

PART 1 - GENERAL**1.01 DESCRIPTION**

- A.** Work includes all materials, labor and incidentals necessary for the complete installation and proper operation of all **vinyl** coated chain link fences and gates shown on the Drawings. This section includes the following:
 - a. Fence framework, fabric, and accessories.
 - b. Excavation for posts and grade beams.
 - c. Gates and related hardware.
 - d. Security Screening at parking lot.

- B.** Design Requirements: Fencing system and installation engineered to withstand 130 mph wind load.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A.** Vehicular Slide Gate: See section 02832

1.03 REFERENCES

- A.** ASTM A121 – Zinc Coated (Galvanized) Steel Barbed Wire.
- B.** ASTM A123 – Zinc (Hot Dipped Galvanized) Coatings on Iron and Steel Products.
- C.** ASTM A153 – Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- D.** ASTM A392 – Zinc Coated Steel Chain-Link Fence Fabric
- E.** ASTM A428 – Test method for Weight on Coating on Aluminum-Coated Iron or Steel Articles.
- F.** ASTM A478 – Chromium-Nickel Stainless Weaving and Knitting Wire.
- G.** ASTM A491 – Aluminum Coated Steel Chain Link Fence Fabric.
- H.** ASTM A585 – Aluminum Coated Steel Barbed Wire.
- I.** ASTM A653 – Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- J.** ASTM A792 – Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- K.** ASTM A817 – Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcellled Tension Wire
- L.** ASTM A824 – Metallic Coated Steel Marcellled Tension Wire for Use with Chain Link Fence.
- M.** ASTM 1011 – Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Allor with Improved Formability.
- N.** ASTM B429 – Aluminum-Alloy Extruded Structural Pipe and Tube.
- O.** ASTM F567 – Practice for Installation of Chain-Link Fence.
- P.** ASTM F626 – Fence Fittings.
- Q.** ASTM F668 – Poly (Vinyl Chloride) (PVC) Coated Steel Chain Link Fence Fabric.
- R.** ASTM F900 – Industrial and Commercial Swing Gates.
- S.** ASTM F1043 – Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework.
- T.** ASTM F1083 – Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.

- U. ASTM F1184 – Industrial and Commercial Horizontal Slide Gates.
- V. AISI 430 – Stainless Steel
- W. Chain Link Fence Manufacturers Institute (CLFMI): Product Manual

1.04 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Shop Drawings: Indicate plan layout, spacing of components, post and grade beam details and dimensions, details of post installation and bracing, hardware anchorage, schedule of components, and hardware schedule.
- C. Product Data: Provide manufacturer’s technical data and specifications for products to be installed.
- D. Certification of Compliance: Prior to incorporation in construction, submit manufacturer’s certificate that specific products proposed for use meet or exceed specified requirements.
- E. Test Reports: Submit results of specified test indicating compliance with specified requirements.

1.05 PRODUCT DELIVERY AND STORAGE

- A. Installer will store product upright, covered and protected from all weather conditions.
- B. Store materials off ground. Protect against oxidation.

1.06 QUALITY ASSURANCE

- A. Chain link fabric, posts, and components, and installation shall conform with the requirements of the CLFMI Product Manual unless otherwise shown or specified.
- B. Like items of materials shall be the end products of one manufacturer.
- C. Installation: ASTM F567.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum five (5) years documented experience.

1.08 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.09 WARRANTY

- A. Provide five (5) year warranty on vinyl-coated chain-link fence and gates.

1.10 CONTRACTOR EXPERIENCE

- A. The installing fence contractor shall have a minimum of five (5) years experience on fencing

projects of similar nature as indicated in the specification and on the drawings.

- B.** The installing fence contractor shall successfully completed a fencing installation of similar nature as specified and drawn, having a construction value of \$35,000.00.
- C.** Information confirming items (A) and (B) above shall be submitted to the Architect and Owner prior to commencement of the Work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. FRAMEWORK:

- a.** Unless specified otherwise, framework may be Type I or Type II at Contractor's option.
- b.** Type I Pipe
 - i.** ASTM F1083 standard weight (schedule 40), plain ends.
- c.** Type II Pipe
 - i.** ASTM A1011, or ASTM A653, Grade D, cold formed, electric welded; minimum yield strength 50,000 PSI.
 - ii.** External surface coated with Poly (Vinyl Chloride) (PVC), color as selected by Owner. Fabric shall be hot-dipped zinc coated of 1.0 ounce +/- 0.1 ounce per square foot, followed by 30 +/- 15 micrograms of chromate per square inch and 0.5 +/- 0.2 mils of clear acrylic polyurethane.

The interior surface shall have a hot-dipped zinc coating of 1.0 ounce +/- 0.1 ounce per square foot followed by a chromate conversion coating or a zinc rich coating having a minimum zinc powder coating of 91%, by weight, capable of providing galvanic protection.

d. Dimensions and Weights:

Outside Diameter (OD) in inches	Type I Steel	Type II Steel
	Weight/Foot	Weight/Foot
1.660	2.27	1.82
2.000	2.72	2.28
2.375	3.65	3.12
2.875	5.79	4.64
4.000	9.11	6.56
6.625	17.97	Not Permitted
8.625	28.55	Not Permitted

- e. Terminal Posts (End, Corner, and Angle Posts)**
 - a.** Minimum 4.000 inch OD at fences with fabric extending 12' or less above finish grade.
 - b.** Minimum 6.625" OD elsewhere.
- f. Line Posts**
 - a.** Minimum 2.875" OD at fences with fabric extending 12' or less above finish grade.
 - b.** Minimum 4.000" OD elsewhere.
- g. Gate Posts:** Minimum 4.000" OD, unless otherwise indicated.

h. Rails (Top, Intermediate, Bottom) and Braces: 1.660" OD, unless otherwise noted.

B. Fabric:

1. ASTM A392; Class 2 zinc coating, galvanized after weaving.
2. 2" diamond-mesh, No. 9 gauge wire.
3. Knuckled bottom selvage; twisted and barbed top selvage except knuckled top salvage where indicated.
4. Minimum breaking strength for fence fabric 1,290 pounds.

2.02 ACCESSORIES

A. Fittings

1. ASTM F626; Malleable steel, cast iron, or pressed steel.
2. All fittings shall receive a hot-dip zinc coating, conforming to ASTM A123/ASTM A153.
3. Fittings include extension arms for barbed wire, tension bars and bands, clips, truss rod assemblies, boulevard clamps, hardware, fabric and barbed tape fastenings and accessories.

B. Tension (Stretcher) Bars: One-piece lengths equal to full height of fabric with a minimum cross-section of 1/4" by 3/4".

1. Provide one tension bar for each gate post and end post.
2. Provide two tension bars for each corner post.

C. Tension (Stretcher) Bar Bands: Steel, 3/4" x 1/10" nominal to secure tension bars to end, corner, and gate posts.

D. Extension Arms

1. 18" long, 45E bracket type; slits at even spacings for three strands of barbed wire.
2. Extension arms shall permit permanent attachment to post by means of welding.
3. Locations Other Than Terminal Posts: Breakaway (Swing-down) type designed to give way when a torque load of 40 to 50 foot-pounds is applied to the arm.
4. Terminal Posts: Match other extension arms, except breakaway feature may be deleted to accommodate erection procedures if required. Extension arms other than break away will require approval.

E. Post Tops

1. Weathertight closure cap for tubular posts.
2. One for each exposed tubular post end where equal protection is not afforded by combination post cap/extension arm.

F. Truss Assembly: 3/8" truss rod and turnbuckle; capable of withstanding 2,000 pounds tension.

- G.** Boulevard Clamps: Two piece clamp with carriage bolts.
- H.** Boulevard Bands
 - 1. Bands: 5/8" size.
 - 2. Band Bolts: 5/16" x 1-1/2" carriage bolts with nuts.
- I.** Tie Wire: 9 gauge galvanized steel wire, unless otherwise indicated. Tie wires shall be painted orange prior to installation.
- J.** Hog Rings: 9 gauge galvanized steel. Hog rings shall be painted orange prior to installation.
- K.** Twist Ties: 18 gauge stainless steel, supplied by the barbed tape manufacturer. Twist ties shall be painted orange prior to installation.
- L.** Ground Stakes: No. 3 rebar, 18" length with 3" hook, hot dipped galvanized.

2.03 GATES

- A.** Gate Frames: Type I or Type II pipe members, 2.375" OD unless otherwise indicated.
- B.** Provide truss rods of 3/8" minimum nominal diameter to prevent sag or twist.
- C.** Provide vertical intermediate bracing of gate leaves, spaced so that members are no more than 8' apart.
- D.** Provide horizontal gate leave braces and 5/16" minimum diagonal truss rods as required to provide rigid construction, free from sag or twist.
- E.** Gate Fabric: Match fence fabric.
- F.** Attach fabric to frame at intervals not exceeding 12". Secure with tension bars, tension bands, and 6 gauge steel wire.

2.04 GATE HARDWARE

- A.** Hardware:
 - 1. Pressed steel or cast iron, conforming to ASTM F626.
 - 2. All hardware shall receive a hot-dip zinc coating, conforming to ASTM F626.
- B.** Hinges:
 - 1. Rated heavy-duty and sized for the supported gate, with large bearing surfaces for clamping in position.
 - 2. Hinges shall not twist or turn under the action of the gate.
 - 3. Hinges shall not allow the gate to be lifted without first removing the hinges.
 - 4. The gates shall be capable of being opened and closed easily by one person.
- C.** Hold-Open-Stop (Duck-bill hold back):
 - 1. Mechanical device which automatically engages the free end of the gate leaf

when in the full open position and holds it in the open position until manually released.

2. Provide hold open stops for manually operated swinging vehicle gates.

D. Drop Bar

1. Provide drop bar and keeper for multi-leaf swing gates.

2.05 FINISHES

A. Components Not Otherwise Indicated: Poly (Vinyl Chloride) (PVC) exterior coated Zinc-coated ASTM A123.

B. Hardware Not Otherwise Indicate: Zinc-coated ASTM A153.

PART 3 - EXECUTION

3.01 INSPECTIONS

A. Verify grade provides flat surface allowing fence construction with gap no more than indicated on drawings between bottom of bottom rail and the ground or grade beam.

3.02 INSTALLATION

A. Install in accordance with ASTM F567.

B. Erect fencing in straight lines between angle points.

C. All chain link fences shall be electrically grounded.

D. Postholes

1. Depth:
 - a. Minimum 24" plus 3" for each foot or fraction thereof post exceeds 4 foot projection above grade.
 - b. Greater if indicated on drawings.
2. Diameter:
 - a. Minimum 4 times post diameter.
 - b. Holes for line posts shall be 12" minimum diameter.
 - c. Holes for gate, corner, and pull posts shall be at 16" minimum diameter.
 - d. Greater if indicated.
3. Work concrete into post holes to leave no voids.
4. Provide crown watershed finish on the top surface of concrete.

E. Grade Beams

1. Size: As indicated on Drawings.
2. Work concrete into grade beams to leave no voids.
3. The top surface of the grade beam shall slope in one direction in order not to trap water run-off, unless otherwise indicated.

F. Line Posts

1. Space posts equidistant in the fence-line not more than 10' on centers and in true lines.
2. Set posts plumb and with 3" of concrete under post.

G. Terminal Posts

1. Terminal posts shall be used at beginning and end of each continuous length of fence, at changes in vertical or horizontal alignment of 15E or more, and at intervals not exceeding 800'.
2. Where runs are greater than 800', space terminal posts evenly between corner or end posts.
3. Diagonally brace terminal posts to adjacent line posts.

H. Rails, Braces, and Truss Rods

1. Install on the side of the fence least accessible to inmates.
2. Connect rails to posts using boulevard clamps.
3. Brace gate and terminal posts to adjacent line posts with a horizontal compression member and diagonal truss rods used as tension members.

I. Top Rail

1. Install rail continuously through post caps or extension arms.
2. Each joint where a rail meets a post shall be secured so that no perceivable movement between the two pieces takes place when the fence fabric is flexed.

J. Intermediate and Bottom Rails

1. Install rails in one piece between posts and flush with posts on fabric side.
2. Each joint where a rail meets a post shall be secured so that no perceivable movement between the two pieces takes place when the fence fabric is flexed.
3. Where grade beam is used, anchor bottom rail to grade beam. Type, size, and spacing of anchors as indicated on drawings.

K. Threaded Connectors and Accessories

1. Peen threaded connectors and accessories after installation.

L. Fence Fabric

1. Allow concrete to obtain sufficient strength before installing fence fabric.
2. Fasten fabric to terminal and gate posts with tension bars and tension bar bands.
 - a. Stretch fabric taut at intervals of 100' maximum.
 - b. Space tension bar bands not more than 12" on o.c.
3. Secure fabric to rails and posts with wire ties at maximum 12" o.c. At 18'
 - a. Weave tie wire through the fence fabric, completely around the rail or post, and twist wire securely with three twists on the rail or post side of the fence; cut off the tails of the wire to preclude untwisting by hand.
 - b. Twist shall be on side of fence least accessible to inmates. Knuckle twist on ties less than 8 feet above grade.

4. Horizontal splicing of fabric on 18' high fences is permitted if both sides of the splice are secured to a horizontal rail at the splice.
5. Vertical splicing of fabric is permitted if both pieces of fabric are woven together.
6. Completed fabric installation shall pass Fabric Deflection Test.
7. Secure fabric to tension wire with wire ties at 24" o.c.

M. Extension Arms and Post Caps

1. Anchor post caps to posts with set screws to prevent rotation and removal.
2. Anchor extension arms to posts with set screws to prevent rotation and removal. After installation cut off head of set screw flush with arm. Tack weld as shown on Drawings.

N. Gates

1. Install gates plumb, level and secure for full opening without interference. Adjust hardware for smooth operation. Gate operators shall be installed in strict accordance with the manufacturer's recommendations.
2. Modify gates and posts as required to receive hardware as specified.
3. The maximum clearance between the bottom of the gate in closed position and finished grade shall be as indicated on the drawings.

3.03 ERECTION TOLERANCES

- A. Maximum Variation from Plumb: 1/4".
- B. Maximum Offset from True Position: 1".
- C. All posts shall be able to pass a pull test when a force of 48 pounds is applied perpendicular to the fence at the top of the post. The post shall not deflect more than one (1) inch at the location where the force is applied.

3.04 FENCE FABRIC DEFLECTION TEST

- A. The deflection of the fabric shall be consistent and uniform. No audible noise shall be generated by the fence system before, during, or following the deflection test.
- B. Deflection of fence fabric shall be no greater than 2" when a force of 30 pounds is applied in the center of a panel, perpendicular to the plan of the fence fabric.
- C. Fabric shall return to original position when force is released.

3.05 FENCE POST RIGIDITY TEST

- A. Fence post rigidity shall be tested by applying a 50-pound force on the post, perpendicular to the installed fabric, and mid-height on the post. Post movement

measured at the point where the force is applied shall not exceed 3/4 inch from the relaxed position.

- B.** Every tenth post shall be tested for rigidity. When a post fails this test, further tests on the next four posts on either side of the failed post shall be made. All failed posts shall be removed, replaced, and retested at the Contractor's expense.

3.06 ADJUSTING

- A.** Adjust operable components for smooth, even operation.
- B.** Field repair damaged galvanized surfaces.
- C.** Coordinate with other Bid Packages, as required.

END OF SECTION