SECTION 32 3116 WELDED WIRE FENCES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including general and supplementary conditions.

1.2 SUMMARY

A. This section includes the following:
   1. Fencing system complete with all hardware, posts, gates and accessories to complete the installation.
   2. Swing gates and hardware.
   3. Sliding gates and hardware.
   4. Concrete foundation for posts

1.3 REFERENCES

A. American Society for Testing and Materials:
   1. ASTM A53 Standard specification for pipe, steel, black and hot dipped, zinc coated, welded and seamless
   2. ASTM 185 Standard specification for steel welded wire reinforcement, plain, for concrete.
   3. ASTM 641 Standard specification for Zinc-Coated (Galvanized) carbon steel wire.
   4. ASTM A853 Standard specification for steel wire products.
   5. ASTM 1043 IC Strength and Protective Coatings on steel industrial chain link fence framework.
   6. ASTM B117 Standard practice for Operating salt spray (fog) apparatus.
   7. ASTM A90 Standard specification for weight of coating on iron and steel with zinc or zinc-alloy coatings
   8. ASTM 2453 Standard specification for welded wire mesh fence fabric metallic coated or polymer coated.
   9. ASTM F668 Standard specification for polyvinyl chloride (PVC) and other organic polymer-coated steel fence fabric.
   10. ASTM C33 Standard specification for Concrete aggregate.
   11. ASTM C150 Standard specification for Portland cement

B. American Concrete Institute:

   1. ACI 301 Specifications for structural concrete

1.4 SUBMITTALS

A. Product Data: For each product indicated, include manufacturer's recommendations for installation.
B. Installation drawings: Show layout, locations, components, materials, dimensions, sizes, weights, finishes of components, installation and operational clearances, gate swings, post sizes, spacing and mesh type, gate details, dimensions, details of post anchors and post attachments.
C. Samples: Submit color selections and samples for finishes on fence and accessories if requested by the owner/specifier.

1.5 QUALITY ASSURANCE

A. The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and the materials and techniques specified. Review and follow manufacturer's installation instructions.
B. Provide fence system and gates, as a complete unit produced by a single manufacturer, including necessary erection accessories, fittings and fastenings
C. Manufacture qualifications: Company specializing in manufacturing the products specified in this section with a minimum of 5 years documented experience.
D. Field quality control to conducted by owner's project manager.

1.6 DELIVERY, HANDLING AND STORAGE

A. Deliver fence materials, gates, posts and accessories to project site, completely prefinished. Upon receipt at the job site, all materials shall be checked to ensure that not damages occurred during shipping. Materials shall be handled and stored properly to protect against damage and theft.
B. Handle fence components to protect finish coating from any scuffs, abrasions and other damages during unloading and installation. Excessive damage to factory applied coatings will be cause for rejection.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Betafence USA, Ennis TX 75119, Fax 972-878-4703, 888-650-4766

2.2 MATERIAL

A. Fencing System: Subject to the performance and design requirement specified herein, fence and gates shall be manufactured from the following materials.

1. Wire Mesh Fence System: Fence system shall be 6’ (1828mm) high x 82’ (24993mm) long roll.

   a. Wire mesh shall be welded per ASTM A185 using 13 gauge (.095”) galvanized steel wire.
   b. The wire shall have a minimum tensile strength of at least 75,000 lbs/in².
   c. Applied on wire 30 g/m² (.05) zinc coating conforming to ASTM A641.
   d. Horizontal and Vertical wires shall be welded to form 2” x 2” (50mm x 50mm) square. Each horizontal wire will have a crimp to provide for a tighter, more rigid installation.
   e. Exterior surface shall have a minimum thickness of 6 mils of PVC coating applied after fabrication.
   f. The vertical wires of the mesh shall have a barb extended 1” from the last horizontal wire. This can be placed at the top or bottom of fence.

2. Round Fence Posts:

   a. Steel posts to be SS40 standard weight pipe in accordance with ASTM 1043 IC.
   b. Line posts to be 4.00” (101.6mm) O.D. x .160” (4.06mm) wall thickness. Brace post to be 1.90” (48.3mm) x .120” (3.04mm) wall thickness.

3. Fittings and Fasteners:

   a. Post caps shall be of press on type steel caps zinc plated to ASTM B633, class II or malleable steel caps galvanized to ASTM A123.
   b. Post brackets shall be galvanized steel with stainless, galvanized or zinc plated fasteners. All brackets shall be finished to match fence finish and color.

4. Swing Gates: Design of gates shall be as shown on the drawings.

   a. Gate frames and infill panels: Materials as described above.
   b. Frame members: shall be MIG welded. If necessary, truss rods or cables to be used to prevent gate sag and allow for future adjustment.
   c. Gate Post and Foundations: Size as determined by the Engineer, based on gate size local wind loading requirements and installation type.
   d. Hinges: Manufacturer’s standard hinges, structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift off type hinge design.
   e. Latch: Capable of accepting padlock.
   f. Keeper: Provide keeper for each gate leaf over 5 feet wide. Gate keeper shall consist of mechanical device for securing free end of gate when in full open position.

5. Slide, Cantilever Gates: Design of gates shall be as shown on the drawings.

   a. Gate frames and infill panel: Materials as described above.
   b. Frame members: Shall be MIG welded. If necessary, truss rods or cables to be used to prevent gate sag and allow for future adjustment.
   c. Gate Post: Size as determined by the Engineer, based on gate size, local wind loading requirements and installation type.

2.3 FINISHES

A. Coating Material for Fence Fabric: Wire mesh fence fabric shall be finished with a factory applied PVC coating that will provide superior weather, U.V. and corrosion resistance.

Thickness: Minimum film thickness of 6 mils as measured by manufacturer's standard inspection procedures.

1. Polymer coated steel fabric per ASTM F668

B. Coating Material for Posts: Post, brackets and fasteners shall be finished with a factory applied TGIC polyester powder coating of the Super Durable Class.

Thickness: Film thickness of 2 – 4 mils as measured by manufacturer's standard inspection procedures.

1. Requirements for powder coating process
   a. Pretreatment: The fence system shall be prepared using a pre- treatment cleaning system to remove foreign material and to properly prepare the surface to achieve the coating system specified above.
   b. Curing: Heat cure in accordance with coating manufacturer's prescribed cure schedule to properly crosslink and bond finish to metal substrate.
   c. Adhesion resistance per ASTM D3359
   d. Impact resistance per ASTM D2794
   e. Film Hardness per ASTM D3363
   f. Corrosion resistance per ASTM B117
   g. Solar Concentration Exposure per ASTM D4141
   h. Chemical Resistance

1) Muriatic Acid Resistance (15 minute spot test)
   a. Apply 10 drops (by volume) solution of muriatic acid (37% com grade hydrochloric acid) in tap water on the coated surface and cover it with a glass, convex side up. The acid solution and test shall be conducted at 65 degree to 80 degree. After a 15 min exposure, wash off with running tap water.

b. Performance: No blistering and no visual change in appearance when examined by the unaided eye.

2) Mortar Resistance (24 hour pat test)
   a. Prepare mortar by mixing 75g (2.6 oz) of building lime conforming to ASTM C207 and 225g (7.9oz) of dry sand, both passing through a 10 mesh wire screen with sufficient water, approximately 100g (3.5 oz) to make a soft paste. Immediately apply wet pats mortar about 1300mm² (2 in²) in area and 12mm (1/2 in) in thickness to coated specimens, which have been aged at least 24 hours after coating. Immediately expose test specimens for 24 hours to 100% relative humidity at 100 degree.

3) Detergent Resistance
   a. Prepare a 3% (by weight) solution of detergent as prescribed in ASTM D2248 and distilled water. Immerse at least two test specimens in the detergent solution at 100 degree for 72 hours. Remove and wipe the specimens dry. Immediately apply tape (Permacel 99 or equivalent) 20mm (3/4in) wide by pressing down firmly against the coating to eliminate voids and air pockets. Place tape longitudinally along the entire length of the test specimens. If blisters are visible, then the blistered area must be taped and rated. Sharply pull off at a right angle to the plane of the surface being tested, per ASTM D3359.
   b. No loss of adhesion of the film to the metal. No blistering and no significant visual change in the appearance when examined by the unaided eye.

2.4 CONCRETE FOOTINGS

A. General: Comply with ACI 301 for cast in place concrete; materials consisting of Portland cement complying with ASTM C150, aggregates complying with ASTM C33, and potable water.
B. Concrete Mixes: Normal-weight concrete air entrained with not less than 3000 psi compressive strength (28 days), 3 inch (75mm) slump, and 1 inch (25mm) maximum size aggregate.
C. Footings: Footings shall be minimum 3,000 psi after twenty-eight days. Concrete footing sizes shall be determined by engineer.

PART 3 – EXECUTION

3.1 PREPARATION

A. Verify areas to receive fencing.
B. Coordinate fence installation with work of other sections listed in these specifications.
C. Examine conditions under which fencing and gates are to be installed. Notify contractor of unsatisfactory conditions. Do not proceed with work until conditions are satisfactory to the installer.

3.2 INSTALLATION

A. Install fence and gates in accordance with manufacturer's instructions and approved installation drawings.
B. Handle fence components to protect finish coating form any scuffs, abrasion or other damage during installation. Excessive damage to factory applied coatings will be cause of rejection.
C. Space posts at dimensions indicated in the installation drawings. Attach fence to posts using stainless steel or galvanized steel, panel hanger brackets supplied by manufacturer. Filed welding of panels and post is unacceptable as it will cause significant damage to the galvanizing and coatings.
D. Concrete footing: Place concrete around posts and vibrate or tamp for consolidation. Verify that post are set plumb, aligned and at correct height and spacing and stabilized in position during placement and finishing operations until concrete is sufficiently cured. Protect portion of posts above ground from concrete splatter.
E. Install gates level, plumb and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust gate to operate smoothly, easily and quietly throughout entire operational range. Confirm that latches and locks engage accurately and security without forcing or binding.
F. Avoid unnecessary cutting, drilling and welding of pre-finished fence components. If necessary to cut, drill, weld or otherwise modify product due to field conditions, repair factory finish in accordance with item below.
G. Touch-up any necessary areas by lightly sanding; apply a zinc rich cold galvanizing primer followed by a high quality acrylic lacquer paint to match finish. Touch-u paint is available from manufacturer. Note: Field applied touch-up cannot match the performance of factory applied finishes and should be limited to use.

3.3 CLEANING

A. Fence contractor shall remove packing materials and unused product and level uneven areas due to excavation created by fence installation.

End of Section 32 3116