TECHNICAL SPECIFICATIONS

1.0 STRUCTURAL AND MISCELLANEOUS STEEL
All structural steel shall be furnished as required by the Contract Drawings and as incidental and necessary to complete the work, even if not shown on the drawings. The Contractor shall furnish all labor, materials, tool, and equipment necessary for the fabrication and erection of all structural steel in accordance with the plans, including but not limited to piles, plates, bolts, and miscellaneous items. All materials shall be new stock, free from mill scale and rust, and shall be straight and free, from deformations.

1.1 Submittals
Coordinate submittal preparation with construction, fabrication, other submittal, and activities that require sequential operation. Transmit in advance of construction operation to avoid delay. No extension of Contract Time will be authorized because of failure to transmit submittals sufficiently in advance of the Work to permit processing.

1.2 Shop Drawings Detailing Fabrication of Structural Steel Components
  1.2.1 Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  1.2.2 Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
  1.2.3 Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify high strength bolts and machine bolts.

1.3 Mill test reports signed by manufacturers certifying that their products, including the following:
  1.3.1 Structural steel, including chemical and physical properties;
  1.3.2 Bolts, nuts, and washers, including mechanical and chemical analysis;
  1.3.3 Shop primers;
  1.3.4 Non-shrink (shrinkage-resistance) grout.

1.4 Comply with application provisions of the following specifications and documents:
  1.4.1 AISC specifications for Structural Steel Buildings, Allowable Stress Design (ASD) and Load and Resistance Factor Design (LRFD).
  1.4.2 Research Council on Structural Connections “Specification for Structural Joints Using ASTM A325 or A490 Bolts.”

1.5 Welding Standard: Comply with applicable provisions of AWSD1.1 “Structural Welding Code-Steel.”
  1.5.1 Present evidence that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has, undergone recertification.

1.6 Delivery, Storage, and Handling
  1.6.1 Deliver structural steel to Project Site in such quantities and at such times to ensure continuity of installation.
  1.6.2 Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Project steel members and packaged member from erosion and deterioration.
    a. Store fasteners in a protected place. Clean and lubricate bolts and nuts that become dry or rusty before use.
b. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair to replace damaged materials or structures as directed.

1.7 Materials

Steel members shall confirm to the following:

1.7.1 Structural steel shapes, plates, and bars: ASTM A36.

1.7.2 Anchor bolts, bolts, nuts and washers: ASTM, A307, Grade A; carbon-steel, hex-head bolts, carbon-steel nuts, unhardened steel washer.

1.8 Steel Members

1.8.1 Steel Piles: HP12 x 63, grade A36 steel, 80 feet long. Whalers: HP12 x 63, grade A36 steel, 15 feet long.

1.8.2 Steel connectors, are made of A36 steel plates and hot rolled angles, galvanized.

1.8.3 Bolts:

a. All anchor bolts installed in concrete shall be adhesive type anchor bolts. Acceptible products are HIT RE 500 epoxy anchors by Hilti North America, Chem-stud or Hammer-Capsule by Powers Fasteners or pre-approved substitution. All bolts or threaded rods, nuts and washers shall be zinc-plated or stainless steel.

b. Other bolts and mechanical fasteners shall confirm to A307 and shall be galvanized.

1.8.4 Restraint chain assemblies shall be galvanized and shall have 40,000 lb working tension capacity or 80,000 lb ultimate tension capacity.

2.0 PRIMER AND FINISH COATINGS

2.1 Primer shall be lead- and chromate-free, nonasphaltic, and rust inhibiting.

2.2 Galvanizing repair paint: High zinc-dust-content paint shall be used for regalvanizing welds and repair damaged galvanized steel. The primer shall contain at least 93% by weight zinc dust.

2.3 Primer shall comply with DOD-P-21035A or SSPC Paint 20.

2.4 All coating materials shall be furnished in unopened, clearly identifiable containers.

2.5 Epoxy coating shall not be applied at temperatures below 50 degrees F. Painting will be permitted when air or steel temperature is between 40 degree F and 100 degree F. Surface of steel must be dry.

2.6 Finish Film Thickness

2.6.1 All coating film thickness must be adhered to strictly. The film thickness may be checked by the Engineer using a calibrated film thickness gauge.

2.6.2 The final coat will be checked for holidays over entire surface. A holiday detector set at the resistance determine by the paint manufacturer for proper film thickness will be used for checking.

2.6.3 Contractor may use any of the approved paint systems listed below. Requests for substitutions should be made in writing to the Engineer, fully describing the alternate system, prior to its use.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Primer</th>
<th>Top Coat</th>
<th>Dry Film Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern Imperial</td>
<td>—</td>
<td>1225 Reactar</td>
<td>16 mils</td>
</tr>
</tbody>
</table>
3.0 **GROUT**

3.1 Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C404, Size No. 2. Mix at ratio of 1 part cement to 2.5 parts sand, by volume, with minimum water required for placement and hydration.

3.2 Non-metallic, Shrinkage-Resistant Grout: premixed, non-metallic, non-corrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage compensating agents, water-reducing agents, complying with ASTM C 1107, of consistency suitable for application, and a 30-minute working time.

4.0 **FABRICATION**

4.1 Fabricate and assemble structural steel in shop to greatest extent possible. Fabricate structural steel according to AISC Specifications.

4.1.1 Mark and mach-mark materials for field assembly.

4.1.2 Fabricate for delivery a sequence that will expedite erection and minimize field handling of structural steel.

4.1.3 Complete structural steel assemblies, including welding of units, before starting shop priming operations.


4.2 Thermal Cutting: Perform thermal cutting by machine' to greatest extent possible. Plane thermally cut edges to be welded.

4.3 Finishing: Accurately mill ends of columns and other members transmitting loads in bearing.

4.4 Holes: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members.

4.4.1 Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

4.4.2 Weld threaded nuts to framing and other specialty items as indicated to receive work.

5.0 **SHOP PRIMING**

5.1 Shop prime steel surfaces, except the following:

5.1.1 Surfaces embedded in concrete and mortar. Extend priming of partially embedded members to a depth of two (2”) inches.

5.1.2 Surfaces to be field welded.

5.1.3 Galvanized surfaces.

5.2 Surface Preparation: Except otherwise specified, all exterior surfaces shall be sandblasted to "near white" metal per SSPC-SP-10 and shall demonstrate an anchor pattern of 1-1.5 mils peak to valley profile.

5.3 Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils or the minimum
thickness required for elements exposed to marine environments especially at the splash zone. Use priming methods that results in full coverage of joints, corners, edges, and exposed surfaces.

5.3.1 Stripe paint corners, crevices, bolts, welds, and sharp edges.

5.3.2 Apply two coats of shop paint to inaccessible surfaces after assembly or erection.

5.3.3 Change color of second coat to distinguish it from first.

6.0 GALVANIZING
6.1 Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to all structural steel except stainless steel according to ASTM A123.

7.0 SOURCE QUALITY CONTROL
7.1 Contractor will engage an independent testing and inspecting agency to perform shop inspections and tests and prepare test reports.

7.1.1 Testing agency will conduct and interpret tests and state in each report, whether test specimens comply with or deviate from requirements.

7.1.2 Provide testing agency with access to places where structural steel work is being fabricated or produced so required inspection and testing can be accomplished.

7.2 Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

7.3 Additional testing, at the contractor's expenses, will be performed to determine compliance of corrected work with specified requirements.

7.4 In addition to visual inspection, shop-welded connections will be inspected and tested according to AWS D1.1 and the inspection procedures listed below, at testing agency's option.

7.4.1 Liquid Penetrant Inspection: ASTM E165.

7.4.2 Magnetic Particle Inspection: ASTM E709: performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.

7.4.3 Radiographic Inspection: ASTM E94 and ASTM E142; minimum quality level "2-2T."

7.4.4 Ultrasonic inspection: ASTM E 164.

8.0 ERECTION
8.1 Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Building and Bridges."

8.2 The minimum length of H-pile between splices shall be twenty (20 ft) feet.

8.3 In any plane critical- to field assembly, the horizontal distance from the centerline of any column to the centerline of the adjacent column in any direction shall be within a tolerance of +1/4 inch of the net drawing dimension.

8.4 The angle between a taut line stretched from a column to the next column on one side of the structure and a taut line from the same column to the other column shall be within one minute of the angle indicated on the drawing. Every practical effort shall be exerted to effect accuracy in column, location horizontally at all planes.

8.5 Alignment of columns shall maintain within 1/4 inch. All fabrication shall proceed on a flat and level surface.
8.6 Splice members only where indicated.
8.7 Do not use thermal cutting during erection.
8.8 Do not enlarge unfit holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts.

9.0 STEEL PILES
9.1 All steel piles shall be made of hot-rolled sections which conform to the ASTM A36. The piles are eighty feet (80’) long after they are driven to the required depth and cut-off is accomplished. Whalers between piles are fifteen (15’) long.
9.2 The Contractor will be responsible for all layout and, surveying required to place the piles at the locations indicated on the drawings.
9.3 The Contractor shall install piles to the depth indicated on the drawings. The Contractor shall select equipment and methods of driving without damaging piles in any manner. The Contractor is responsible for supplying reinforcement at the tip and butt of piles in order to avoid damage to the piles during driving.
9.4 Fabrication tolerances shall be in accordance with the AISC latest edition. The minimum length of a segment of steel pile between splices shall be 20 ft. Splices should be done using full penetration welds, designed to develop the full tensile strength of the pile section. Welding shall conform to AWS Specifications.
9.5 Piles shall be driven within two inches of the correct location and shall not deviate more than 1/8" per foot from the vertical. Any piles driven slightly out of line shall be carefully pulled into line. No piles will be left unsupported after driving; no waving or oscillation of piles will be allowed.

10.0 TREATED TIMBER
Contractor shall provide and install all timber fender, as required.
10.1 All timber shall conform to rough sawn Southern Yellow Pine No. 1 Dense SR.
10.2 Timber beams shall be treated in accordance with American Wood Preservers’ Association Standards CI and C3 .80 CCA, Latest revision, "Standard Preservative Treatment by Pressure Processes - All Timber Products."
10.3 Timber beams shall not receive more than one treatment.
10.4 Fasteners for fender system shall be Lewis dome head bolts, galvanized, complete with washer and nut, one inch diameter. All other bolts shall be galvanized and complete with washers and nuts.
10.5 Timber shall be precut to length and holes drilled prior to treatment.
10.6 Field cuts and holes shall be protected in accordance with AWPA "Standard Instruction for the Care of Pressure-Treated Wood after Treatment."
10.7 Holes made in the pressure-treated materials shall be poured fill of hot preservative, using a bent funnel for horizontal holes if necessary.
10.8 Damaged areas or cuts after treatment shall be covered with at least two coats of the preservative used for initial treatment.

11.0 CONCRETE REPAIR
11.1 Remove damaged concrete as indicated on the Contract Drawings. Concrete should be removed to a horizontal plane slightly below the underside of the deck slab. **Do not cut existing reinforcement**, except as noted on Contract Drawings. Clean all concrete off of existing reinforcement.

11.2 Lay out new horizontal reinforcement across the top of bottom bars and contact splice to existing bottom beam bars. Tie securely in place.

11.3 Reform beam profile. Leave opening in form to allow pumping of concrete into form.

11.4 Concrete consistency shall be such that concrete can flow fully into form without need for vibration. Maximum coarse aggregate size shall not exceed ½ inch. Concrete shall contain a shrinkage compensating admixture to assure full contact between top of beam and bottom of slab after curing. Concrete may contain admixtures to increase plasticity, such as super-plasticizers or retarders to prevent early set. Concrete shall contain no less than 20% fly-ash by volume. No admixture containing calcium chloride or chloride ions shall be used.

11.5 Three concrete test cylinders shall be taken at the time of placement. The testing lab shall test one cylinder at 7 days and one cylinder at 28 days. Concrete shall have a minimum compressive strength of 5000 psi at 28 days. If the 28-day sample does not meet the required compressive strength, the third cylinder shall be held and tested at 56 days. If the concrete meets the minimum 28-day strength at 56 days, the concrete shall be deemed satisfactory.

12.0 CONCRETE PATCHING

12.1 Remove all loose or cracked concrete by mechanical means. Flush concrete surface with air compressor to remove dust. Remove all concrete from exposed reinforcement. Clean all scale from exposed reinforcement by light blasting.

12.2 Coat all damaged concrete surfaces and exposed reinforcement with “Duralprep AC” by Euclid Chemical Company or preapproved substitution. Apply per manufacturer’s recommendations.

12.3 When surface prep has dried completely, patch damaged areas with “Verticoat” by Euclid Chemical Company or preapproved substitution. Trowel mix into damaged areas to bring surface to original profile.