

**SECTION 32 31 13.10
RENOVATION OF CHAIN LINK FENCES AND GATES**

GALVANIZED AND VINYL COATED

PART 1 GENERAL

2.01 REFERENCE STANDARDS

- A. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric; 2011a (Reapproved 2022).
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- C. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2023.
- D. ASTM F567 - Standard Practice for Installation of Chain-Link Fence; 2023.
- E. ASTM F1043 - Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework; 2018 (Reapproved 2022).
- F. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures; 2018 (Reapproved 2022).

2.02 1.01 SECTION INCLUDES

- A. A. All requirements, materials and construction techniques for the renovation of Chain Link Fences and Gates.

2.03 1.02 RELATED REQUIREMENTS

- A. A. Section 09 91 13 – Exterior Painting

2.04 1.03 REFERENCE STANDARDS

- A. A. [ASTM A392](#) - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric; most current version
- B. B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; most current version.
- C. C. [ASTM A1011/A1011M](#) - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; most current version.
- D. D. [ASTM F567](#) - Standard Practice for Installation of Chain-Link Fence; most current version.
- E. E. [ASTM F1043](#) - Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework; most current version.
- F. F. [ASTM F1083](#) - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures; most current version.

2.05 1.04 SUBMITTALS

- A. A. See Section 01 33 00 – Submittal Procedures, for submittal procedures.
- B. B. Product Data: Provide data on mesh fabric, posts, accessories, fittings and hardware.
- C. C. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components.
- D. D. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines and easements.

PART 2 PRODUCTS

3.01 2.01 MATERIALS (TO BE USED AS NEEDED TO RENOVATE EXISTING CHAIN LINK FENCE)

- A. A. Mesh Fabric

1. 1. Mesh fabric shall consist of steel wire helically wound and interwoven in such a manner as to provide a continuous chain link mesh. The wire shall be woven in the form of approximately square mesh, having parallel sides and horizontal and vertical diagonals of approximately uniform dimensions. Permissible variation from the specified size of mesh shall be 1/8 inch after exerting enough tension to remove all slack.
- B. Vinyl Clad Mesh
1. 1. Vinyl clad fabric shall consist of a chain link mesh, size to be shown the drawings, woven from a vinyl coated, hot-dipped galvanized steel wire core. The nominal diameter of the wire for 2" mesh, prior to vinyl cladding, shall be 0.1920 inches. The steel wire shall have a minimum breaking load of 2,170 lbs. when tested in accordance with ASTM Designation E8, from F668, Table 3. The nominal diameter of the wire for 1" mesh, prior to vinyl cladding, shall be 0.1483 inches. The steel wire shall have a minimum breaking load of 1,290 lbs. when tested in accordance with ASTM Designation E8, fro F668, Table 3.
 2. 2. The vinyl shall be bonded to hot-dipped galvanized steel wire by the molten extrusion process under pressure of 5000 psi. The vinyl coating shall be without voids. The vinyl-coated wire shall be woven into fabric without tears or cuts which reveal the substrata. The minimum thickness of vinyl coating at any point shall be 0.015 inches and the maximum thickness 0.025 inches.
 3. 3. The vinyl coating shall be of a self-extinguishing character and have an average tensile strength of 3,300 psi, elongation of 200%, high abrasion resistance, maximum deformation of 15% at 248 degrees Fahrenheit, shall resist attack from prolonged exposure to: sea water, salt solutions, alkalis, acids, petroleum products, oils, fats, and fungi inducing atmospheres.
 4. 4. The vinyl-coated wire from which the fabric is woven shall withstand an accelerated aging test consisting of exposure for 1000 hours without failure at a black panel of temperature of 145 degrees Fahrenheit. when tested in accordance with ASTM D 1499. Type D, E, or F apparatus described in ASTM G 23 or Type BH apparatus described in ASTM G 26 shall be used for the test. The color of the vinyl coating shall be BLACK, unless shown otherwise on the Drawings.
 5. 5. The product shall be construed to have failed the test if:
 - a. a. The wire fails to withstand a mandrel bend test of a single bend at -20 degrees Fahrenheit. around a mandrel no larger than ten times the diameter of the wire, without exhibiting breaks or cracks in the vinyl coating.
 - b. b. Shrinkage of the vinyl coating is greater than 1/16 inch per foot of wire.
 - c. c. There is significant change in color or gloss of the vinyl coating as determined by visual inspection.
- C. Galvanized Mesh
1. 1. The base metal of the mesh fabric shall be a 6 gauge steel wire (decimal equivalent .1920) when tested in accordance with ASTM Designation E8.
 2. 2. The chain link mesh fabric shall be zinc-coated by the hot- dip process after fabrication. The weight of zinc coating shall not be less than 1.2 oz per square foot of actual surface covered when tested in accordance with ASTM Designation A90. The zinc used for the coating shall conform to the grades specified in ASTM Designation B6 Standard Specification for Slab Zinc.
 3. 3. The height of the mesh fabric shall be the overall dimension from ends of twists or knuckles. The tolerance of the nominal height shall be plus or minus one inch. The height of the fence shall match the existing installation.
 4. 4. The size of the mesh shall be determined by measuring the minimum clear distance between the wires forming the parallel sides of the mesh, measured in either direction. The tolerance of the size or the mesh shall be plus or minus 1/8 inch.
 5. 5. The diameter of the zinc coated wire shall be determined as the average of two readings measured to the nearest 0.001 inch taken at right angles to each other on the

straight portion of the parallel sides of the mesh. The tolerance in the diameter of the coated wire shall be plus or minus 0.005 inch.

6. Chain link mesh fabric 60 inches high and under, shall be furnished with knuckling on both selvages. Chain link mesh fabric 72 inches high and over shall be furnished with knuckling on the bottom selvage and twisting at the top. Knuckling shall be accomplished by interlocking adjacent pairs of wire ends and bending the wire ends back into a closed loop. Twisting shall be accomplished by twisting adjacent pairs of wire ends together in a closed helix of 1-1/2 machine turns, which is equivalent to three full twists, and cutting the wire ends at a sharp angle to provide sharp points. The wire ends beyond the twist shall be at least 1/4" long.

D. All Mesh Fence Types

1. Tie wire shall be 9-gauge steel wire, galvanized as specified above. Tie wire shall be provided at intervals not to exceed 12 inches for attaching fabric to all line posts, gate frames, and not exceeding 18 inches when attaching fabric to top, bottom and intermediate rails. Mesh shall be attached using a "wrap and wrap" tie method.
2. Posts and rails shall be steel pipe, either Type I, ASTM F1083, standard weight schedule 40 minimum yield strength of 25,000 psi, hot-dipped galvanized with minimum average 1.8 oz/sq. ft. of coated surface area; or Type II cold-formed welded steel pipe complying with ASTM F 103, Group 1C, with minimum yield strength of 50,000 psi. Protective coating per ASTM F1043, external coating Type B, zinc with organic overcoat, 0.9 oz per square foot minimum zinc coating with chromate conversion coating and verifiable polymer film. Internal coating Type B, minimum 0.9 oz per square foot zinc or Type D, zinc pigmented, 81% nominal coating, minimum 3 mils thick.
3. Pipe shall be designated by their nominal inside diameters for the height of fence specified and in accord with the "Schedule of Sizes." Fittings and hardware such as caps, corner and end clamps, boulevards, ends, etc. shall be pressed steel with a minimum thickness of 3/16 inch or shall be certified malleable iron. All fittings shall be hot-dipped galvanized in accord with ASTM F1083.
4. One intermediate rail shall be furnished for all panels of 8' high fences as per the "Schedule of Sizes" detail. Two intermediate rails shall be furnished for all panels of 12' high fences. Top and bottom rails shall be furnished for all panels for all fences. Wherever diagonal bracing crosses an intermediate rail, the brace shall pass between the rail and the mesh.
5. Rails shall be fastened with proper fittings to end, corner line and gate posts. Top rail shall pass through holes in fittings on line posts. Sections of top rail shall be coupled with outside sleeve couplings to allow for expansion and contraction. Rails shall be parallel to each other. The posts are to be truly vertical. The couplings shall not be less than 6 inches long with a .070 minimum wall thickness.
6. Straps shall be 1/8" x 7/8" galvanized steel, at intervals not to exceed 12 inches for attaching fabric and tension bars to posts.
7. Tension bars shall be 1/4 inch by 3/4 inch galvanized steel and not less than 2 inches shorter than the nominal height of the fabric with which they are to be used. One tension bar shall be provided for each end and gatepost and two for each corner post. Tension bars shall be threaded through fabric.
8. Diagonal bracing with turnbuckles shall be required on all end, corner, and gateposts, as well as on all gate panels. Diagonal bracing and turnbuckle shall be heavy-duty steel with a minimum diameter of 1/2 inch.
9. All nuts, bolts, screws and other fastening devices shall be cadmium plated. Bolts shall not protrude more than 1/8 inch beyond fully tightened nuts and shall be peened. Loose fittings such as pipe caps, post caps, etc. shall be securely fastened with No. 14. 0.239 inch diameter cadmium plated drive screws.
10. Gates shall be framed on four sides with 2 inch diameter standard weight steel pipe. The gate frames shall be of all shop welded construction with complete full welds ground smooth. They shall be thoroughly cleaned and hot-dipped galvanized in accord with ASTM F1083.

11. 11. Padlocks for gates shall be round 2-1/2" body diameter, 7/16" diameter hardened steel shackle x 1" clearance, 5 pin tumbler, keyed alike x 2 keys each, non-removable key in unlocked position. American Lock Co. #600 DL, telephone (800) 426-0206, or approved equal.
12. 12. Gate hinges shall be heavy-duty malleable iron full back type allowing for 180 degree swing. Gate locking device shall be heavy-duty external type with latch, catch, keeper and all appurtenances, including drop rod and steel center stop for drop rod.
13. 13. All gates over 6 feet high shall have an intermediate rail. Wherever a diagonal brace crosses an intermediate rail, the brace shall pass between the rail and the mesh.
14. 14. Anchoring compound for fence posts shall be "Thorogrip" fast setting anchoring compound, as manufactured by DeGussa Building Systems, 880 Valley Park Drive, Shakopee, MN 55379, Phone No. 1-800-433-9517, or approved equal. The crown grout or sealer shall be ThoRoc "HBA" repair mortar, or approved equal, as manufactured by DeGussa Building Systems. Local Representative is Phil Catalano, DeGussa sales office, 664 Craig Avenue, Staten Island, NY 10307, Phone 1-718-667-6121, Fax 1-718-356-6964.
15. 15. Concrete used in the construction of this fence shall be in accordance with the Concrete Section of these Specifications. Paint (as needed) shall be as per Exterior Painting specs, 09 91 13. The color of the paint shall be BLACK, unless otherwise indicated on the Drawings.

PART 3 EXECUTION

4.01 3.01 CONSTRUCTION

- A. A. Where called for on the Drawings, the Contractor shall renovate the existing chain link fence. The Contractor shall remove all existing chain link mesh fabric and replace with new chain link mesh fabric, type as indicated on the drawings.
- B. B. Contractor shall straighten all bent posts. Where posts are damaged beyond repair, they shall remove the damaged posts and install new posts. The Contractor shall replace and install with new any and all damaged or missing top rails, bottom rails, intermediate rails (as required), turnbuckles, tension bars, fittings and hardware.
- C. C. In locations where the renovation of the existing chain link fencing requires that a new post replace an existing post, the Contractor shall remove the existing post and footing before installing the new footing and post. If the existing post to be replaced is in concrete curb 8 inches wide or greater, the Contractor shall remove the existing post with care, fill the remaining hole with concrete and finish the curb surface smooth and flush. New holes shall be cored in the existing curb with a water lubricated diamond core drill to the required depth and proper spacing for the chain link fencing and the new fencing installed according to standard method. Removed fencing shall remain the property of the Authority and shall be stored on the site or removed from the site by the Contractor as directed by the Development Superintendent.
- D. D. In locations where new chain link fence posts are to be installed in new/existing concrete curbs or walls, holes for posts shall be cored. Holes for footings shall be formed, all in accordance with the Concrete Section of these Specifications.
- E. E. Posts shall be set to the proper specified depths in the concrete curbs or footings. They shall be set plumb, properly aligned and grouted securely in place with "THOROG RIP" or approved equal. After the anchoring grout has hardened, the crown grout or sealer shall be neatly troweled into fill and seal the holes with a 1/4" wash. The diameter of the hole shall not exceed the outside diameter of the post it is to receive by more than 1 inch.
- F. F. After posts have been grouted in place, rails shall be fastened with the specified fittings and hardware to line, corner, end and gate posts. Top rails shall pass through holes in fittings on line posts. Sections of top rail shall be coupled with outside sleeve couplings that allow for expansion and contraction. Rails shall be parallel to the finished grades and parallel to each other. Top and bottom rails shall be furnished for all panels for all fences. Intermediate rails shall be furnished for all fences 8 feet and higher.

- G. G. If the framework is to be repainted, the entire framework consisting of all new and old posts, rails, fittings, gates, and all other components shall be painted after erection and before attaching the mesh fabric. All surfaces to be painted must be clean and free of dust or loose rust. All greasy and oily residues must be removed from new metal with mineral spirits or other appropriate solvent. Repeat cleaning procedure as often as necessary to remove contaminants completely. After all surfaces are properly prepared, two (2) coats of paint shall be applied. No paint shall be applied during damp weather or when the temperature is below 40 degrees Fahrenheit. During painting, all concrete work, paving etc., shall be fully protected from stains. Any paint spots that may occur shall be immediately removed with an approved paint or stain remover.
- H. H. After the framework is completely renovated, new chain link mesh fabric shall be installed. Tension bars shall be threaded through the mesh fabric. The mesh fabric shall be stretched uniformly and tightly. The tension bars shall then be clamped onto end posts, corner or gateposts with steel straps, spaced at intervals not to exceed 12 inches. The mesh fabric shall then be attached to all line posts with tie wires at intervals not to exceed 12 inches and to top, bottom and intermediate rails with tie wires at intervals not to exceed 18 inches. Mesh fabric shall remain in tension after pulling force is released.
- I. I. All end, corner, and gateposts shall have diagonal bracing with turnbuckles. The post shall remain truly vertical after the tightening of the turnbuckle to provide frame rigidity without sag or twist. If diagonal bracing crosses an intermediate rail, the brace shall pass between the rail and the mesh.
- J. J. Mesh fabric for gates shall be attached to tension bars with ties at intervals not to exceed 12 inches. The mesh fabric shall be stretched between the welded gate panel frame and the tension bars attached to the frame with steel straps at intervals not to exceed 12 inches. The stretched mesh fabric shall then be attached to the top and bottom of the gate frame with tie wires at intervals not to exceed twelve (12) inches.
- K. K. All gates shall have diagonal bracing with turnbuckles tightened to provide frame rigidity without sag or twist.
- L. L. The gates shall be installed with the heavy-duty hinges in accordance with the Materials Section of these specifications. Gates shall be installed plumb, level and secure. Installed gates shall be checked for opening without interference and ease of locking. Hardware shall be adjusted and lubricated for smooth operation.
- M. M. All materials and installation procedures needed to upgrade the existing chain link fence shall be in accordance with the Drawings and Specifications.
- N. N. The Contractor shall have sufficient covers and guards to protect his work from rain, freezing, drying effects of sun and wind, traffic or other damaging causes. It is the Contractor's responsibility to protect and maintain his work at all times until final acceptance of the work by the Authority.

END OF SECTION 32 31 13.10