

SPECIAL PROVISIONS
SECTION 531
 MARINE STRUCTURES

531.01 Description This work shall comprise the, detailing, fabrication, delivery and installation of marine components, structures, and corresponding elements in accordance with the Plans and Specifications. All requirements in this specification are the responsibility of the Contractor, unless otherwise noted.

Facilities Quality Control Plan shall be administered by a Certified Welding Inspector (CWI) for welding and National Associate of Corrosion Engineers (NACE) II for coatings or by other individuals approved by the Fabrication Engineer.

531.02 Materials All materials shall comply with the requirements of the respective Subsections of this Specification.

531.03 General Specifications The specifications for marine elements are as follows:

Moorings	Subsections 531.50 through 531.59
Gangways	Subsections 531.60 through 531.69
Fenders	Subsections 531.70 through 531.79

531.04 Inspections Quality Control (QC) is the responsibility of the Contractor. Inspect all aspects of the Work and supervise all nondestructive examination (NDE). Record measurements and test results in a clear and legible manner. Reject materials and workmanship that do not meet contract requirements. The Contractor may perform NDE in addition to the minimum required. Make the results of all measurements and testing available to the Quality Assurance Inspector (QAI).

531.05 Notice of Beginning of Work The Contractor shall provide the Department a minimum of a two week notice for in-Maine work and a three week notice for out-of-Maine work, prior to beginning production. If the production schedule changes, notify the Fabrication Engineer no less than three working days prior to the initial start-up date. Any Work done without the QAI present will be rejected. Advise the Fabrication Engineer of the production schedule and any changes to it. If Work is suspended on a project, the Fabrication Engineer will require 72 hours' notice prior to the resumption of Work.

Office facilities for the QA staff shall meet the requirements of Standard Specification Section 504.09, Facility Inspection.

MOORINGS

531.50 Description Provide all labor, materials, equipment, and supervision necessary for the installation of mooring devices and chocks.

531.51 Materials The materials shall meet the requirements of the following Sections of the Standard Specifications and Special Provisions:

Concrete	502 Class LP
Coating	506 Zinc-Rich Coating

Anchor Rods	720.07
Mooring Hardware	731.01
Polyurethane (self-leveling)	731.02
Polyurethane (non-sag)	731.03

The mooring hardware shall have a high chemical-resistant coating suitable for severe marine exposure. Coating shall conform to Standard Specification Section 506 – Shop Applied Protective Coating – Steel. provide the coating system to ensure compatibility between coats and quality control of the final product.

Mooring Tackle shall comprise a concrete (or granite) anchor block, chains, shackles, and mooring ball.

531.52 Submittals Submit the following for review and approval prior to ordering any materials:

For Mooring Hardware:

1. Product Data: Indicate the make, model, certified load capacity with directions of load indicated, method and orientation of installation, and size, type, and location of fasteners for the mooring device. Indicate the paint coating system. Illustrate dimensions and thicknesses of components via manufacturer cut sheets.

For Mooring Tackle:

1. Product Data and Illustration: Indicate the size and length of components and certified load capacity of steel chains and elements. Illustrate in cross-section views the maximum radius of the mooring ball at extreme tidal elevations. Illustrate dimensions and thicknesses of components via manufacturer cut sheets.

531.53 Design Mooring Hardware and associated anchorages shall be designed to withstand the loads provided in the Contract Plans. The factor of safety against yielding shall be a minimum of 3.0. The manufacturer of the mooring device shall indicate the size (diameter) and length of the anchor rod necessary to achieve the capacity of the mooring device.

Mooring Tackle shall be designed to withstand the intended design vessel as noted on the Plans at extreme tidal elevations: Mean Lower Low Water (MLLW) minus 2 ft and Mean Higher High Water (MHHW) plus 2 ft based on tidal elevations listed at the closest National Oceanic and Atmospheric Administration (NOAA) Tidal Station to the project site. Wave, wind, and current forces shall be included in the design of the mooring tackle components with a factor of safety no less than 3.0.

531.56 Installation Anchor bolts shall be of the size, type and location as recommended by the mooring hardware manufacturer. Where existing mooring hardware is to be used, the size, location, and embedment of the anchor bolts shall be as detailed on the Plans. Contractor shall verify bolt size and spacing for new and existing mooring devices. Anchor bolts and sleeves shall be held in place with templates that match bollard manufacturer's bolt pattern. Templates shall ensure proper location of bolts and sleeves during placement of concrete.

Prior to placement of concrete, areas of mooring hardware shall be formed out of the concrete pour. Contractor shall verify orientation. Just prior to setting of each mooring device, a bed of high-strength, non-shrink grout shall be placed to seal mooring hardware into position. Contractor shall ensure no voids are created beneath the mooring hardware. After mooring hardware is set and tightened down, excess grout shall be removed.

Fill the anchor bolt holes using a one-part self-leveling polyurethane sealant to create a meniscus of material.

Seal the perimeter of the mooring device at the concrete interface with a one-part non-sag polyurethane elastomeric sealant.

ALUMINUM GANGWAYS

531.60 Description This work shall consist of furnishing all labor, materials, equipment, transportation and incidentals required to assemble and install aluminum gangways, complete, as shown on the Contract Plans to include anchor bolts, nuts, washers, transition plates, shims, and all other hardware required to construct gangways in accordance with these Specifications and shown on the Plans.

531.61 Materials All materials shall conform to the following:

Stainless Steel	711.12
Aluminum	716.01
UHMW-Polyethylene	731.04
MDS-Nylon	731.05

Gangways and their secondary components shall be fabricated of ASTM B221, Aluminum Alloy 6061-T6 or 6063-T5. Secondary fabricated components shall consist of handrails, treadplates, kick plates, hinges, and anchor plates.

All fastener bolts and studs shall be stainless steel ASTM F593, Type 316. Fastener nuts and washers shall be ASTM F594, Type 316.

When rollers are provided at the free end of the gangway, they shall be fabricated of UHMW-Polyethylene or a MDS Nylon material.

531.62 Submittals Submit the following for review and approval prior to ordering any materials:

1. Shop Drawings: Illustrate dimensions and thicknesses of all components. Drawings shall be signed and stamped by a professional engineer licensed in the State of Maine.
2. Product Data: Indicate the make and model of the gangway unless custom-fabricated and its load carrying capability. Provide a maintenance manual listing regularly schedule maintenance activities to be performed by the owner.

3. Material Certifications: Aluminum, stainless steel, and UHMW-Polyethylene.
4. Certificate of Conformance: Manufacturer shall provide written documentation of product conformance in the form of a written certificate. Also, a metal name tag shall be affixed to the side of the gangway within 3 ft from the end of rail in a conspicuous location with manufacturer's contact information and live load capacity.
5. Design Calculations: Computations indicating conformance to the design loads shown on the Contract Plans and within these Specifications. Calculations shall be signed and stamped by a professional engineer licensed in the State of Maine.
6. Quality Control Plan
7. Welding Procedures

531.63 Design The aluminum gangway shall be designed to the current edition of *The Aluminum Association Specifications and Guide for Aluminum Structures*. The design of aluminum gangways shall meet the criteria noted below and as indicated on the Contract Plans. The designer shall consider the environmental forces and effects associated with the marine environment specific to the site including the extreme conditions of wind and wave forces.

General Gangway:

1. The Plans will illustrate and identify the following attributes based on the marine environmental condition and the intended functionality of the gangway:
 - i. Vertical live load requirements (minimum 85 lbs/ft²).
 - ii. ADA compliance features.
 - iii. Overall dimensions including width, clear width (between handrails), and length.
2. The length of the gangway shall be designed to accommodate the full range of tidal conditions from MLLW minus 2 ft to MHHW plus 2 ft in accordance with the closest NOAA Tidal Station data. Accommodation of this tidal range shall mean that a 4 ft by 4 ft landing is maintained at each end of the gangway during the extreme tidal range noted above.
3. The maximum deflection shall not exceed L/180 where L is the length of the gangway in inches.
4. Handrail Horizontal Load - Handrails shall be capable of withstanding a 200-pound concentrated horizontal load applied at the top of the railing.
5. Handrail Vertical Load - Handrails shall be capable of withstanding a 50-pound per-foot vertical loading applied at the top of the railing.

Provisions shall be made for supporting utilities beneath or alongside the gangway when required by Contract. Hangers shall be the sizes, shapes, and lengths sufficient for their intended use and hot-dipped galvanized in accordance with ASTM A123. Protection from galvanic reaction of dissimilar metals shall be provided.

The walkway surface shall be comprised of planks with perforations to provide an integral non-skid surface. The use of cross-cleats or other mechanical devices to achieve non-skid capacity shall only be allowed when specifically called for on the plans.

Handrail height shall be 34 inches (min.) to 42 inches (max.) from the top of deck. When the top rail of the gangway also serves as the handrail, the top rail shall be round, schedule 40 aluminum pipe of no less than 2-inch diameter. The handrail shall extend a minimum of 12 inches past the walking surface of the gangway at both ends.

When specified on the Plans, a continuous kick plate shall be installed along the edge of the walking surface along the bottom of each railing on the inside faces. The plates shall be 1/4 inch x 3 inches flat bar.

Transition plates shall be installed at the ends of the gangway using piano-style hinges. The transition plate dimensions shall be 1/4 inches x 48 inches wide by 24 inches long with a non-slip surface. The hinged end of the gangway (hinge and latch) shall be designed and detailed by the manufacturer to conform to the load requirements and schematics given and shown in the Contract Plans, including the details for attachment to the gangway support structure.

The roller at the free end of the gangway shall be 3-inch minimum diameter and the full width of the gangway unless otherwise dimensioned on the Contract Plans.

All bolts, nuts, and washers shall be as indicated on the shop drawings, or if not so indicated, shall be of sizes, shapes and lengths sufficient for their intended uses and shall be stainless steel.

531.64 Fabrication All components of the gangway shall be shop fabricated and assembled in accordance with the details shown on the Contract Plans. Welded components of Aluminum gangways shall be performed by experienced operators in accordance with *ANSI/AWS D1.2-97* using the gas metal arc welding process. All exposed surfaces and their welded joints shall be smooth and free of sharp or jagged edges.

531.66 Delivery Gangways shall be delivered, handled, and stored to prevent damage. Place the gangway on level dunnage to avoid warping. Protect transition plates, anchorage plates, and rollers.

531.67 Installation Gangways shall be installed level in the transverse direction and anchored at one end in accordance with the Plans. Anchorages shall be comprised of bolted connections in oversized slotted holes to permit longitudinal expansion and contraction. The free end of the gangway shall be vertically supported yet confined horizontally using guide plates or a recessed pocket if indicated on the plans.

FENDERS

531.70 Description This work shall consist of the manufacture, delivery, and installation of fenders of the types and dimensions and at the locations shown on the Contract Plans. Fender systems may include steel panels with UHMW surfaces, rubber buckling elements, chains, spacers, and anchorage hardware or Elastomeric Arch and D-Fenders.

531.71 Materials All materials shall meet the requirements of the following sections of The Standard Specifications and Special Provisions.

Coating	506 Zinc-Rich Coating
Structural Steel	713.01
Anchor Rods	720.07
UHMW- Polyethylene	731.04
Ethylene Propylene Dimonomer (EPDM), rubber	731.06

The steel fender panels shall have a minimum yield strength of 50 ksi and all welding shall be in accordance with the latest version of the AWS D1.1 standard. Steel for brackets and miscellaneous steel items shall be of structural steel conforming to ASTM Standard A36 or stronger and shall be of the shape, size and details indicated or suitable for the purposes.

The steel fender panels shall have a high chemical-resistant coating suitable for severe marine exposure. Coating shall conform to Standard Specification Section 506 – Shop Applied Protective Coating – Steel. The coating shall be a three-coat Zinc-Rich Coating of no less than 18 mils DFT: two coats of 8 mils minimum per coat, and top-coated with polyurethane of 2 mils minimum. Surface preparation shall be SSPC-SP10 with an anchor profile of 2.5 mils to 4.0 mils. One manufacturer shall provide the coating system to ensure compatibility between coats and quality control of the final product.

The rubber for the proposed fender shall be vulcanized, natural, synthetic or a mixture. The fender(s) shall be reinforced with carbon black and resistant to aging, ozone, temperature extremes, marine growth, seawater, abrasion, and ultraviolet rays.

The rubber is to be homogenous in quality and free from foreign materials, bubbles, tears, cracks and other harmful defects. The unvulcanized rubber compound used to mold the fenders must be produced specifically for this project. Only virgin rubber shall be used to manufacture the fenders. Manufacturer shall submit a certificate of conformance stating the unvulcanized rubber used meets this requirement.

The embedded steel plates are to be firmly bonded into the rubber body through the process of vulcanization, and completely encapsulated so that no steel is exposed except where female bolting nuts are present.

All steel chains shall be hot-dipped galvanized, Grade 3, Stud-Link Chains. Pad eyes, U-bolts, and shackles shall be hot-dipped galvanized G2130. Bolts shall be anchored into the existing concrete and secured with epoxy anchoring material. Epoxy material shall be a product that is on the MaineDOT Qualified Products List for “Epoxy and Resin Based Adhesive Bonding Systems” suitable for a marine environment and capable of sustaining the specified loads. Fenders shall be provided with templates for setting anchor bolts.

All fasteners between the steel fender panel and the rubber fender elements, and between the rubber fender elements and the mounting substrate shall be stainless steel ASTM A240, Type 316 unless otherwise noted on the plans.

531.72 Submittals Submit the following for review and approval prior to ordering any materials:

1. Shop Drawings: Illustrate dimensions, arrangement, and thicknesses of all components. For steel fender panels, illustrate internal stiffeners, wearing surfaces, chains, anchorages,

and hardware. Drawings shall be signed and stamped by a professional engineer licensed in the State of Maine.

2. **Product Data:** Indicate the make, model, and certified energy rating capacity for the rubber buckling fenders. Indicate the coating system and UHMW materials for steel fender panels. Indicate the mounting hardware components. Provide catalog data sheets for the coating system.
3. **Material Certifications & Test Certificates:** Rubber fenders, steel, chains, shackles, U-bolts, pad eyes, anchor bolts, epoxy resins, and UHMW.
4. **Certificate of Conformance:** Performance of the fender system to absorb the design berthing energy. Pressure test report of the steel closed-box fender panel.
5. **Design Calculations:** Computations indicating conformance to the design energy shown on the Contract Plans. For rubber fenders, provide energy compression curves. For steel fender panels, provide structural calculations indicating conformance to the design loads and locations shown on the Contract Plans. Calculations shall be signed and stamped by a professional engineer licensed in the State of Maine.
6. **Material Safety Data Sheets:** Paint coating system.
7. **Quality Control Plan- Coating and Welding**
8. **Welding Procedures.**
9. **Manufacturer's Documentation:** Provide qualification package which supports 15 years of manufacturing experience of rubber fender elements for the marine industry, and satisfactory proof of past performance of similar applications. Provide instructions for the handling, assembly, and installation of materials and elements. Provide qualifications and certifications of the individuals performing welding procedures.
10. **Warranty Certification:** Rubber fenders.

531.73 Design The fender system shall be designed to withstand the berthing energies and forces noted on the Contract Plans. Berthing energies shall be listed in kip-ft. The manufacturer shall review the design criteria shown on the Contract Plans regarding the vessel characteristics, berthing requirements, and minimum standoff requirements prior to designing and submitting the panel shop drawings and material specifications.

The fender panel shall be of the closed-box type and be rectangular in shape as shown on the Contract plans with a vertical height and horizontal width as illustrated. If the fender panel is beveled along its perimeter, only the flat frontal area of the panel that contacts the vessel shall be considered when calculating the hull pressure. The panel shall be designed and constructed according to the AISC Steel Construction Manual Specifications 15th edition.

The fender panel shall also be designed to include all possible loads imparted by the vessel including but not be limited to line loads at the extreme top and extreme bottom of the flat portion of the panel to represent tidal variations, storm surges, and vessel movements. The weight of the panel with the UHMW-PE wearing surface shall not exceed the load limitation noted on the plans.

The proposed chains, shackles, pad eyes (or U-bolts, or “dog-bones”), and hardware shall prevent excessive shear and weight-induced deflection of the existing fenders. The proposed chains are

identified by the anticipated minimum link-counts, and the Contractor shall field verify the actual number of chain links (length) required prior to ordering and purchase. All chains are mandatory and must be included in the design. Chain capacities shall have a minimum factor of safety of 2. Pad eye anchor bolts shall be of the prescribed strength and size and installed to the depths shown on the Contract Plans. The hole diameter for the anchor bolts shall be in accordance with the recommendations of the epoxy manufacturer to achieve 125% of the design tensile strength of the bolt.

The UHMW-PE wearing surface shall be comprised of individual plates which cover the full face of the fender panel including the faces of beveled panels along its perimeter. The plates shall be a minimum of 1 1/2 inches thick and black in color unless otherwise noted on the Contract Plans. The plates shall be fastened to the fender panel using stainless steel hex-head bolts and washers that are counter sunk into the plate as shown on the Plans. The UHMW wearing pads on the front face of the fender panels shall be drilled and counter bored for the studs or mounting bolts. The counter bored hole shall leave a minimum of 1/2-inch of material between the panel and the washer. The wear surface shall be a minimum of 1/2-inch. All mounting studs (or bolts) shall be a minimum of 5/8-inch diameter. All studs, bolts, washers, and nuts shall be Alloy 316 stainless steel. All exposed edges of the UHMW shall include 3/4-inch by 3/4-inch chamfers. A gap of 1/4-inch min. to 1/2-inch max. shall be maintained between plates throughout the wearing surface.

531.74 Fabrication Steel fender panels shall be fabricated to the grades and dimensions shown on the Contract Plans and the requirements of Standard Specification Section 504, Structural Steel. Do not substitute material without the approval of the Fabrication Engineer. All external welds shall be seal-welds to prevent corrosion. All exposed surfaces and their welded joints shall be smooth and free of sharp or jagged edges. All bolt holes shall be drilled or punched. The manufacturer is to supply current welding procedures as well as individual welder qualifications and certifications as part of their submittal documentation.

Rubber fenders include leg fenders, conical fenders, arch fenders, and D-fenders used behind steel fender panels or individually as illustrated in the Contract Plans. Leg fenders, arch fenders, and D-fenders shall be extruded and continuous in length as indicated. Conical fenders shall be manufactured as one single unit.

The Contractor shall warranty and guarantee that the fender panel including the steel panels, UHMW-PE facing, the rubber elements and all connection hardware meets or exceeds the material and performance criteria specified and shall be free of defects in construction and/or materials for a period of two years from the date of Physical Work Complete. Should any warranty defects be found within this period, the Contractor shall be required to repair all defects at no additional cost to the Department.

531.75 Delivery Steel fender panels and rubber fender elements shall be delivered, handled, and stored to prevent damage. Steel fender panels shall be protected from construction activities which may damage the paint coating or gouge the UHMW wearing surfaces. Rubber fenders shall be protected from bending or abrading of end fittings, cutting of rubber, or damage to coating of hardware. Protect rubber fenders from exposure to damaging liquids, oils, greases and extended exposure to sunlight.

531.76 Installation Install the fender system in the position indicated on the Plans.

For proposed rubber buckling leg and conical fenders, attach the fender to the back of the steel fender panel and position the assembly in the location shown on the Plans. Mark the hole locations on the dolphin and then reposition the assembly to the side to enable clean drilling. Pre-drill holes into the mounting surface prior to attachment.

Fasteners between the rubber buckling fender and the steel fender panel (if present), and anchorages between the rubber buckling fender and the mounted surface shall be stainless steel ASTM A240, Type 316. Use an anti-seize compound to coat threads of bolts prior to installing all hardware.

Pad eyes shall be installed simultaneously and integrally with the steel reinforcement. Layout of the pad eyes shall be prepared in accordance with the Plans prior to concrete placement.

Care shall be taken to secure all fender units with required hardware without sagging or distortion. Installation shall include chains, spacers and attachment to fenders as indicated.

531.77 Special Testing The Contractor shall perform special tests on the following components.

Steel Fender Panels: Pressure testing shall be performed to ensure an air and watertight seal. Pressure test results must be provided to the approval engineer prior to delivery of the panels.

Anchors drilled and grouted shall be tested for pull-out strength. Anchors that fracture shall be replaced by drilling and installing a new anchor approximately 6-inches away laterally from the broken one. Anchors that fail, may be replaced by a new anchor using the same hole, provided depth and diameter requirements are achieved, as approved by the Resident.

531.90 Method of Measurement

Mooring Hardware will be measured for payment by each unit in place and accepted.

Mooring Hardware Clean and Recoat will be measured for payment by each unit that is blast-cleaned and coated.

Mooring Tackle will be measured for payment by each unit fully assembled and installed. The chains, shackles, and mooring ball shall be incidental to this item.

Mooring Block will be measured for payment by each unit fully furnished and installed. Concrete anchor block (or granite block) shall comprise this item.

Aluminum Gangways will be measured for payment by each unit in place and accepted. Anchorage connections and transition plates shall be incidental to the Aluminum Gangway pay item.

Aluminum Gangway Guides will be measured for payment by each pair in place and accepted.

Steel Closed-Box Fender Panel will be measured for payment by each unit in place and accepted.

Steel Closed-Box Fender Panel Fully Furnished will be measured for payment by the lump sum in place and accepted.

Steel Chains, Shackles, and Pad Eyes will be measured for payment by each unit in place and accepted. The length and size of steel chains and shackles shall be as noted on the Plans.

Elastomeric Leg and Conical Fenders will be measured for payment by each unit in place in and accepted.

Elastomeric Arch and D-Fenders will be measured for payment by the linear foot in place and accepted.

531.91 Basis of Payment

Mooring Hardware shall be paid for at the Contract unit price, which shall be full compensation for all materials, equipment, labor, and incidentals necessary for furnishing and installing the mooring hardware as shown on the Plans. Payment shall include concrete fill materials placed inside the mooring device, anchorage hardware, coatings, and sealants.

Mooring Tackle shall be paid for at the Contract lump sum price, which shall be full compensation for all materials, equipment, labor and incidentals necessary for furnishing and installing the mooring tackle as shown on the Plans. Payment shall include pad eyes, chains, shackles, and mooring balls.

Mooring Block shall be paid for at the Contract lump sum price, which shall be full compensation for all materials, equipment, labor and incidentals necessary for furnishing and installing the mooring block as shown on the Plans. Payment shall include a concrete (or granite) anchor block,

Aluminum Gangways will be paid for at the Contract unit price and shall include all labor, materials, incidentals, and equipment necessary to satisfactorily complete the work in accordance with the Plans and Specifications. Payment shall include fabrication, delivery and installation of the gangways, transition plates, and connections. Installation shall include all hardware to fasten, secure, and level the gangway(s).

Aluminum Gangway Guides will be paid for at the Contract unit price per pair and shall include all labor, materials, incidentals, and equipment necessary to satisfactorily complete the work in accordance with the Plans and Specifications.

Fender Panel, Steel Closed-Box will be paid for at the Contract unit price for the respective Contract items which shall be full compensation for all labor, materials, incidentals, and equipment necessary to satisfactorily complete the work in accordance with the Plans and Specifications. Basis of payment shall include all coatings, threaded inserts and studs, and UHMW-PE wearing surfaces.

Fender Panel, Steel Closed-Box Fully Furnished will be paid for by the Contract lump sum price for the respective Contract items which shall be full compensation for all labor, materials, incidentals, and equipment necessary to satisfactorily complete the work in accordance with the Plans and Specifications. Basis of payment shall include all steel fender panels, coatings, threaded inserts and studs, UHMW-Polyethylene wearing surfaces, rubber buckling fender elements, chains, shackles, and pad eyes.

Steel Chains, Shackles, and Pad Eyes when individual pay items are provided in the schedule of items, these items will be paid for at the Contract unit price for the respective Contract items. Payment shall be full compensation for all labor, materials, incidentals, and equipment necessary

to satisfactorily complete the work in accordance with the Plans and Specifications. Installation of Pad Eyes shall entail drilling of the concrete hole, hole cleaning, and anchor materials. If no individual item is provided, the item shall be considered incidental to the Fender panel item.

Elastomeric Leg and Conical Fenders will be paid for at the Contract unit price. Payment shall be full compensation for fabrication, delivery and installation, including all labor, materials and equipment necessary to complete the work.

Elastomeric Arch and D-Fenders will be paid for at the Contract linear foot. Payment shall be full compensation for fabrication, delivery and installation, including all labor, materials and equipment necessary to complete the work.

Cathodic Protection by Sacrificial Anodes will be paid for under Pay Item 655.501, Cathodic Protection by Sacrificial Anodes.

Payment will be made under:

<u>Pay Items</u>	<u>Pay Unit</u>
531.9501 Mooring Hardware – Bollards	Each
531.9511 Mooring Hardware – Cleats	Each
531.9521 Mooring Hardware – Double Bitts	Each
531.9531 Mooring Hardware – Chocks	Each
531.9541 Mooring Hardware – Clean and Recoat	Each
531.9551 Mooring Tackle	Each
531.9561 Mooring Block	Each
531.9601 Aluminum Gangway (xx LF)	Each
531.9611 Aluminum Gangway Guides	Each
531.9701 Fender Panel, Steel Closed-Box	Each
531.9702 Fender Panel, Steel Closed-Box Fully Furnished	Lump Sum
531.9711 Steel Chains	Each
531.9715 Steel Shackles	Each
531.9719 Steel Pad Eyes	Each
531.9721 Elastomeric Leg Fenders	Each
531.9731 Elastomeric Conical Fenders	Each
531.9741 Elastomeric Arch Fenders	Linear Foot
531.9751 Elastomeric D-Fenders	Linear Foot