ANTI RAM SECURITY CHAIN LINK FENCE - 4,000 LB @ 20 MPH

SECTION 32 31 13.53

2015

<This specification, applicable for the specific purpose of ram protection or combined ram and security protection, is based on the material and installation of two fence designs tested by Southwest Research Institute, San Antonio, TX for the Chain Link Fence Manufactures Institute. Any deviation from the material or installation specifications could affect performance. Soil conditions should be evaluated for each site to establish concrete footing size>

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. DIVISION 01 - GENERAL REQUIREMENTS: Drawings, quality, product and performance requirements, general and supplemental conditions apply as applicable to the project and project documents.

1. The design performance requirements are in accordance with ASTM F2781 “Standard Practice for Testing Forced-entry, Ballistic, and Low Impact Resistance of Security Fence Systems.” The fence design as specified has been tested to stop and restrain a 4,000 lb vehicle traveling at 20 MPH in (4.0 ft) or (7.5 ft)

1.2. SUMMARY

A. This Section includes chain link fence and gates specifications:
   1. Galvanized steel coated chain link fabric
   2. Aluminum coated steel chain link fabric
   3. Polymer coated steel chain link fabric
   4. Zinc 5% Aluminum alloy coated steel chain link fabric
   5. Galvanized steel framework and fittings
   6. Polymer coated galvanized steel framework and fittings
   7. Barbed wire
   8. Barbed tape
   9. Installation

B. Related Sections:
   1. 01 33 13 Certificates
   2. 01 33 23 Shop Drawings, product data
   3. 01 43 13 Manufacturers Qualifications
   4. 01 43 23 Installer Qualifications
   5. 01 45 00 Quality Control
   6. 01 65 00 Product Delivery Requirements
   7. 01 66 00 Product Storage and Handling Requirements
   8. 03 30 53 Miscellaneous Cast in Place Concrete
   9. 31 22 19 Finish Grading

1.3 REFERENCES

A. ASTM A121 Specification for Metallic-Coated Carbon Steel Barbed Wire

B. ASTM A392 Specification for Zinc-Coated Steel Chain-Link Fence Fabric

C. ASTM A491 Specification for Aluminum-Coated Steel Chain-Link Fabric

D. ASTM A817 Specification for Metallic-Coated Steel Wire for Chain Link Fence Fabric and Marcelled Tension Wire

E. ASTM A824 Specification for Metallic-Coated Steel Marcelled Tension Wire for Use With Chain Link

F. ASTM F552 Standard Terminology Relating to Chain Link Fencing

G. ASTM F567 Standard Practice for Installation of Chain Link Fence

H. ASTM F626 Specification for Fence Fittings

I. ASTM F668 Specification for Polymer Coated Chain Link Fence Fabric

J. ASTM F934 Specification for Standard Colors for Polymer-Coated Chain Link

K. ASTM F1043 Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework

L. ASTM F1083 Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures

M. ASTM F1345 Specification for Zinc-5% Aluminum-Mischmetal Alloy-Coated Steel Chain-Link Fence Fabric

N. ASTM F1664 Specification for Poly (Vinyl Chloride) (PVC) and Other Conforming Organic Polymer-Coated Steel Tension Wire Used with Chain-Link Fence

O. ASTM F1665 Specification for Poly (Vinyl Chloride) (PVC) and Other Conforming Organic Polymer-Coated Steel Barbed Wire Used with Chain-Link Fence

P. ASTM F1910 Specification for Long Barbed Tape Obstacles

Q. ASTM F1911 Standard Practice for Installation of Barbed Tape

R. ASTM F2781 Standard Practice for Testing Forced-entry, Ballistic, and Low Impact Resistance of Security Fence Systems

1.4 SUBMITTALS

A. Shop drawings: Site plan showing layout of fence location with dimensions, cleared area, elevation of fence, gates, footings and details of attachments. Comply with the provisions of Section 01 33 23.

B. Certifications: Manufacturers material certifications in compliance with the current ASTM specifications and contractor certification confirming installation in accordance with the specifications; comply with the provisions of Section 01 33 13.

C. Material samples: When required, provide representative samples of chain link fabric, framework and fittings, comply with the provisions of Section 01 33 23.

D. Domestic certifications: Material certifications, Made in U.S.A., Buy American Act or Buy America, follow the provisions of Section 01 33 13. <To ensure compliance with specifications, quality and performance criteria it is advisable to require material meeting one of the three U.S. manufactured purchase requirements>

E. Specification Changes: May not be made after the date of bid.

1.5 QUALITY ASSURANCE

A. Manufacturer: Company headquartered in the United States having U.S. manufacturing facility/facilities specializing in manufacturing chain link fence products with at least 5 years experience; comply with Section 01 43 13.

B. Fence contractor: Company with demonstrated successful experience installing similar projects and products in accordance with ASTM F567 and have at least 5 years experience in accordance with the provisions of Section 01 43 23.

C. Tolerances: Current published edition of ASTM specifications tolerances apply. ASTM specification tolerances supersede any conflicting tolerance.

1.6 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver products to site per the requirements of Section 01 65 00.

B. Storage: Store and protect products off the ground when required, Section 01 66 00

PART 2 – PRODUCTS

1.1.MANUFACTURERS

A. Framework, posts, rails, pipe for gates:

Wheatland Tube Co. 800 343 0124, www.wheatland.com

1.2.CHAIN LINK FABRIC

A. Steel Chain Link Fabric: <Select mesh for impact/security requirement; 1/2 in mesh 9 gauge provides 4 ft. stop penetration, 3/8 in. mesh 11 gauge provides 7.5 ft. stop penetration> <minimum fabric height 72 in. (1.83 m) required for impact performance> [height or heights indicated on drawings] <Select fabric design configuration from below and insert ASTM designation, coating requirement, include class and color when applicable>
[1/ 2 in. mesh (13 mm) 9 gauge (0.148 in.) (3.76 mm) diameter]
[3/8 in. mesh (10 mm) 11 gauges (0.120 in.) (3.05 mm) diameter]
   1. Zinc-Coated Steel Fabric: ASTM A392 galvanized before weaving.
      a. Class 1 - 1.2 oz/ft² (366 g/m²)
      b. Class 2 - 2.0 oz/ft² (610 g/m²) <not available for 11 gauge wire>
   2. Aluminum–Coated Steel Fabric (Aluminized): ASTM A491
   3. Zinc-5% Aluminum-Mischmetal Alloy Coated Steel Fabric: ASTM F1345
      a. Class 1 – 0.6 oz/ft² (183 g/m²)
      b. Class 2 – 1.0 oz/ft² (305 g/m²)
   4. Polymer Coated Steel Fabric: ASTM F668, the wire gauge specified is that of the metallic coated steel core wire
      a. Class 1 extruded
      b. Class 2a extruded and adhered
      c. Class 2b fused and adhered
      d. Color: [dark green] [olive green] [brown] [black] in compliance with ASTM F934
   5. Fabric selvage: Knuckle finish at top and bottom, K&K

2.3 ROUND STEEL PIPE FENCE FRAMEWORK

A. Round steel pipe and rail: Schedule 40 standard weight pipe, in accordance with ASTM F1083, 1.8 oz/ ft² (550 g/m²) hot dip galvanized zinc exterior and 1.8 oz/ft² (550 g/m²) hot dip galvanized zinc interior coating
Regular Grade: Minimum steel yield strength 30,000 psi (205 MPa)
High Strength Grade: Minimum steel yield 50,000 psi (344 MPa) (4.00 in. OD not available in High Strength Grade)
<Specify 2.0 oz/ft² (610 g/m²) zinc coating for added corrosion protection if required>

1. Line Post : Minimum 4.00 in. (101.6 mm) OD, 9.11 lb/ft (13.6 kg/m)
2. End, Corner, Pull post: Minimum 4.00 in. (101.6 mm) OD, 9.11 lb/ft (13.6 kg/m)
3. Top, brace, and intermediate rails: 1.660 in. (42.2 mm) OD, 2.27 lb/ft (3.4 kg/m).
4. Bottom rail: 1.990 in. (48.3 mm) OD, 2.72 lb/ft (4.0 kg/m).

B. Round steel pipe and rail: Cold-rolled electric-resistance welded pipe in accordance with ASTM F1043 Materials Design Group IC, WT-40 pipe, minimum steel yield strength 50,000 psi (344 MPa). External coating, hot dip galvanized zinc 1.0 oz/ ft² (305 g/m²) with a clear polymeric overcoat, Interior coating, 90% zinc-rich coating having a minimum thickness of 0.30 mils (0.0076 mm).
1. Line post: minimum 4.00 in. (101.6 mm) OD, 6.56 lb/ft (9.76 kg/m)
2. End, Corner, Pull post: minimum 4.00 in. (101.6 mm) OD, 6.56 lb/ft (9.76 kg/m)
3. Top, brace, and intermediate rails:1.660 in. (42.2 mm) OD, 1.84 lb/ft (2.74 kg/m)
4. Bottom rail: 1.990 in. (48.3 mm) OD, 2.28 lb/ft (3.39 kg/m)

C. Polymer Coated Pipe: Polymer coated pipe shall have a [PVC or Polyolefin] [Polyester] coating fused and adhered to the exterior zinc coating of the galvanized pipe in accordance with ASTM F1043. The minimum thickness of coating [PVC or Polyolefin coating 10 mils (0.254 mm)] [polyester 3 mils (0.0076 mm)] Color to match fabric [dark green] [olive green] [brown] [black] per ASTM F934.

Framework Wind Load Caution:
Fences containing windscreens and fences greater than 8 feet (2.4 m) in height using, 1 in. (25 mm) mesh or smaller require a wind load force analysis for post selection and post spacing. An interactive Wind load Fence Post Calculator is available at www.wheatland.com

2.4 TENSION WIRE

A. Metallic Coated Steel Marcelled Tension Wire: 7 gauge (0.177 in.) (4.50 mm) in compliance with ASTM A824 **[**Match coating type to that of the chain link fabric] <Insert metallic coating Type and class when applicable>

1. Type I Aluminum–Coated (Aluminized) 0.40 oz/ft² (122 g/m²)
2. Type II Zinc-Coated, ASTM A817 Class 4 - 1.2 oz/ft² (366 g/m²)
3. Type II Zinc-Coated, ASTM A817 Class 5 - 2.0 oz/ft² (610 g/m²)

B. Polymer Coated Steel Tension Wire: 7 gauge (0.177 in.) (4.50 mm) wire complying with ASTM F1664. Wire gauge specified is the core wire gauge. [Match

coating class and color to that of the chain link fabric] <Insert material coating class and color>

1. Class 1, extruded
2. Class 2a, extruded and adhered
3. Class 2b, fused and adhered

2.5 BARBED WIRE

A. Metallic Coated Steel Barbed Wire: Comply with ASTM A121, Design Number 12-4-5-14R, double 12-½ gauge (0.099 in.) (2.51 mm) twisted strand wire, with 4 point 14 gauge (0.080 in.) (2.03 mm) round barbs spaced 5 inches (127 mm) on center. Match coating type to that of the chain link fabric. <12-4-5-14R is specifically designed for chain link fence applications> <Insert material coating specification including type and class when applicable>
   1. Coating Type A - Aluminum-Coated (Aluminized): Strand wire coating, 0.30 oz/ft² (90 g/m²) with aluminum alloy barbs.
   2. Coating Type Z - Zinc-coated: Strand wire coating Type Z, Class 3, 0.80 oz/ft² (254 g/m²), barb coating 0.70 oz/ft² (215g/m²)

B. Polymer Coated Barbed Wire: Comply with ASTM F1665, 14 gauge, 0.80 in (2.03 mm) double twisted galvanized steel core strand wire; zinc coated four point, 14 gauge (0.080 in.) (2.03 mm) barbs spaced 5 inches (127 mm) on center [Match strand wire coating class and color to the chain link fabric] [Galvanized steel or aluminum alloy barbs are not polymer coated] <Insert strand wire class coating and color>

1. Class 1, extruded
2. Class 2a, extruded and adhered
3. Class 2b fused and adhered.

1.6.BARBED TAPE

Stainless Steel Long Barbed Tape: Comply with ASTM F1910. <Based on the security level required select the design configuration from the table listed in ASTM F1910> < Insert description, barbed tape material, coil diameter, core wire material and gauge when applicable, barb clusters per loop, coil loops, coil loop spacing, coil length, attachment points>

1.7.FITTINGS

A. Brace Bands and Line Rail Clamps: Galvanized pressed steel complying with ASTM F626, steel thickness 1/8 in. (3.18 mm), band width 1 in. (25 mm), zinc coated 1.20 oz/ft² (366 g/m²). Secure with 3/8 in. (9.53 mm) galvanized steel carriage bolts.

B. Terminal Post Caps, Line Post Loop Tops, Rail and Brace Ends, Rail Sleeves: In compliance to ASTM F626, heavy industrial pressed steel galvanized after fabrication having a zinc coating of 1.20 oz/ft² (366 g/m²).

C. Truss Rod Assembly: In compliance with ASTM F626, 3/8 in. (9.53 mm) diameter steel truss rod with a pressed steel turnbuckle, zinc coating of 1.2 oz/ft² (366 g/m²), assembly capable of withstanding a tension of 2,000 lbs. (970 kg).

D. Security mesh terminal post strap: Galvanized coated 1.2 oz. /ft² (366 g/m²) steel one-piece strap, full height of the fabric, having a minimum cross section of 1 1/2 in. (38.1 mm) by 1/4 in. (6.35 mm) with holes spaced minimum 12 in. (304.8 mm) on center to accommodate 3/8 in. (9.53 mm) carriage bolts. < The 1/2 in. (13 mm) or 3/8 in. (10m) mesh is secured being sandwiched between the strap and the terminal post by bolting thru the strap, mesh and terminal post.>

E. Barbed Wire Arms: In compliance with ASTM F626, pressed steel galvanized after fabrication, minimum zinc coating of 1.20 oz. /ft² (366 g/m²), capable of supporting a vertical 250 lb (113 kg) load. [Type I – three strand 45 degree (0.785 rad) arm] [Type II – three strand vertical arm] [Type III – "V" shaped six strand arm]

F. Polymer Coated Color Fittings [when specified]: Coating applied to fittings as specified within this specification in compliance with ASTM F626. Polymer coating minimum thickness 0.006 in. (0.152 mm) fused and adhered to the zinc coated fittings, match color to fence system

1.8.TIE WIRE and HOG RINGS

Tie Wire and Hog Rings: 9 gauge (0.148 in) (3.76 mm) galvanized steel wire having a minimum zinc coating 1.20 oz/ft² (366 g/m²); preformed power fastened tie and preformed hog rings per ASTM F626. <specify when polymer color coated> [9 gauge core (0.148 in) (3.76 mm) polymer coated, match coating, class and color to that of the chain link fabric]

1.9.SWING GATES

<Pedestrian and vehicle gates must be designed and rated to withstand a impact force of 4,000 lb (1814.4 kg) at 20 MPH (32.19 KPH) or be protected by a separate barrier capable of resisting the ram force design criteria.>

A. Swing Gates: <standard design, not crash rated > Galvanized steel welded fabrication in compliance with ASTM F900. Gate frame members 1.900 in. OD (48.3 mm) <Insert pipe specification> [ASTM F 1083 schedule 40 galvanized steel pipe] [ASTM F1043 Group IC WT 40 galvanized steel pipe] Frame members spaced no greater than 8 ft. (2440 mm) apart vertically and horizontally. Welded joints protected by applying zinc-rich paint in accordance with ASTM Practice

A780. Positive locking gate latch, pressed steel galvanized after fabrication. Galvanized malleable iron or heavy gauge pressed steel post and frame hinges. [Match gate fabric to that of the fence system] Gateposts, ASTM F1083 schedule 40 galvanized steel pipe. <Insert diameter, specification and weight> <Because the minimum post size for the anti ram design is 4.00 in. OD the minimum sing gate post is 4.00 in OD. Select larger post diameter when applicable using the gatepost table 2.9 C>
[Polymer coated gate frames and gateposts match the coating type and color to that specified for the fence framework. Moveable parts such as hinges, latches and drop rods may be field coated using a liquid polymer touch up]

B. Electrically operated gates must be manufactured and installed in compliance with ASTM F2200 and UL325

C. Swing Gate Gateposts: Schedule 40 pipe in compliance with ASTM F1083

Gate fabric height up to and including 6 ft. (1.2m)		
Gate leaf width	**Post Outside Diameter**	**Weight**
up to 4 ft. (1.2 m)	4.000 in. (101.6 mm)	9.11 lb/ft (13.6 kg/m)
over 4 ft. to 10 ft. (1.2 to 3.05 m)	4.000 in. (101.6 mm)	9.11 lb/ft (13.6 kg/m)
over 10 ft. to 18 ft. (3.05 to 5.5 m)	4.000 in. (101.6 mm)	9.11 lb/ft (13.6 kg/m)
Gate fabric height over 6 ft. to 12 ft. (1.2 to 2.4m)		
Gate leaf width		
up to 6 ft. (1.8 m)	4.000 in. (101.6 mm)	9.11 lb/ft (13.6 kg/m)
over 6 ft. to 12 ft. (1.8 to 3.7 m)	4.000 in. (101.6 mm)	9.11 lb/ft (13.6 kg/m)
over 12 ft. to 18 ft. (2.4 to 5.5 m)	6.625 in. (168.3 mm)	18.97 lb/ft (28.2 kg/m)
over 18 ft. to 24 ft. (5.5 to 7.3 m)	8.625 in. (219.1 mm)	28.58 lb/ft (42.5 kg/m)

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1.10. HORIZONTAL SLIDE GATE

<gates must be designed and rated to withstand an impact force of 4,000 lb (1814.4 kg) at 20 MPH (32.19 KPH) or be protected by a separate barrier capable of resisting the force.>

A. Type I-Overhead Slide Gates: <standard design, not crash rated > In compliance with ASTM F1184 Type I. Gate frame to be of welded construction, minimum 1.900 in. OD (48.3 mm) galvanized steel pipe members. <Insert pipe specifications>. [ASTM F1083 schedule 40 pipe] [ASTM F1043 Group IC WT 40 pipe] Framing members to be spaced no more than 8 ft. (2440 mm) apart horizontally and vertically. Welded joints are to be protected by applying zinc-rich paint in accordance with ASTM Practice A780. Provide positive locking latch, pressed steel, galvanized after fabrication. Galvanized steel drop bars to be provided with double gates. Chain link fabric to match the fence system**.** Manufacturer's standard overhead beam/structure, track, rollers and accessories designed to support the load of the gate panel taking into consideration wind load and possible icing. The support beam/structure to be galvanized or receive proper corrosion protection. Schedule 40 galvanized steel pipe <Insert post requirement > gateposts in compliance with ASTM F1083.

[Post size for gate openings up to and including 10 ft. (3.05 m) shall be 4.000 in. OD (101.6 mm),
Openings greater than 10 ft. (3.05 m) up to 24 ft. (7.3 m) 4.000 in. OD (101.6 mm)
Openings greater than 24 ft. (7.3 m) up to 40 ft. (12.2 m) double 4.000 in. OD (101.6 mm) posts]

B. Cantilever Slide Gates: <standard design, not crash rated > In compliance with ASTM F1184 Type II

1. Class 1-External Roller Design: Horizontal top and bottom steel pipe "track" members to be 2.375 in. OD (60.3 mm), vertical and internal members, 1.900 in. O.D. in compliance with <Inset gate pipe frame specification> [ASTM F1083 schedule 40 galvanized steel pipe] [ASTM F1043 Group IC WT 40 galvanized steel pipe.] Gate frame to be fabricated by welding, vertical and horizontal members installed no greater than 8 ft. (2440 mm) apart. Welded joints are to be protected by applying zinc-rich paint in accordance with ASTM Practice A780. Gates designed to open or close by applying an initial pull force no greater 40 lbs. (18.14 kg). Match chain link fabric to that of the fence system. Positive locking pressed steel latch, galvanized after fabrication. Galvanized steel drop bars provided with double gates. Gateposts, 4.000 in. OD (101.6 mm) schedule 40 pipe per ASTM F1083. Safety protective guards must be provided for the top and bottom external rollers.

2. Class 2-Internal Roller Design**:** <Indicate material and design> Gate frame fabricated by welding, vertical and horizontal members installed no greater

than 8 ft. (2440 mm) apart. Class 2 cantilever slide gates to comply with the performance deflection criteria listed in ASTM F1184. Gates designed to open or close by applying an initial pull force no greater than 40 lbs. (18.14 kg). Internal truck assemblies designed to handle the forces required for gate size opening and height. Match chain link fabric to that of the fence system. Gateposts, 4.000 in. O.D. (106.1 mm) schedule 40 pipe per ASTM F1083. <Internal roller cantilever designs vary by manufacturer and material select design below>

a. [Steel Pipe Frame Design: Match the specification of Class 1 cantilever slide gate. Securely bolt an extruded aluminum enclosed track to the top horizontal member that is designed to accommodate internal roller assemblies.]
b. [Aluminum Frame Design: Aluminum rectangular members of various shapes and wall thickness per manufacturers design for gate opening and height. Top horizontal member to be one-piece extruded section having an integral internal track to accommodate truck assemblies.]

C. [Polymer coated horizontal slide gates and posts shall match the coating type and color as that specified for the fence framework.] <Insert coating requirement and color>

D. Electrically operated gates must be manufactured and installed to comply with the requirements of ASTM F2200 and UL 325.

2.11 CONCRETE

Concrete for post footings shall have a 28-day compressive strength of 3,000 psi. (20.6 Mpa)

PART 3 EXECUTION

1.1. CLEARING FENCE LINE

Clearing: Surveying, clearing, grubbing, grading and removal of debris for the fence line or any required clear areas adjacent to the fence <Insert project requirement> [is included in the earthwork contractor's contract under the provisions of Division 31 Earthwork.] [is not included in the earthwork contractor's contract and is the responsibility of the fence contractor in accordance with the provisions of Division 31 - Earthwork.] The contract drawings shall indicate the area to be cleared and grubbed and or graded.

3.2 FRAMEWORK INSTALLATION

A. Posts: Basic design 4.00 in (101.6 mm) OD posts shall be set plumb in concrete footings in accordance with ASTM F567. Minimum footing depth, 48 in. (1.2 m), minimum diameter 16 in. (406.4 mm). <Site soil conditions, local frost depth, fence height, larger post diameter and wind load may require larger diameter or deeper footings> Top of concrete footing to be at grade crowned to shed water away from the post. Line posts installed at intervals not exceeding 8 ft. (2.44 m) on center. [ASTM F1083 High Strength Grade 50,000 psi yield Schedule 40 pipe posts, maximum 10 ft. (3.05 mm) on center.]

B. Top, bottom and intermediate rail: <Fences 12 feet (3.66 m) high or higher require mid rail.> Install 21 ft. (6.4 m) lengths of top rail continuous thru the line post or barb arm loop top. Splice rail using top rail sleeves minimum 6 in. (152 mm) long. Top rail loop tops or barb arms shall be secured to the line post by thru bolting using 3/8 in. (9.55 mm) carriage bolts. Rail shall be secured to the terminal post by a brace band and rail end. Bottom rail or intermediate rail shall be field cut and secured to the line posts using line rail clamps or brace band with rail end. All rails shall be secured to the rail end or line rail clamp after installation by field drilling and thru bolting with 3/8 in. (9.55 mm) carriage bolts. All bolt threads are to be peened to prevent removal of the nut. The 1.900 in. (48.3 mm) bottom rail shall be anchored in the center of the span with a 36 in (914.4 mm) long pre formed ½ in (12.7 mm) diameter galvanized steel tie down rod having an eye at one end to receive the rail and a right angle 6 in (152.4 mm) leg at the other end for concrete embedment. The tie down rod is to be set in a minimum 12 in (304.8 mm) diameter by 36 in (914.4 mm) deep concrete footing.

C. Terminal posts: End, corner, pull and gate posts shall be braced and trussed. The horizontal brace rail and diagonal truss rod shall be installed in accordance with ASTM F567.

D. Tension wire: Tension wire shall be installed horizontally at vertical intervals of 24 in (609.6 mm) or less for the full height of the fabric. Tension wire to be stretched taut, independently and prior to the fabric between terminal posts and secured to the terminal post using a brace band. Secure the tension wire to each line post with a tie wire.

1.3. CHAIN LINK FABRIC INSTALLATION

Chain Link Fabric: Install fabric to secure/ram side of the framework having a ground clearance of no more than 2 inches (50 mm). Attach the chain link mesh to terminal post by sandwiching the mesh between the post and the vertical 1 1/2 in. (38.1 mm) by 1/4 in. (6.35mm) galvanized steel strap using carriage bolts by bolting thru the vertical strap, chain link mesh and post. Space thru bolts no greater than spaced 12 in. (304.8 mm) on center. Chain link fabric shall be sufficiently stretched taut so as not to deflect more than 3 inches (76 mm) in the center of the fence panel in between the two line posts when subjected to a 30 lb (13.6 kg)

horizontal force. Fabric to be fastened to the line post and rails with tie wires spaced no greater than 12 inches (304.8 mm) on center. Secure fabric to the tension wire with hog rings or power twisted ties spaced no greater than 12 inches (304.8 mm) apart.
Tie wire shall be power fastened and wrapped 360 degrees around the post or rail including at least one chain link wire picket. Twist the two wire ends together three full turns. Excess wire shall be cut off and bent over to prevent injury.

1.4. BARBED WIRE INSTALLATION

Barbed Wire: Stretched taut between terminal posts and secured in the slots provided on the line post barb arms. Attach each strand of barbed wire to the terminal post using a brace band. Barb arms to be secured to the post by thru bolting using 3/8 in. (9.55 mm) carriage bolts. <Indicate type of barb arm, Type I, II or III and direction [inward] [outward] for installation of Type I arm. >

1.5. GATE INSTALLATION <protective ram barriers shall be installed according to the manufacturers recommendation>

A. Swing Gates: Installation of swing gates and gateposts in compliance with ASTM F 567. Direction of swing shall be [inward] [outward] Gates shall be plumb in the closed position having a bottom clearance of 3 in. (76 mm) grade permitting. Hinge and latch offset opening space shall be no greater than 3 in. (76 mm) in the closed position. Double gate drop bar receivers shall be set in a concrete footing minimum 6 in. (152 mm) diameter 24 in. (609.6 mm) deep. Gate leaf holdbacks shall be installed for all double gates. Electrically operated gates must be installed in compliance with ASTM F2200 and UL 325**.**

B. Horizontal Slide Gates: Installation varies by design and manufacturer, install according to manufacturers instructions and in accordance with ASTM F567. Gates shall be plum in the closed position, installed to slide with an initial pull force no greater than 40 lbs. (18.14 kg). Double gate drop bar receivers to be installed in a concrete footing minimum 6 in. (152 mm) diameter, 24 in. (609.6 mm) deep. Roller guards and guide posts must be installed on Type I external roller cantilever slide gate in compliance with ASTM F1184. Ground clearance shall be 3 in. (76 mm), grade permitting. Electrically operated gates must be installed in compliance with ASTM F2200 and UL 325.

3.6 BARBED TAPE INSTALLATION

Barbed Tape: Barbed tape when specified shall be installed in accordance with ASTM F1911.

1.7. NUTS AND BOLTS

Bolts: Carriage bolts used for fittings shall be installed with the head on the secure side of the fence. All bolts shall be peened over to prevent removal of the nut.

1.8. ELECTRICAL GROUNDING

Grounding: Grounding of the fence and gates is not the responsibility of the fence contractor and not included in the fencing scope of work for this contract. Grounding, when required, shall be specified and included in Contract Section 33 79 00 Site Grounding. A licensed electrical contractor shall install grounding when required.

1.9. CLEAN UP

Clean Up: The area of the fence line shall be left neat and free of any debris caused by the installation of the fence.

END OF SECTION 32 31 13.53