SECTION 32 31 13 – CHAIN LINK FENCE AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:

1. Chain link fences system including gates.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Chain Link Fence and Gates:

1. Basis of Measurement: By linear foot.
2. Basis of Payment: Includes all required materials, tools, and labor to properly install the chain link fence system as shown on the drawings.

1.3 REFERENCE STANDARDS

A. American Society for Testing Materials:
1. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
2. ASTM A500 – Standard Specification for Cold-Formed Welded and seamless carbon steel structural tubing in rounds and shapes
3. ASTM F567 - Standard Practice for Installation of Chain-Link Fence
4. ASTM F626 – Standard Specification for fence fittings
5. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and Other Polymer-Coated Steel Chain Link Fence Fabric
6. ASTM F900 - Standard Specification for Industrial and Commercial Steel Swing Gates
7. ASTM F1043 – Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework

1.4 SUBMITTALS

A. Product Data: Upon receiving Owner’s Notice To Proceed, Submit manufacturer information indicating proposed materials, accessories, details, and construction information, including storage requirements.

B. Provide Shop Drawings for all products in this section.
1. Product data in the form of manufacturer’s technical data, specifications, and installation instruction for fence, posts, fabric, gates, and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Manufacturer Instructions:

1. Indicate special procedures required to install specified products.

E. Source Quality-Control Submittals: Indicate results of factory tests and inspections as required or requested.
1. Obtain fences and gates as complete units, including necessary erection accessories, fittings, and fastenings, from a single source or manufacturer.

F. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

G. Submit qualifications for manufacturer and installer.

1.5 COORDINATION

A. Coordinate Work of this Section with utility owners and local authorities.

B. Notify affected utilities at least 72 hours prior to construction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

B. Stored Materials:
1. Store materials according to manufacturer instructions.
2. Store materials, to the best of ability, to prevent damage, theft, or vandalism.
3. For materials in a storage facility, the products must be classified and marked in accordance with the NFPA 704, NFPA 49, and NFPA 325M.

C. Protection:

1. Protect materials from moisture and dust by storing them in clean, dry locations remote from construction operations areas.
2. Block individual and stockpiled pipe lengths to prevent moving.
3. Provide additional protection according to manufacturer instructions.

1.7 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing products specified in this Section with a minimum of five years of experience.

B. Installer: Company specializing in performing Work of this Section with a minimum of five years of documented experience.

1.8 CLOSEOUT DOCUMENTS

A. RECORD DRAWINGS - Provide the following information on all record drawings:
   1. Fencing and gate locations shall be clearly indicated on record drawings.
   2. Fence corners shall have two tape pulls for location or northing/easting coordinates.

1.9 WARRANTY

A. Provide a two-year materials and workmanship warranty. The contractor shall be responsible for correcting defects in the Work during the warranty period, including defective material and workmanship.

B. Provide any required documentation or certifications for items with a manufacturer's warranty.

1.10 EXISTING CONDITIONS

A. Field Measurements:

   1. Verify field measurements prior to fabrication.
   2. Indicate field measurements on Shop Drawings.
   3. Confirm exact layout of fencing in relation to property lines and setbacks.

B. Protection of other utilities:

   1. Approximate location of certain known underground lines is shown.
   2. Existing small lines not shown.
   3. Locate small and other possible utility lines using electronic pipe finder, or other approved method.
   4. Repair or replace any damaged utility line or structure at no additional cost to Owner.

1.11 JOB CONDITIONS

A. It is the responsibility of the Contractor to maintain all necessary safety procedures in accordance with all local, state, and federal regulations.

1.12 GENERAL REQUIREMENTS

A. All sewer lines shall have a minimum of three (3) feet of cover or as indicated on the Drawings.

PART 2 - PRODUCTS

2.1 GENERAL

A. Fencing and gate systems shall be installed within strict recommendations of the manufacturer and ASTM guidelines.

B. Use fencing material specified herein and as indicated on the Contract Drawings.

2.2 FENCE FABRIC

A. Provide 3 1/2" x 5" mesh by 8-gauge finish, 9-gauge core fused and bonded vinyl coated wire (Class 2B) per ASTM F668. Mesh wire shall be coated to the finished product prior to weaving.

B. Provide fabric in one (1) piece width of 72".

C. All fence fabric shall be knuckled at bottom selvage and twisted at top.

D. Provide pre-inserted privacy slats during manufacturer consisting of the following properties:
   1. Double-wall, self-locking 2.85" wide
   2. Results of 98% privacy
   3. Manufactured from virgin high-density polyethylene.
   4. Confirm color with JMWSC.

E. Provide PrivacyLink fence fabric, Master-Halco, or approved equal.

2.3 FRAMING

A. General
   1. Steel strength and coating requirements of posts and rails shall conform to ASTM A500, Grade B 50,000 Yield Strength.
   2. Prior to finish coating, framing shall receive a zinc with organic overcoat consisting of 0.9 ounces per square foot.
   3. Provide Polyolefin coated finish on all fence frame (posts, rails, gates, etc.) conforming to requirements of ASTM F1043. Coating shall have a minimum thickness of 10 mil.
   4. Pipes shall be straight, true to section, material, and sizes specified and shall conform to the following minimum weights per foot:

Outside Diameter (O.D.) (in)	Steel (lbs/ft)
1-5/8	1.84
1-7/8	2.28
2-3/8	3.12
2-7/8	4.64

3-1/2	5.71
4-0	6.56

5. Supply framing by Master-Halco, US Premier Tube Mills, or approved equal.

B. End, Corner, and Pull Posts
1. Provide 2.875-inch (O.D.) for fencing with heights 60 inches or less.
2. Provide 4.00-inch (O.D.) for fencing with heights greater than 60 inches.

C. Line or Intermediate posts:
1. Provide 1.9 - inch (O.D.) for fencing with heights 60 inches or less.
2. Provide 2.375-inch (O.D.) for fencing with heights greater than 60 inches.

D. Gate Posts
1. Furnish posts for supporting single gate leaf or one leaf of a double gate installation for nominal gate widths as follows:
   a. Provide 2.875 - inch (O.D.) for up to 6 feet
   b. Provide 4.00 - inch (O.D.) for 6 feet to 13 feet

E. Top Rail
1. Manufacturer's longest lengths, with expansion-type couplings (designed to allow contraction and expansion), approximately 6-inches long, for each joint. Provide means for attaching top rail securely to each gate corner, pull, and end post per ASTM F626.
   a. Provide 1.625 – inch (O.D.)

F. Intermediate and Bottom Rail
1. Provide 1.625 – inch (O.D.)

2.4 SWING GATES

A. General
1. All swing gate parts and accessories shall have a 3-mil (minimum) polyester coating finish to match the color of fence fabric selected by owner.

B. Gate Frame
1. Swing gates shall be fabricated in accordance with ASTM F900.
2. Provide fully welded gate frames. Gate frame shall consist of all required horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware, and accessories. Space members a maximum of 8-feet apart unless otherwise indicated.
3. Fabricate gate perimeter frames with minimum 1.90-inch OD steel pipe.

C. Hinges
1. Provide hinges structurally capable of supporting gate leaf and allow opening and closing without binding.
2. Hinges shall be designed to permit gate swing of 180° outward and be a non-lift-off type.
3. Provide 2 pairs of hinges for each leaf.

D. Latch

1. Provide forked type or plunger-bar type to permit operation from either side of gate.
2. Latch shall include a padlock eye as integral part of late.

E. Keeper
1. Provide gate keeper for double swing gates (vehicle gates), which automatically engages gate leaf and holds it in open position until manually released.
2. Provide keeper for each leaf.

F. Gate Stop
1. Provide gate stops for all double swing gates, consisting of mushroom-type flush plate with anchors, set in concrete.
2. Gate stop shall be designed to engage center drop rod or plunger bar that cannot be removed.
3. Gate stop shall include locking device, and padlock eyes as integral part of latch, permitting both gate leaves to be locked with a single padlock.

2.5 FENCE ACCESSORIES

A. General
1. All fence accessories shall have a 3-mil (minimum) polyester coating finish to match the color of fence fabric selected by owner, unless coating is specified otherwise.

B. Post and Rail Caps
1. Provide weather tight hot dipped galvanized pressed steel or aluminum caps.
2. Provide hot dipped galvanized pressed steel or aluminum eye top caps to permit passage of top rail.
3. Provide hot dipped galvanized pressed steel or aluminum rail end caps for top rail and brace rail ends.
4. Provide means for attaching top rail securely to each corner, pull, slope, gate, and end post.
5. Furnish all post and rail caps with a 3-mil (minimum) polyester coating matching the color of the fence.
6. All fence fittings shall comply with ASTM F626.

C. Tension Wire
1. Provide 9 gauge, 0.148” zinc coated steel wire core with an 8-gauge finish, fused and bonded vinyl coated wire.

D. Wire Ties
1. Provide 9 gauge, 0.148” zinc coated steel wire with a 3-mil (minimum) polyester coating finish.
2. Provide 12.5-gauge (min), 0.0985” zinc coated steel wire with a 3-mil (minimum) polyester coating finish for attachment of fence fabric to tension wire.

E. Tension and Stretcher Bands
1. Provide minimum 3/4-inch-wide hot dipped galvanized pressed steel with 3-mil (minimum) polyester coating finish.
2. Tension bads shall have a minimum of 14-gauge (0.074 inch) thickness.
3. Tension and brace bands shall have a minimum of 12-gauge (0.105 inch) thickness.

F. Tension or Stretcher Bars
   1. Provide 3/16 inch thick by 3/4-inch-wide stretcher bars, hot dipped galvanized steel with 3-mil (minimum) polyester coating finish.
   2. Stretcher bars shall not be less than 2 inches of the full height of fabric.
   3. Provide one bar for each gate and end post, and two for each corner and pull post.

G. Post Brace Assembly
   1. Provide manufacturer's standard adjustable brace at end and gate posts and at both sides of corner and pull posts. The horizontal brace shall be located at mid-height of fabric.
   2. Provide same material as top rail for brace.
   3. Provide truss to line posts with 3/8-inch diameter steel rod and adjustable tightener capable of withstanding a minimum of 2,000 lbs.
   4. Provide post cap as specified in section 2.4.B.
   5. All post brace assembly parts shall have a 3-mil (minimum) polyester coating finish.

H. Fence Accessory Hardware
   1. Provide corrosion resistant nuts and bolts matching fence fabric as required for proper installation fence.
   2. Sizing shall be based on fence manufacturers recommendation for intended use.

2.6 MISCELLANEOUS MATERIALS

A. As required, provide all other materials for a complete and proper installation for products and installation processes as described here within.

2.7 SOURCE QUALITY CONTROL

A. All materials will be inspected for conformance with specifications. Any supplied materials not meeting the quality of standards set here within will be replaced by contractor at no additional cost to the Owner.

PART 3 - WORK EXECUTION

3.1 LAY OUT OF WORK

A. Provide all required materials, labor, instruments, etc. required to properly lay out work.

B. Prepare "cut sheets" for approval by Engineer and Owner.

C. Exercise proper precaution to verify requirements on the Drawings prior to laying out Work. Any errors that otherwise might have been avoided shall be corrected at no additional cost to the owner.

D. Provide proper notification of errors or discrepancies found to Engineer in a timely manner to ensure corrective actions are made.

3.2 LOCATING

A. Locate all existing site features, underground utilities (Water, sewer, electric, gas, etc.) prior to beginning work. Notify owner and engineer of any conflicts or discrepancies from plans.

3.3 EXAMINATION

A. Verify that site preparation and grading is completed to a level where the fence will not be disturbed during any additional construction activities.

3.4 INSTALLATION

A. Install fence in compliance with ASTM F 567. Do not begin installation and erection before final grading is completed, unless otherwise permitted.

B. Install fencing where indicated on drawings.

C. Excavation:
   1. Drill (auger) or hand excavate (using post-hole digger) holes for posts to diameters and spacings indicated, in firm, undisturbed or compacted soil.
   2. If not indicated in the drawings, excavate holes for each post to a minimum diameter recommended by fence manufacturer, but not less than 4 times largest cross section of post.
   3. Unless otherwise indicated, excavate hole depths approximately 6” lower than post bottom, with bottom of post set not less than 36” below finished grade surface.

D. Post Setting
   1. Remove all foreign and loose debris from sides and bottoms of holes, and moisten soil prior to placing concrete.
   2. Center and align posts in holes 3 inches above bottom of excavation.
   3. In a continuous pour, place concrete around post. Vibrate and tamp to ensure consolidation of concrete.
   4. Adjust posts to make plumb and check for required fence top alignment. Post shall be securely held in position during placement and finishing processes.
   5. Unless otherwise indicated, top of concrete footings shall be 2-inches below grade.
   6. Keep concrete moist for 7-days after placement or cure by a method approved by the engineer.

E. Top Rails
   1. Run rail continuously through line post caps, bending to a radius for curved runs (if applicable), and at other posts terminating into rail end attached to posts or posts caps.
   2. Provide expansion couplings at joints. Space couplings as recommended by manufacturer.

F. Intermediate and bottom Rails
   1. Provide intermediate and bottom rails as detailed on drawings.
   2. Install between each post, using rail ends and special offset fittings where necessary. Rail shall be flush with post on fabric side.

G. Brace Assemblies
   1. Install braces on each side of terminal posts so posts are plumb when diagonal rod is under proper tension.
   2. Braces shall be firmly attached with fittings.
   3. Install diagonal truss rods at corners as shown on JMWSC standard details.

H. Tension Wire
   1. Install tension wire within 6 inches of bottom of fabric before stretching fabric and tie to each post.
   2. Wire shall be pulled taut, without sags.
   3. Fasten wire to fence fabric with hog ties at 24 inches on center.

I. Fabric
   1. Leave approximately 2 inches between finish grade and bottom selvage unless otherwise indicated.
   2. Pull fabric taut and tie to posts, rails, and tension wires.
   3. Install fabric on security side (outer side of area to be fenced) and anchor to framework so that fabric remains in tension after pulling force is released.
   4. Attached fabric with wire ties to line posts at 12 inches on center and to rails, and braces at 24 inches.
   5. Pull fabric taut and thread tension (stretcher) bar through fabric and attach it to terminal posts with bands. Space bands at a maximum distance of 15 inches on center. Any clamps used shall not be spaced more than 4-inches on center.

J. Wire ties
   1. Use U-Shaped wire of proper length to secure fabric to posts and rails with ends twisted a minimum of 2-full turns.
   2. Bend all wire ends to minimize hazards to persons or clothing (snags).

K. Gates
   1. Install gates plumb, level, and secure for full opening without interference.
   2. Install ground-set items in concrete for anchorage.
   3. Adjust hardware for smooth operation and lubricate where necessary.

L. Fasteners
   1. Install nuts and bolts where required on tension bands.
   2. Peen or tack weld ends of bolts to prevent removal of nuts. Bolt shall be located on opposite side of fence fabric.

END OF SECTION 32 31 13