within **ten (10) days** of the date of Notice of Award, the Bid Security shall be paid to the Port as liquidated damages. The Proposer agree with the Port that the amount of Bid Security fairly and reasonably represents the amount of damages the Port will suffer due to the failure of the Proposer to fulfill its obligations required herein.
6. Proposers will be permitted to withdraw their Proposals at any time prior to Proposal opening.
 7. The Port will not award a Contract to any Proposer who cannot prove to the satisfaction of the Port that they have a minimum of five (5) years of experience in the manufacturing of steel sheet piles sections.
 8. Sealed Proposals shall be addressed to the Port of Palm Beach District and plainly marked “**BERTH 1 BULKHEAD REPLACEMENT - ADVANCED MATERIAL ORDER – FLOATING MARINE FENDERS**” on the outside of the envelope. The Proposer’s name and address shall also be included on the outside of the envelope.
 9. The Proposer agrees that the Proposal shall be good, and may not be withdrawn for a period ending the later of **ninety (90) calendar days** after Proposal Opening, or the execution of the Contract between the successful Proposer and the Port.
 10. The Port reserves the right to waive any technicalities/irregularities and/or to reject any and/or all Proposals. The Port further reserves the right to award a contract to that Proposer whose submittal best serves the interests of the Port, in the sole discretion of the Port.

END OF REQUEST FOR PROPOSAL INVITATION

PROPOSAL FORM - LUMP SUM

Proposal of _____
(Name)

(Address)

(Phone) (E-Mail)

to furnish all materials, equipment and labor to perform all Work in accordance with the RFP Documents for the Berth 1 Bulkhead Replacement – Advanced Material Order – Floating Marine Fenders, located at the Port of Palm Beach in Riviera Beach.

To: Port of Palm Beach District (Owner)
One East 11th Street
Riviera Beach, FL 33404
Mr. Manuel Almira, Executive Director

Dear Mr. Almira:

The undersigned Proposer has carefully examined the RFP Documents and the Site of the proposed Work and is familiar with the nature and extent of the Work and any local conditions that may in any manner affect the Work to be done.

The undersigned Proposer agrees to do all the Work and furnish all materials called for by the RFP Documents for Berth 1 Bulkhead Replacement – Advanced Material Order – Floating Marine Fenders in the manner prescribed therein and to the standards of quality and performance established in the technical specifications for the lump sum prices stated herein.

1. BASE PROPOSAL:

Proposer (Supplier) shall deliver floating marine fenders, chains, shackles, mounting plates and anchor bolts and related appurtenances to the Port of Palm Beach for use and acceptance by Owner’s Contractor. Upon delivery the Owner’s Contractor will receive, inspect and accept product (if in compliance). Once accepted the Owner’s Contractor will offload product at project site and take possession of the materials.

Proposer shall be responsible to furnish all materials, labor and shipping required to deliver product to the Port of Palm Beach Cruise Terminal Site located at One East 11th Street, Riviera Beach, FL and to coordinate offloading by the Owner’s Contractor and to coordinate stockpiling with the Owner’s Contractor.

If Proposer’s product can be delivered sooner than the date needed, then the Proposer shall include in the Base Proposal the cost to store the product off site until the indicated earliest date needed.

Proposer shall be responsible to repair any damage to product due to shipping and delivery.

Proposer shall provide fenders (Product) and items listed above in accordance with the technical specification sections and sketches as follows for the products in this RFP.

- SECTION 35 59 13 – Floating Marine Fender System
- SKETCH SK-1

For the above scope of work Proposer shall indicate the Cost and Time required below. The undersigned Proposer agrees that its Proposal shall be good and may not be withdrawn for a period of 90 days after the scheduled closing time for receiving proposal.

Cost (Lump Sum)

Proposer is to fill in all blanks below. All cost below shall exclude applicable taxes as defined in the attached Consumer Certificate Exemption #85-8012646126C-7 from the State of Florida but include all other fees and taxes applicable to this type of work.

Item	Description	Qty.	Unit	Unit Price	Total Price
1	Fender System	14	Each	\$	\$
2	Delivery / Shipping to Port of Palm Beach	1	LS	\$	\$
TOTAL (Items 1 – 4)					\$

Base Proposal Cost Total-Written Out (Lump Sum):

_____ Dollars and _____ Cents

Time

All times shall be based on a Purchase Order being issued the last week of April. The Owner cannot receive delivery of any product earlier than August 1, 2019 shop drawings, which is when their contractor will likely be ready to receive the product. Proposer shall identify as part of this Proposal the following:

- Number of Calendar Days from date of Purchase Order to complete fabrication and testing of fenders and to deliver all product to the Port of Palm Beach ready for offloading by Owner's Contractor (no earlier than August 1, 2019).
_____ days
- If the Port elects to delay delivery of product after fabrication and testing; indicate below the number of weeks past August 1, 2019 that the product can be stored off site in supplier's possession without additional cost to Base Proposal being charged to the Port for storage.
_____ weeks

2. ALTERNATE PROPOSAL ITEM:

As part of each alternate, Proposer shall:

- Coordinate related Work and modify or adjust adjacent Work as necessary to ensure that Work affected by each accepted Alternate is complete and fully integrated into the Project.
- Immediately following the Award of the Contract, prepare and distribute to each party involved, notification of the status of each Alternate.
- Include as part of each Alternate, miscellaneous devices, accessory objects, and related items incidental to or required for a complete installation whether mentioned as part of the Alternate.

Alternate Proposal Item 1 – Off Site Storage – Should fender fabrication progress on time and they are ready for a August 1, 2019 delivery, and the Owner needs to delay delivery for unforeseen conditions, and the Proposer is unable to store the product without additional cost until the Port needs the product, this alternate is for the additional cost per week for storage of the product off site in a Proposer-controlled yard.

\$ _____ /week

4. BID SECURITY

Accompanying this Proposal is a certified or cashier's check or a Bid Bond in the amount of 5 percent of the Total Base Proposal, made payable to the Owner, which may be forfeited as liquidated damages if, in the event this proposal is accepted, the undersigned fails to execute the Construction Contract with the Owner within three (3) business days after acceptance of the Proposal; otherwise said certified or cashier's check or Bid Bond will be returned to the undersigned as more specifically defined in the Request for Proposals Invitation.

5. BASIS OF AWARD

The Port (Owner) has a time certain need to complete construction on this project and the timely receipt of the product at the project site (Port of Palm Beach) is necessary. The Port anticipates the Owner's will be ready to offload product by August 1, 2019.

If Proposer's product can be tested and delivered sooner than this date, then the Proposer shall include in the Base Proposal the cost to store the coated product off site such that the product is delivered by no earlier than August 1, 2019.

If Proposer's product will not be tested and delivered to Port by the date indicated above, then the Port will need to consider the impacts to the project which will result from this later delivery as part of the award of this RFP.

If Proposer's has alternative or optional delivery methods and concepts that the Port can consider and review as part of this RFP which can help the Port with their schedule, then these elements

will be reviewed and considered as part of this proposal. Proposer shall submit these concept(s) as part of the proposal narrative.

The overall basis of award of the proposal will not be based solely on price and will be based on the best combination of cost, schedule and product information received. Products that do not meet the technical specifications including material and testing will not be accepted. Each aspect of the proposal will be reviewed by the Port for compliance with the overall project’s needs.

Each Proposal will be evaluated and scored based on the following criteria with a maximum score of 100 points available. Tie breaks will be based on the best proposal for time and cost that meets the Port’s needs. The cost of additional storage may be considered should the Port need a small delay in delivery time.

A. Proposers Base Cost – Maximum of 50 Points

Points will be awarded for Base Proposal Cost as defined below:

- Apparent Low Proposal Cost – Base Proposal 50 Points
- Cost Proposal within 5.0% higher than the Apparent Low Proposer 40 Points
- Cost Proposal within 10.0% higher than the Apparent Low Proposer 30 Points
- Cost Proposal within 15.0% higher than the Apparent Low Proposer 20 Points
- Cost Proposal within 20.0% higher than the Apparent Low Proposer 10 Points
- More than 20.0% higher than Apparent Low Proposer 0 Points

B. Proposers Partial Order Delivery Schedule – Maximum of 25 Points

Percent of total fenders and accessories available for delivery on or before August 1, 2019:	100%	25 pt
	75%	20 pt
	50%	10 pt
	0%	0 pt

C. Proposers Complete Order Delivery Schedule – Maximum of 25 Points

Date of final delivery of all fenders and accessories, on or before:	August 1, 2019	25 pt
	August 1, 2019	20 pt
	September 1, 2019	10 pt
	September 15, 2019	5 pt
	After September 15, 2019	0 pt

Total Score = Total of A+B+C

The Port reserves the right to waive any technicalities/irregularities and/or to reject any and/or all Proposals. The Port further reserves the right to award a contract to that Proposer whose submittal best serves the interests of the Port, in the sole discretion of the Port.

6. ATTACHMENTS TO PROPOSALS

The following documents are to be attached to and made a condition of this Proposal:

- Required Bid security in the form of Bid bond.
- List of Proposed Suppliers and shipping agents.
- Cut Sheets and Product data required in technical sections including testing results.
- Narrative of proposed fabrication locations and shipping method. General description to better explain your Proposal.
- Additional narrative and attachments to clarify the Proposer's proposal as required if any deviations are proposed or alternate delivery options are suggested.

7. ADDENDA

Proposer acknowledges the receipt of Addendum numbers:

1. _____, 2. _____, 3. _____, 4. _____, 5. _____.

Dated this _____ day of _____, 20__.

NAME OF PROPOSER: _____

ADDRESS OF PROPOSER: _____

[CORPORATE SEAL] BY: _____

TITLE: _____

END OF PROPOSAL FORM



Consumer's Certificate of Exemption

DR-14
R. 10/15

Issued Pursuant to Chapter 212, Florida Statutes

85-8012646126C-7	12/31/2017	12/31/2022	STATE GOVERNMENT
Certificate Number	Effective Date	Expiration Date	Exemption Category

This certifies that

PORT OF PALM BEACH DISTRICT
1 E 11TH ST STE 600
RIVIERA BEACH FL 33404-6911

is exempt from the payment of Florida sales and use tax on real property rented, transient rental property rented, tangible personal property purchased or rented, or services purchased.



Important Information for Exempt Organizations

DR-14
R. 10/15

1. You must provide all vendors and suppliers with an exemption certificate before making tax-exempt purchases. See Rule 12A-1.038, Florida Administrative Code (F.A.C.).
2. Your *Consumer's Certificate of Exemption* is to be used solely by your organization for your organization's customary nonprofit activities.
3. Purchases made by an individual on behalf of the organization are taxable, even if the individual will be reimbursed by the organization.
4. This exemption applies only to purchases your organization makes. The sale or lease to others of tangible personal property, sleeping accommodations, or other real property is taxable. Your organization must register, and collect and remit sales and use tax on such taxable transactions. Note: Churches are exempt from this requirement except when they are the lessor of real property (Rule 12A-1.070, F.A.C.).
5. It is a criminal offense to fraudulently present this certificate to evade the payment of sales tax. Under no circumstances should this certificate be used for the personal benefit of any individual. Violators will be liable for payment of the sales tax plus a penalty of 200% of the tax, and may be subject to conviction of a third-degree felony. Any violation will require the revocation of this certificate.
6. If you have questions regarding your exemption certificate, please contact the Exemption Unit of Account Management at 800-352-3671. From the available options, select "Registration of Taxes," then "Registration Information," and finally "Exemption Certificates and Nonprofit Entities." The mailing address is PO Box 6480, Tallahassee, FL 32314-6480.

PAGE LEFT INTENTIONALLY BLANK

**SECTION 35 59 13
FLOATING MARINE FENDER SYSTEM**

PART 1 - GENERAL

1.01 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred in the text by basic designation only.

1. U.S. Department of Defense (DOD):
RR-C-271 (1995) Chains and Attachments, Welded and Weldless
2. Federal Standards (FED-STD):
PPP-C-1752B (1990) Polyethylene Plastic Foam
3. American Society for Testing and Materials (ASTM):

ASTM A 123	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 153/A 153M	Tubing
ASTM D 412	Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers – Tension
ASTM A 413/A 413M	Carbon Steel Chains
ASTM D 470	Cross linked Insulations and Jackets for Wire and Cable
ASTM D 624	Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D 885	Test Method for Tire Cords, Tire Cord Fabrics, and Industrial Filament Yarns Made from Man-Made Organic-Base Fibers
ASTM D 1052	Measuring Rubber Deterioration-Cut Growth Using Ross Flexing Apparatus
ASTM D 1630	Rubber Property - Abrasion Resistance (NBS Abrader)
ASTM D 1667	Flexible Cellular Materials-Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam)
ASTM D 2240	Rubber Property - Durometer Hardness
ASTM D 3575	Flexible Cellular Materials Made From Olefin Polymers

ASTM F 2192-02 Test Method for Determining and Reporting
the Berthing Energy and Reaction of Marine
Fenders

4. American Welding Society (AWS):
AWS D1.1 Structural Welding Code - Steel
5. PIANC – International Navigation Association
Report of WG33 Guidelines for the Design of Fender Systems

1.02 SYSTEM DESCRIPTION

The resilient, foam filled marine fenders shall be designed so that when compressed across its diameter by two parallel flat plates extending the full length and width of the fender, the fender shall absorb 180 kip-foot of energy ± 15 percent when 60 percent compressed (i.e. to a dimension of 40 percent of its original diameter) with a corresponding load of not more than 134 kips ± 15 percent at predicted energy attainment. The fender shall also be designed to withstand a sustained reaction force of 125 kips for a duration of not less than 24 hours each occurrence for at least 200 occurrences during its 10-year life

1.03 SUBMITTALS

- A. Submit the following (with Proposal Submittal):
 1. Product Data
 - a. Resilient, foam filled marine fenders;
 - b. Include dimensions, material specifications, and method of manufacture.
 - c. Test data for fender repair materials.
 - d. The manufacturer shall have an experienced engineering and production staff with more than 10 years experience in the manufacture of this product. Trelleborg, Inc manufactures an acceptable product meeting the requirements of this specification.
 - e. The manufacturer must have produced at least 500 fender units of this type with a diameter over 3 feet.
 2. Design Data (with Proposal Submittal):
 - a. Resilient, foam filled marine fenders;

- b. Submit calculations, including computer analysis and other design data.
3. Test Reports (Historical Samples with Proposal and Actual After Fabrication):
 - a. Fender compression test;
 - b. Fender cyclic-compression test;
 - c. Fender sustained-load test;
 - d. Fender pull-through test;
 - e. Elastomeric skin thickness test
 - f. Foam Core Density Test
 - g. Test reports showing that the foam core in the fender meets the minimum requirements specified in article 2.2 of this section.
 - h. Test reports showing that the elastomer used in the fenders meets the minimum requirements specified in article 2.3.1 of this section.
 - i. Test reports showing that the filament reinforcing in the fender skin meets the minimum requirements specified in article 2.3.3 of this section.
 - j. Test reports showing that the hardware used to attach the fenders meets the minimum requirements specified in article 2.3.4 of this section.
4. Anchor Plate layout templates by June 1, 2019.

1.04 QUALITY ASSURANCE

A. Elastomer Skin

The elastomer skin of the fender shall be free from cracks, burrs, warpage, checks, chipped or blistered surfaces, and shall have a smooth surface.

B. Steel Fabrication

The steel used in fabrication shall be free from kinks, sharp bends, and other conditions, which would be detrimental to the finished product. Manufacturing

processes shall not reduce the strength of the steel to a value less than intended by the design. Manufacturing processes shall be done neatly and accurately. Make bends by controlled means to insure uniformity of size and shape.

C. Foam Core

The foam core shall be homogeneous and of one piece fabricated construction and shall not be in chip or granular form. The foam core construction shall utilize only a heat-laminated process, and yield a single solid foam core. The foam core shall not contain scraps, strips, or sheets of foam either rolled or stuffed into the required shape unless pieces are bonded together in layers of uniform patterns to form a homogeneous, one piece core. Homogeneous foam rings of adequate thickness to insure performance of the fender is acceptable provided the Proposer / Supplier could show a minimum 5-year performance of similar fenders.

Tests shall be carried out on every batch of foam delivered, and shall be in accordance to ASTM D 3575 or comparable ISO methods.

All foam used shall be traceable to the manufacturer of the foam, by means of production data and lot number, or other positive means. Production/QualityControl records of the fender manufacturer shall record this information for each fender manufactured. The fender manufacturer's records must be able to trace all foam used in each fender back to the manufacturer of the foam, and identify the date the foam was manufactured and tested.

The manufacturer of the foam shall provide certified test reports for each lot of foam delivered, and the fender manufacturer must maintain these records for a period of 10 years. The fender manufacturer shall provide proof that the sufficient quantity of foam was purchased to complete this contract. The fender manufacturer shall retain samples from each lot of foam used in the fenders. The samples shall be subject to re-tests at the request of the purchaser of the fenders.

D. Welding

AWS D1.1. Welds shall be of sufficient size and shape to develop the full strength of the parts connected by the welds. Welds shall transmit stress without permanent deformation or failure when the parts connected by the weld are subjected to proof and service loadings.

1.05 DELIVERY, STORAGE, AND HANDLING

Fenders shall be undamaged when delivered and shall be handled and stored so as to prevent damage such as bending or abrading end fittings or cutting of rubber. Protect fenders from exposure to damaging liquids, oils, and greases.

1.06 WARRANTY

Furnish the manufacturer's warranty. The warranty shall be issued directly to the Customer and shall not be limited in dollar value. The warranty period shall be not less than 1 years from the date of final payment certificate or date of final installation whichever is later.

PART 2 - PRODUCTS

2.01 CONFIGURATION

- A. Fenders shall have cylindrical mid-bodies with conical or hemispherical shaped ends terminating in an end fitting on the cylinder's centerline at each end. The diameter of the mid-body shall be 60 inches minimum, and the length of the mid-body shall be 120 inches minimum. If conical ends are provided, they shall have an angle of 60 to 75 degrees, when measured from the central axis of the fender. The fittings at either end shall be connected through the center of the fender by a chain; shall terminate in a clevis fitting sized for a 1 3/4 inch shackle; and shall swivel to allow the end fitting to rotate freely on the axis of the fender. The length of the fender from eye to eye of the end fittings shall be a minimum of 168 inches. Design end fitting as small as possible to transmit the ultimate load of the shackle to the fender. End fitting shall be sized so as not to contact loading surfaces when the fender is compressed to 30 percent of its original diameter (70 percent compression). The end fitting shall be permanently affixed to the fender core with an annular casting of elastomer prior to applying the skin. Each end fittings shall not be a continuous member, however each independent end fitting shall be of sufficient length to span all but 3 feet in the center of the fender. Fill interior of the fender with energy absorbing closed-cell foam as specified. The use of chipped or particulate foam is not acceptable.
- B. Dimensional tolerance + 2% and – 0%.

2.02 FOAM CORE

The energy absorbing foam core shall be closed-cell cross-linked polyethylene foam. The foam core construction shall utilize only a heat-laminated process, and yield a single solid foam core. Use of chipped or granulated particulate foam is not acceptable. The foam shall have the minimum following properties:

- A. Density, ASTM D 1667, 7.2 to 8.8 lbs/ft³
- B. Tensile strength, ASTM D 3575 or ASTM D 412, 150 psi minimum
- C. Elongation (ultimate), ASTM D 3575 or ASTM D 412, 150 percent minimum

- D. Water absorption percent volume after 24 hour exposure, ASTM D 1667, 5.0 percent maximum
- E. Continuous service temperature, -65 to +120 degrees F
- F. 25 percent compressive set, ASTM D 1667, 8 percent maximum *
- G. 50 percent compressive set, ASTM D 3575, 12 percent maximum *

* Suppliers option: Compressive Set of foam core material shall be based on either the 25 percent or the 50 percent requirement listed.

2.03 FENDER SKIN

The outer fender skin shall be minimum 1.13 inches thick and constructed of elastomer as specified. Reinforcing is optional as required by the Supplier's design. If reinforcing is used, a minimum of ten separate filament-reinforcing wraps shall be applied as specified under Filament Wrap. The filament wraps shall be evenly distributed in the inner 75 percent to 90 percent of the coating thickness. The outer 10 percent to 25 percent of elastomer shall have no filament reinforcing. The elastomer and filaments shall be applied in a continuous manner to assure adhesion between the various layers. The connection of the skin to the end fittings shall be designed and sized to transmit twice the safe tensile capacity of the chain into the fender skin.

A. Elastomer

The elastomer used in the fender skin shall be a non-marking solvent free 100 percent PTMEG (polytetramethylene ether glycol) 2,4-toluene diisocyanate, and aromatic diamine polyether urethane elastomer, with UV inhibitors and antioxidants and shall have the following unreinforced properties:

1. Shore A. hardness, ASTM D 2240, 75 to 95.
2. Tensile strength, ASTM D 412, 2600-psi minimum.
3. Elongation (ultimate), ASTM D 412, 375 percent minimum.
4. Tear strength, ASTM D 470, 230 Lbs/inch minimum.
5. Flex life (Ross), ASTM D 1052, 243,000 cycles minimum.
6. Abrasion resistance (NBS), ASTM D 1630, 100 minimum.

B. Filament Wrap

If filament reinforcing is required by the Proposer / Supplier's design, construct each filament-reinforcing wrap of continuous filaments applied in a helical pattern, at a helix angle of 45 to 60 degrees to the longitudinal axis of the buoy. A wrap shall consist of two such filament helixes of equal but opposing helix angles. The spacing between the filaments in the same helix shall be no more than 1/8 inch, measured in a direction parallel to the longitudinal axis of the fender. Each wrap shall extend along the entire longitudinal axis of the fender and shall also encase the fender end fittings and secure them to the fender body.

C. Filament Reinforcing

If filament reinforcing is required by the Proposer / Supplier's design, the reinforcing filaments in the outer skin shall be nylon tire cord of 2540 denier weight with the following properties:

1. Breaking strength, 53 pounds
2. Elongation (ultimate), ASTM D 412, 16 percent

D. Reinforced Skin Properties: The reinforced skin, when constructed in accordance with this specification, shall exhibit the following properties when tested in accordance with the guidelines below:

1. Tensile Strength: When a full-thickness specimen of the skin is tested in tension, with the longitudinal direction of pull aligned with the filament direction (in one helix direction), the specimen shall have the following breaking strength:
2. Tensile Strength, ASTM D 412, 4,500-psi minimum
3. Elongation (Ultimate): In the test for Tensile Strength, the specimen shall have the following Ultimate elongation at break:
 - a. Elongation (ultimate), ASTM D 412, 16% minimum
4. Tear Strength: When a full-thickness specimen of the skin is tested in tear, with the specimen Shaped like Die C in ASTM D-624, and with the direction of pull aligned with the filament Direction (in one helix direction), the specimen shall have the following tear strength:
 - a. Tear strength, ASTM D 470, 450 lb/in

E. Hardware

The internal chain connecting the two end fittings shall be galvanized in accordance with ASTM A 123 or ASTM A 153/A 153M as appropriate. The chain and end clevis fitting shall have a minimum ultimate tensile capacity of 140,000 pounds. The internal chain and end clevis fitting shall have a minimum ultimate tensile capacity of 140,000 pounds. Shackles shall be 1 3/4 inches and shall have a minimum ultimate tensile capacity of 140,000 pounds. All hardware shall conform to RR-C-271. All chains shall conform to the requirements of ASTM A 413/A 413M.

F. Color

Fender skin color shall be black throughout the entire thickness. Galvanized hardware shall be unpainted.

G. Reparability

The fender casing shall be repairable in the event of tears or punctures in the elastomer skin. The repaired area shall have not less than 90 percent of the properties as specified in paragraph entitled "Elastomer." Required repair materials shall be readily available from the fender manufacturer.

2.04 SOURCE QUALITY CONTROL (By Proposer)

A. An approved independent laboratory shall conduct all testing.

1. Fender Compression Test

- a. Compress fender along its diameter between two parallel flat plate surfaces to a compressed dimension of 40 percent of its original diameter. Record load and the corresponding deflection at one-inch increments and plot as a graph of load versus deflection. The load-deflection curve shall then be integrated to generate an energy-deflection curve for the fender. The fender shall meet the energy and force performance requirements of the paragraph entitled "Performance Requirements." After compression of the fender to 40 percent of its original diameter (60 percent compression) the fender shall rebound to 90 percent of its original diameter within two minutes after the load is removed, and to 95 percent of its original diameter within 30 minutes after the load is removed.

2. Fender Cyclic-Compression Test

Compress the fender along its diameter between two parallel flat plate surfaces to a compressed dimension of 40 percent of its original diameter. Release the load and recompress as before. Repeat the compression and release cyclic loadings for a minimum of 10 full cycles of compression. Both the loading and unloading shall last one (1) minute each. A five-minute interval shall be provided between cycles. Permanent deformation, cracking, or tearing of the fender skin, fender core, or end fittings shall constitute failure of this test.

3. Fender Sustained-Load Test

- a. Apply a 125,000-pound compressive load as in paragraph entitled "Fender Compression Test," and hold this load for 24 hours. Record load and deflection each hour. Immediately after release of the load, measure rebound of the fender. Continue to record fender rebound for 24 hours.
- b. Failure of the fender or foam core to rebound to 90 percent of its original diameter after 24 hours shall constitute failure of this test.
- c. If the foam core is not bonded to the skin of the fender, devise and execute a means for measuring rebound of the foam core and for measuring the void between the foam core and the skin. The maximum rate of compression per minute shall be 20 percent of the total reaction force at 60 percent compression. The full compression cycle, not including rebound, shall take a minimum of 5 minutes.

4. Fender Pull-Through Test

- a. Devise and perform a test, which will measure the resistance of the end fittings and internal chain to pull through the longitudinal axis of the fender. Failure of the chain, end fittings, or skin to resist at least 50,000 pounds of pull-through tension shall constitute failure of this test.
- b. After loading, evidence of permanent deformation, cracking, or tearing of the fender or end fittings shall also constitute failure of this test.

5. Elastomeric Skin Thickness Test

- a. After delivery of all of the fenders to the construction site and before fender installation, perform a minimum of 3 skin thickness tests per fender for each of 4 fenders to be selected at random by the ENGINEER.
- b. The ENGINEER will select test locations on the fenders. Each test shall consist of taking a 1/2-inch diameter (minimum) to 1.0-inch diameter (maximum) core from the fender skin, which can be removed from the skin and examined for thickness of elastomer and placement of reinforcing (when reinforcing is required). Take skin thickness measurements from the core sample and record measurements noting placement of reinforcing.
- c. Where the skin thickness measurement is less than the specified minimum, or the minimum required by the Proposer / Supplier's design (whichever is greater) by more than 10 percent, reject the fender.
- d. In addition, if the average of skin thickness tests for one fender is not equal to or greater than the specified minimum, or the minimum required by the Proposer / Supplier's design (whichever is greater), reject the fender.
- e. If tested fender is rejected, at the option of the Construction Manager, the Proposer / Supplier shall then conduct thickness tests for additional fenders.
- f. Replace rejected fenders with fenders meeting the provisions of this specification.
- g. Test replacement fenders for skin thickness as specified herein. The ENGINEER will witness skin thickness tests. The Proposer / Supplier shall notify the ENGINEER 10 working days prior to conducting skin thickness tests.
- h. After skin thickness and foam core testing, patch core holes with elastomer of the same composition and thickness as the specified elastomer skin. Nylon reinforcing is not required in core hole patches.

6. Foam Core Test and Inspection

- a. During the skin thickness testing the fender shall be cored to the center of the fender (up to the internal chain). A hole saw long enough to reach the center of the fender shall be used to extract the foam sample. The fender manufacturer shall provide the ENGINEER with the appropriate hole saw to perform the test. The foam sample shall be tested at one-foot incremental depths to determine the conformance to the density requirements of this specification. Fenders with nonconforming foam shall be rejected.

After skin thickness and foam core testing, patch core holes with foam of the same density (provided by the fender manufacturer with the delivery of the fenders) and elastomer of the same composition and thickness as the specified elastomer skin. Nylon reinforcing is not required in core hole patches.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Pad-eye anchor bolts (or U-bolts) and fender anchor bolts shall be positioned and securely fastened to prevent displacement during concrete placement. Fender manufacturer shall provide anchor bolt placement template or shall provide shop drawing(s) for a Proposer / Supplier fabricated template. If the template is fabricated by the Proposer / Supplier, the Fender manufacturer's representative shall inspect and approve the template, in writing, prior to being used. Cost of template shall be borne by the Proposer / Supplier. Provide Template by June 1, 2019.
- B. Location and placement tolerances shall be as shown on fender system manufacturer's erection drawings.
- C. Fender and tension and weight chains shall be installed in strict accordance with the fender system manufacturer's instructions to prevent damage to the components and to ensure proper functioning under impact load. Fender manufacturer shall provide a field representative who shall supervise and approve the Owner's Contractor's installation of the first fender to be installed. Cost of field representative shall be borne by the Proposer / Supplier.

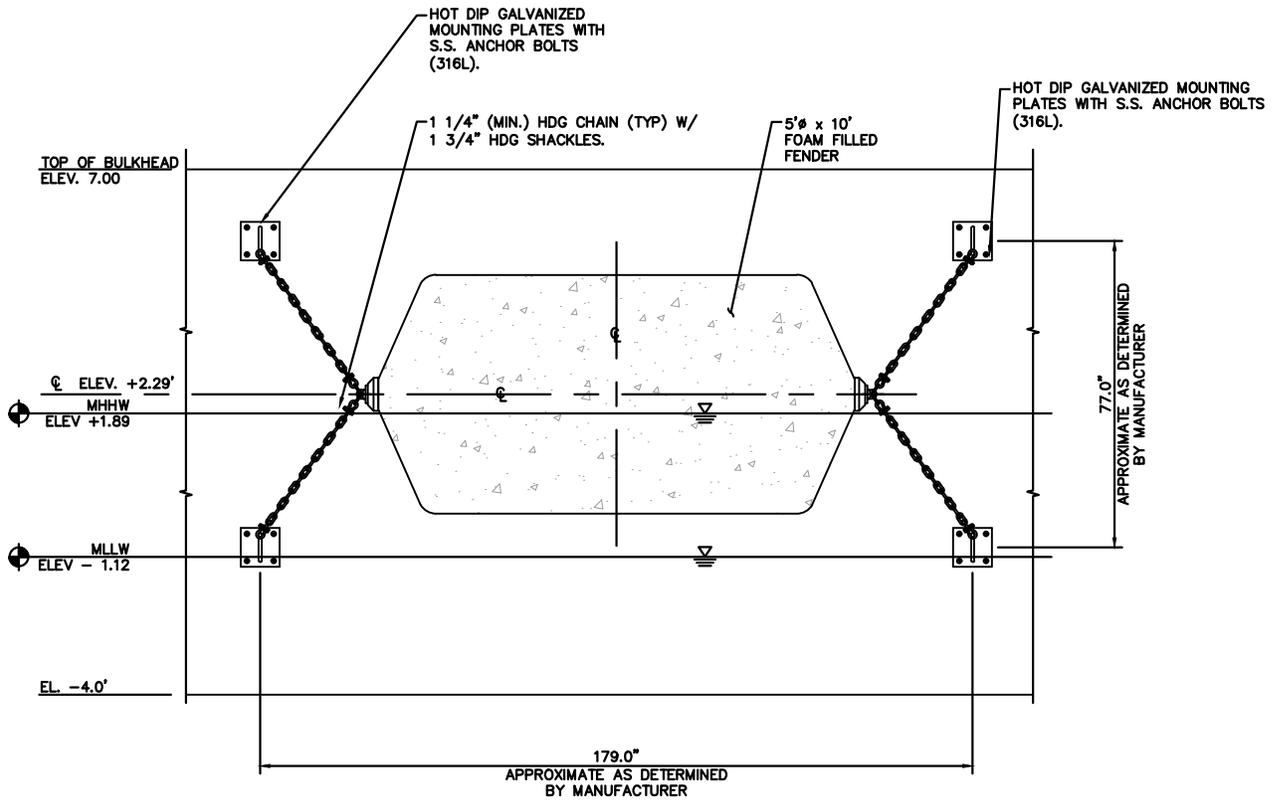
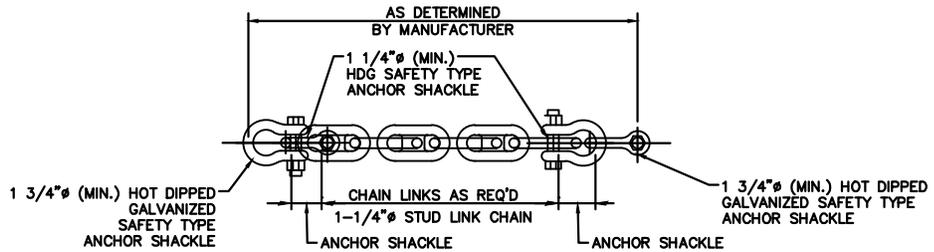
END OF SECTION

140577000 BERTH 1 BULKHEAD REPLACEMENT
ADVANCED FENDER ORDER
PORT OF PALM BEACH DISTRICT

MATERIAL ORDER RFP
MARCH 10, 2019

PAGE LEFT INTENTIONALLY BLANK

Drawing name: K:\WPB_Civil Structures\Port of Palm Beach\140577000-Berth 1 Replacement\CAD\Fender Bid Package\SKETCH-1_Fender.dwg Layout1 Mar 08, 2019 9:32am by: anne.graves
 This document, together with the concepts and designs presented herein, as an instrument of service, is intended only for the specific purpose and client for which it was prepared. Reuse of and improper reliance on this document without written authorization and adaptation by Kimley-Horn and Associates, Inc. shall be without liability to Kimley-Horn and Associates, Inc.



PROPOSER TO PROVIDE FLOATING FENDERS SHIPPED TO PORT OF PALM BEACH INCLUDING BUT NOT LIMITED TO FENDERS, CHAINS, MOUNTING PLATES, AN ANCHOR BOLTS.

1
SK-1

FENDER DETAIL

SCALE: NTS

SCALE
DESIGNED BY J.C. LONG
DRAWN BY A. GRAVES
CHECKED BY J.C. LONG

Kimley»Horn

© 2019 KIMLEY-HORN AND ASSOCIATES, INC.
 1920 WEKIVA WAY SUITE 200, WEST PALM BEACH, FL 33411
 PHONE (561) 845-0665 FAX (561) 863-8175
 WWW.KIMLEY-HORN.COM CA 00000696

PROJECT NO. 140577000

**BERTH 1
 ADVANCED FENDER ORDER**
 PREPARED FOR
 PORT OF PALM BEACH

DESIGN ENGINEER: JCL
FLORIDA P.E. LICENSE NUMBER:
DATE: 03/10/19

SHEET NUMBER SK-1
