SECTION 323113.53 - HIGH-SECURITY CHAIN LINK FENCES AND GATES

Use this Section for Department of Corrections and Community Supervision (DOCCS) or Children & Family Services (CFS) or Office of Mental Health (OMH) Projects only.

Do not include type “A” gates or electric sliding gates in this section. Work for these items is specified in Section 323114 - Gate Systems. Coordinate with Hardware Specifications Writer before editing this Section.

If gates are not included in this Section modify Section title.

1. GENERAL

Edit below for Project.

* + - 1. RELATED DOCUMENTS
         1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
         2. Gate Systems: Section 323114.
         3. Earthwork: Section 310000.
      2. SUMMARY
         1. Section Includes:

High-security chain-link fences.

Manually operated swing gates.

Manually operated horizontal-slide gates.

* + - 1. PREINSTALLATION MEETINGS
         1. Preinstallation Conference: Conduct conference at Project site with all parties involved with erecting the secure perimeter.

Retain subparagraphs below if additional requirements are necessary; include information about conference.

Inspect and discuss electrical roughing in, equipment bases and other preparatory work specified elsewhere.

Review coordination of rough and finish grading the site with work specified elsewhere.

Review sequence of installation of fence and gates, including type of gate operator.

Review required testing, inspection and certifying procedures.

<**Insert requirement**>.

* + - 1. REFERENCES
         1. Comply with ASTM A53 for requirements of Schedule 40 piping.
         2. Welding Standards: “Structural Welding Code - Steel, AWS D1.1” or “Structural Welding Code - Sheet Steel, AWS D1.3”, as applicable, by the American Welding Society (AWS Codes).
         3. Materials and Finishes Standard: ANSI/BHMA A156.18-2012, “American National Standard for Materials and Finishes”.
         4. Electrical Components for Locking Devices and Electric Locks Standard: National Electric Code.
      2. DEFINITIONS

Delete last sentence in paragraph below if no buried fabric.

* + - * 1. Height of Fence: Distance measured from the top of concrete footing to the top of fabric. Fences with buried fabric measured from finished grade to the top of fabric.

Use paragraph below if concrete footings are buried.

Use paragraph above or below.

* + - * 1. Height of Fence: Distance measured for fences with buried concrete footings measured from finished grade to the top of fabric.

Use paragraph below if security coils are required.

* + - * 1. Company Field Advisor: An employee of the company which markets the security coils under their name and who is certified in writing by the Company to be technically qualified in design and installation of security coils or an employee of an organization certified by the foregoing company to be technically qualified in design and installation of security coils.
      1. SUBMITTALS
         1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
         2. Manufacturer’s installation instructions shall be provided along with product data.
         3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
         4. Waiver of Submittals: The “Waiver of Certain Submittal Requirements” in Section 013300 does not apply to this Section.
         5. Shop Drawings: Complete detailed drawings, plans, elevations, sections, details, and attachments to other work for each height and style of fence and gate required. Include separate schedule for each listing all materials required and technical data such as size, weight, and finish, to ensure conformance to specifications.
         6. Product Data: For each type of product.

Include manufacturer’s catalog cuts, specifications, installation instructions, construction details, material descriptions, dimensions of individual components and profiles, and finishes.

USE PARAGRAPH BELOW WITH EPD REQUIREMENT WHEN PROJECT ESTIMATE IS $1M OR MORE.

* + - * 1. Submit an Environmental Product Declaration (EPD) from the manufacturer for steel framework and steel fabric within this specification section, if available. A statement of the contractor’s good faith effort to obtain the EPD shall be provided if not available.

Manufacturer-provided EPDs must be Product Specific Type III (Third-Party Reviewed), in adherence with ISO 14025 *Environmental labels and declarations*, ISO 14044 *Environmental management – Life cycle assessment*, and ISO 21930 *Core rules for environmental product declarations of construction products and services.*

* + - * 1. Samples:

Fence Fabric: Minimum one square foot.

Fence and Gate Posts: One foot long each.

Miscellaneous Materials and Accessories: One each.

Provide material samples to the Director’s Representative.

Use paragraph below if security coils are required.

* + - * 1. Quality Control Submittals:

Test Reports: Security coils test procedure report.

Certificates: Letter required under Quality Assurance Article.

* + - 1. QUALITY ASSURANCE
         1. Comply with standards of the Chain Link Fence Manufacturer’s Institute.
         2. Provide steel fence and related gates as a complete compatible system including necessary erection accessories, fittings, and fastenings.
         3. Posts and rails shall be continuous without splices.

Use paragraph below if security coils are required.

* + - * 1. Security Coils Installation Certification: Letter by the Company Field Advisor stating that the fence company is certified in the installation of the security coils and meets the Contract requirements.
        2. Concrete batching plants shall be currently approved as concrete suppliers by the New York State Department of Transportation.

Retain "Testing Agency Qualifications" Paragraph below if testing fence grounding.

* + - * 1. Testing Agency Qualifications: For testing fence grounding; member company of NETA or an NRTL.

Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

Use article below for new correctional facilities.

* + - 1. MAINTENANCE
         1. Extra Materials: Furnish ratchet tool and 100 (one hundred) stainless steel twistable wire ties for installation of coils by facility personnel.
      2. DELIVERY
         1. Coordinate delivery of anchors and other accessories to be built into other Work, to avoid delay. Furnish instructions and templates as required for accurate location.
         2. The manufacturer of the prison lock keys shall notify the Director’s Representative, <**EIC Name**> at telephone number <**EIC phone number**> and the Deputy Superintendent for Security at <**Facility Name**>, <**DSA Name**> at telephone number <**DSA telephone number**>, a minimum of two days in advance of shipping keys. Ship all prison lock keys direct from manufacturer, through the United States Postal Service, via Registered Mail, Restricted Delivery, Return Receipt Requested, to:

Complete the information below. Do not use P.O. Box Numbers. Use street address, and building number if necessary, to ensure keys are delivered directly to the facility.

**Deputy Superintendent for Administration**

<**Name of Facility**>

<**Address of Facility**>

<**City, State and Zip Code**>

Paragraph below usually applies only to locks for Type “B” gates and lock for manual sliding gates. Determine if the facility uses locks from a specific manufacturer, i.e., Folger, Southern, etc. Edit paragraph below as required.

* + - 1. UNIFORMITY OF DETENTION HARDWARE
         1. Provide detention hardware specified in this section from the same manufacturer.
         2. The existing equipment at <**Facility Name**> is [**Southern Steel**][**Folger Adam**]<**other manufacturer**>. Provide [**Southern Steel**][**Folger Adam**]<**other manufacturer**> detention hardware specified in this section from [**Southern Folger Detention Equipment Company**]<**other provider**>.
      2. FIELD CONDITIONS
         1. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1. PRODUCTS
   * + 1. COMPANIES
          1. Hearne Steel Company, Inc. P.O. Box 1239 Hearne TX 77859, (979) 279-3464, [www.hearnesteel.com](http://www.hearnesteel.com).

The following two manufacturers are for locks and detention hardware.

* + - * 1. Southern Folger Detention Equipment Company, 4634 South Presa St., San Antonio, TX 78223, (210) 533-1231, [www.southernfolger.com](http://www.southernfolger.com).
        2. R.R. Brink Locking Systems, Inc. 500 Earl Road, Sherwood, IL. 60431. (815) 744-7000, [www.rrbrink.com](http://www.rrbrink.com)
        3. Tymetal Corporation, Inc., 678 Wilbur Avenue, Greenwich, NY 12834, (518) 692-9930, [www.tymetal.com](http://www.tymetal.com)
        4. Wheatland Tube Company, 700 South Dock Street, Sharon, PA 16161, (724) 342-6851, www.wheatland.com
      1. PERFORMANCE REQUIREMENTS
         1. Deflection Limits: Fence deflections shall be within the following limits:

Fabric Tension: Maximum 2 inches when tested by applying a 30 lb force at midpoint between rails and horizontally between posts for every eighth lower panel along the fence line. Measure fabric movement from the relaxed position at the point where the force is applied.

Fence Post Rigidity: Maximum 3/4 inch when a 50-lbf force is applied at midheight of every eighth post along the fence line. Measure post movement from the relaxed position at the point where the force is applied.

* + - * 1. Lightning Protection System: Maximum resistance-to-ground value of 25 ohms at each grounding location along fence under normal dry conditions.
      1. MATERIALS
         1. ASTM A1011 high-strength low-alloy steel strip/sheet steel (fy = 50 ksi):

WT-40 Fence Pipe by Wheatland Tube Company.

* + - * 1. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

Use one or more of the 3 articles below to suit fence height required. Edit posts sizes for wind, snow, soil conditions per Project locations. Line post selection based on wind speed is described in CLFMI WLG 2445.

* + - 1. STEEL FRAMEWORK (FOR FENCES UP TO 6’-0” HIGH)
         1. End Posts, Corner Posts and Pull Posts:

Pipe: 2.375 inches OD, 3.65 pounds per linear foot (Schedule 40).

Class B Steel Tubing: 2.375 inches OD, 3.11 pounds per linear foot.

* + - * 1. Line Posts:

Pipe: 1.90 inches OD, 2.72 pounds per linear foot (Schedule 40).

Class B Steel Tubing: 1.90 inches OD, 2.28 pounds per linear foot.

* + - 1. STEEL FRAMEWORK (FOR FENCES 6’-1” - 10’-0” HIGH)
         1. End Posts, Corner Posts and Pull Posts:

Pipe: 2.875 inches OD, 5.79 pounds per linear foot (Schedule 40).

Class B Steel Tubing: 2.875 inches OD, 4.64 pounds per linear foot.

* + - * 1. Line Posts:

Pipe: 2.375 inches OD, 3.65 pounds per linear foot (Schedule 40).

Class B Steel Tubing: 2.375 inches OD, 3.11 pounds per linear foot.

* + - * 1. Light Posts:

Pipe: 4 inches OD, 9.11 pounds per linear foot (Schedule 40).

Class B Steel Tubing: 4 inches OD, 6.56 pounds per linear foot.

* + - 1. STEEL FRAMEWORK (FOR FENCES 10’-1” - 16’ HIGH)
         1. End Posts, Corner Posts and Pull Posts:

Pipe: 4 inches OD, 9.11 pounds per linear foot (Schedule 40).

Class B Steel Tubing: 4 inches OD, 6.56 pounds per linear foot.

* + - * 1. Line Posts:

Pipe: 2.875 inches OD, 5.79 pounds per linear foot (Schedule 40).

Class B Steel Tubing: 2.875 inches OD, 4.64 pounds per linear foot.

* + - * 1. Light Posts:

Pipe: 4 inches OD, 9.11 pounds per linear foot (Schedule 40).

Class B Steel Tubing: 4 inches OD, 6.56 pounds per linear foot.

* + - 1. STEEL FABRIC
         1. One-piece widths for fence heights up to 12’-0”.

Retain "Fabric Heights and Overlap" Subparagraph below for two-piece fabric for fence heights above 12’-0”.

* + - * 1. Fabric Heights and Overlap: Two-piece height with lower fabric height of <**Insert dimension**> and upper fabric height of <**Insert dimension**>.

Use 3/8 inch mesh in two paragraphs below if required.

* + - * 1. Chain link:

2-inch mesh, No. 9 gauge

3/8-inch mesh, No. 11 gauge.

* + - * 1. Selvages:

2-inch mesh, Top edge and bottom edge twisted and barbed.

3/8-inch mesh, Top edge and bottom edge knuckled.

* + - 1. SWING GATE POSTS

Use one (or more) of the 4 paragraphs below.

* + - * 1. Single width of gate up to 6’-0” wide and less than 10’-0” high:

Pipe: 2.875 inches OD, 5.79 pounds per linear foot (Schedule 40).

Class B Steel Tubing: 2.875 inches OD, 4.64 pounds per linear foot.

* + - * 1. Single width of gate 6’-0” to 12’-0” wide or over 10’-0” high:

Pipe: 4 inches OD, 9.11 pounds per linear foot (Schedule 40).

Class B Steel Tubing: 4 inches OD, 6.56 pounds per linear foot.

* + - * 1. Single width of gate 12’-0” to 18’-0” wide:

Pipe: 6.625 inches OD, 18.97 pounds per linear foot (Schedule 40).

* + - * 1. Single width of gate over 18’-0” wide:

Pipe: 8.625 inches OD, 24.70 pounds per linear foot (Schedule 30).

* + - 1. SWING GATE FRAMES

Use one (or more) of the 3 paragraphs below.

* + - * 1. Up to 6’-0” high, and leaf width 8’-0” or less.

Pipe: 1.660 inches OD, 2.27 pounds per linear foot (Schedule 40).

Class B Steel Tubing: 1.660 inches OD, 1.84 pounds per linear foot.

* + - * 1. Height: 6’-0” - 12’-0”, or leaf width exceeding 8’-0”:

Pipe: 1.90 inches OD, 2.72 pounds per linear foot (Schedule 40).

Class B Steel Tubing: 1.90 inches OD, 2.28 pounds per linear foot.

* + - * 1. Height: 12’-1” - 20’-0”.

Pipe: 2.375 inches OD, 3.65 pounds per linear foot (Schedule 40).

Class B Steel Tubing: 2.375 inches OD, 3.11 pounds per linear foot.

* + - * 1. Assemble gate frames by welding. Install mid-height horizontal rails on gates over 6 feet high. When width of gate leaf exceeds 10 feet, install mid-distance vertical bracing of the same size and weight as frame members. When either horizontal or vertical bracing is not required, provide truss rods as cross bracing to prevent sag or twist.

Use article below if sliding gates are required.

* + - 1. SLIDING GATE FRAMEWORK

Select one of the 2 paragraphs below. Use either paragraph for overhead type and cantilever type.

* + - * 1. Posts

Pipe: 4 inches OD, 9.11 pounds per linear foot (Schedule 40).

Class B Steel Tubing: 4 inches OD, 6.56 pounds per linear foot.

Use paragraph below if overhead type is required.

* + - * 1. Frames:

Pipe 1.90 inches OD, 2.72 pounds per linear foot (Schedule 40).

Class B Steel Tubing: 1.90 inches OD, 2.28 pounds per linear foot.

Use article below if Type “B” or “C” gates are required.

* + - 1. SWING GATE HARDWARE

Use paragraph below when Type “A” gates are required.

* + - * 1. Type “A” Gates: As specified in Section 323114.

Use paragraph below when Type “B” gates are required.

* + - * 1. Type “B” Gates: As specified in Section 323114.

Use paragraph below when Type “B-1” gates are required.

* + - * 1. Type “B-1” Gates: As specified in Section 323114.

Use paragraph below when Type “C” gates are required.

* + - * 1. Type “C” Gates:

Hinges: Pressed Steel Offset 180-degree gate hinge item No. 014005 by Hearne Steel Company, Inc. or appropriate for use.

Locks: Drop bar type complete with flush plate set in concrete. For double gates provide full height drop bar and keeper. Padlock eye shall be an integral part of latch construction.

For single leaf gate latch – industrial steel latch Item No. 016424 for 2.875” post or Item No. 016427 for 4” post by Hearne Steel Company, Inc. or appropriate for use.

Use subparagraph below if vehicle gates are required.

Holdbacks for Vehicle Gates: Type which automatically engages the gate leaf and holds it in open position until manually released.

Cast or malleable hardware is not acceptable.

Use article below if sliding gates are required.

* + - 1. SLIDING GATE HARDWARE

Paragraph below is a complete high security electrically operated system and is normally used in sally ports at correctional facilities.

* + - * 1. Overhead Type, Electrically Operated: As specified in Section 323114.

Sliding gate below is used for less secure situations and is normally manually operated, but could be electrically operated.

* + - * 1. Overhead Type, Manually Operated:

Trolley: 2-ton capacity, Style 3569, with aprons by Columbus McKinnon Corp., 140 John James Audubon Pky., Amherst, NY 14228-1197, (800) 888-0985.

Manual Sliding Gate Hardware System, Fortress Heavy Duty Overhead Slide Gate by Tymetal Corporation, Inc.

Lock: Manual operation Folger Adam 806ER, keyed both sides, with 2CS cylinder shields as required. Key individually with 7 keys.

* + - * 1. Cantilever type with enclosed tracks and integral latch assembly:

Manual Sliding Gate Hardware System, Fortress Aluminum by Tymetal Corporation, Inc.

Lock: Manual operation Folger Adam 806ER, keyed both sides, with 2CS cylinder shields as required. Key individually with 7 keys.

* + - 1. FABRICATION AND MANUFACTURE

Use paragraph below if Type “A” and “B-1” gates are required and Section 111901 is not used.

* + - * 1. Personnel Gates, Type “A”, and “B-1”: As specified in Section 323114.

Use paragraph below if Type “B” gates are required and Section 323114-gate systems is not used.

* + - * 1. Lock Box for Type “B” Gates: As specified in Section 323114.
        2. Do not ship the entire assembly from the fabricating shop to the galvanizer prior to QA inspection and approval by the State or designated inspection laboratory that the assembly is in conformance with the Contract Documents.

Remove steel mill stamp, loose mill scale, loose rust, weld slag and spatter, and other detrimental material in accordance with SSPC SP-2 “Hand Tool Cleaning”, SSPC SP-3 “Power Tool Cleaning”.

* + - * 1. At the galvanizer, thoroughly clean all steel prior to galvanizing the entire assembly. Remove oil, grease, and similar contaminants in accordance with SSPC SP-1 “Solvent Cleaning”, SSPC SP-2 “Hand Tool Cleaning”, SSPC SP-3 “Power Tool Cleaning”, SSPC SP-6 “Commercial Blast Clean” or SSPC SP-7 “Brush-Off Blast Cleaning”. A QA observation will be made by the State or designated inspection laboratory that the assembly has been prepared properly.

Include paragraph below if Section 323114 is not used.

* + - 1. KEYING
         1. Key locks as specified and incorporate a keying schedule into the hardware schedule for approval.

Key changes shall be different from changes previously used at this Facility, except as noted.

Record key changes, to avoid future unintended duplication.

Furnish seven keys for each change, except as noted.

Furnish extended shank keys when required.

Use one of the two subparagraphs below.

Key locks as specified in Section 323114.

Insert keying requirements in subparagraph below. Coordinate with Hardware Specifications Writer.

Key locks as follows: <**Insert Note Here**>

* + - 1. MISCELLANEOUS MATERIALS AND ACCESSORIES
         1. Rails and Post Braces:

Pipe: 1.660 inches OD, 2.27 pounds per linear foot (Schedule 40).

Class B Steel Tubing: 1.660 inches OD, 1.84 pounds per linear foot.

* + - * 1. Fittings and Post Tops: Pressed Steel.

Fasteners: Tamper-resistant cadmium plated steel screws or #10-8 x ½” round head grade 18-8 stainless steel U-drive screw, Item No. 0172734.

* + - * 1. Stretcher Bars: One piece equal to full height of fabric up to 12 ft. high, above 12 ft. height, additional bars required, minimum cross-section 3/16 inch by 3/4 inch.
        2. Metal Bands (for securing stretcher bars): Pressed Steel, 12-gauge minimum thickness with beveled edges.
        3. Wire Ties: Conform to American Steel Wire gauges.

For tying fabric to line posts, rails and braces: 9-gauge (.1483 inch) steel wire.

Use subparagraph below when tension wire is required.

For tying tension wire to fabric: 9-gauge (.1483 inch) galvanized steel hog rings.

Use 2 subparagraph below when security coils are required.

For tying security coils to fence fabric, barbed wire, or adjacent coils: 16 gauge (.0625 inch) 300 Series stainless steel wire.

For splicing adjoining sections of security coils: 16 gauge (.0625 inch) 300 Series stainless steel wire, or 11 gauge (.1205 inch) 300 Series stainless steel hog rings.

For splicing overlapped fabric at bottom rail: 9-gauge (.1483 inch) galvanized steel hog rings.

* + - * 1. Truss Rods: 3/8-inch diameter with threaded end to be utilized with a pressed steel industrial truss rod tightener.
        2. Concrete: (Class F1 as defined by ACI 318-14 Section 19.3.1) Portland Cement concrete having a minimum compressive strength of 3500 psi at 28 days, maximum water/cement ratio of 0.55, target air content of 5% +/- 1%. The design mix shall be procured from a NYSDOT approved concrete supplier. Retarding Admixture: ASTM C 494, Type D, Water-reducing and retarding, for use in hot weather concreting, and on the New York State Department of Transportation’s current “Approved List”.
        3. Spiral Paper Tubes:

Sonotube by Sonoco Products Co., North Second St., Hartsville, SC 29550, (800) 377-2692.

Quik-Tube by Quikrete Companies, 5 Concourse Parkway, Suite 1900, Atlanta, GA 30328, (800) 282-5828.

Approved eqivalent.

* + - * 1. Cold Galvanizing Compound: Single component compound giving 93 percent pure zinc in the dried film and meeting the requirements of DOD-P-21035A (NAVY).

Use paragraph below if tension wire is required.

* + - * 1. Tension Wire: Galvanized 7-gauge coiled spring steel wire: ASTM A824.

Use 2 paragraphs below if overhead sliding gates are required.

* + - * 1. Steel Angles, Channels, M and S Shapes: ASTM A36 (36 ksi) or ASTM A572 (50 ksi), Wide Flage Steel Beams ASTM A992 (50 ksi).
        2. Bolts and Nuts: ASTM A307, Grade A.

Use 3 paragraphs below if required.

* + - * 1. Expansion Anchors: ¾ inch diameter with a minimum 4-3/4” embedment depth

Stainless Steel KWIK Bolt 3 (KB3) by Hilti, Inc. [www.hilti.com](http://www.hilti.com); 1-800-879-8000.

Stainless Steel Wedge Anchors -RedHead Trubolt by ITW Commercial Construction, [www.itwredhead.com](http://www.itwredhead.com); 1-800-899-7890.

Stainless Steel Wedge Anchor -Confast by Concrete Fastening Systems, Inc., [www.confast.com](http://www.confast.com); 216-357-7431.

* + - * 1. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout, recommended in writing by manufacturer, for exterior applications.

Use 3 paragraphs below if stone is required between fences, and earthwork section is not included.

* + - * 1. Crushed Stone, All Gradations: Crushed stone only. Comply with all material, physical, and gradation requirements of DOT Article 703-02.
        2. Woven Filter Fabric for Filtration and Separation of Dissimilar Soils: Propex Geotex 4x4 HF, TenCate Mirafi HP570, Carthage Mills FX-400MF.

High-security chain-link fences and gates require grounding for lightning protection of personnel and property. Retain first paragraph below to require a UL Master Label or LPI System Certificate.

* + - * 1. Grounding Materials: Comply with requirements in Section 260526 "Grounding and Bonding."

Connectors and Grounding Rods- Listed and labeled for complying with UL 467.

Connectors for below-grade use: exothermic welded type.

Grounding Rods: Copper-clad steel, 5/8 inches by 96 inches.

Use article below if barbed wire is required.

* + - 1. BARBED WIRE
         1. Two strand 12-1/2-gauge steel wire, with 14 gauge 4-point steel barbs spaced 5 inches oc.
         2. Extension Arms: Pressed steel, extra heavy one piece 45 angle barb arm, Item No. 013822 to 013829 by Hearne Steel Company, Inc. complete with provision for anchorage to posts (including light posts) and attaching 3 rows of barbed wire to each arm and meeting 250 lbs. downpull.

Use one (or more) of the 3 subparagraphs below.

Type: Single 45-degree arm; one for each post.

Type: Single vertical arm; one for each post.

Type: Vee-Type with 2 arms at 45 degree to vertical; one set for each post.

Use 3 articles below if security coils are required.

* + - 1. FIVE FOOT DIAMETER SECURITY COILS
         1. Concertina Type: Minimum 51 coil loops fabricated by wrapping a barbed tape made of AISI 430 stainless steel, whose hardness is optional, around a 300 series austenitic stainless-steel core wire. Diameter of the core wire shall be 0.098 inch plus or minus 0.002 inch and the tensile strength shall be a minimum of 140,000 psi. The barbs shall be offset from the plane of the core wire. Outside diameter of the coil loops shall be 60 inches (plus or minus 2 inches). Each loop shall consist of 45 (plus or minus one) clusters of four needle sharp barbs on four-inch centers, each barb measuring a minimum of 1.2 inches in length.

Adjacent coil loops shall be attached alternately at 9 points of equal spacing about the circumference with stainless steel flat metal band type clips approximately 0.375-inch-wide and 0.065 inch thick. These clips shall prevent the coil loops from being pulled apart at each point of attachment when a minimum 200-pound load is applied, as specified in the barbed tape test procedure. Wrapping of barbed tape about the line wire shall be accomplished within the tolerances specified in MIL-B-52489E, except that the tape shall be wrapped a minimum of 230 degrees and shall satisfy the push test specified therein.

Extended length shall be 25 feet (plus or minus 2 feet), with a maximum spacing between loops of 12 inches.

* + - 1. THIRTY INCH DIAMETER SECURITY COILS
         1. Concertina Type: Minimum 51 coil loops fabricated by wrapping a barbed tape made of AISI 430 stainless steel, whose hardness is optional, around a 300 series austenitic stainless-steel core wire. Diameter of the core wire shall be 0.098 inch plus or minus 0.002 inch, and the tensile strength shall be a minimum of 140,000 psi. The barbs shall be offset from the plane of the core wire. Outside diameter of the coil loops shall be 30 inches (plus or minus 2 inches). Each loop shall consist of 24 (plus or minus one) clusters of four needle sharp barbs on four-inch centers, each barb measuring a minimum of 1.2 inches in length.

Adjacent coil loops shall be attached alternately at 5 points of equal spacing about the circumference with stainless steel flat metal band type clips approximately 0.375 inch-wide and 0.065 inch thick. These clips shall prevent the coil loops from being pulled apart at each point of attachment when a minimum 200-pound load is applied, as specified in the barbed tape test procedure. Wrapping of barbed tape about the line wire shall be accomplished within the tolerances specified in MIL-B-52489E, except that the tape shall be wrapped a minimum of 230 degrees and shall satisfy the push test specified therein.

Extended length shall be 25 feet (plus or minus 2 feet), with a maximum spacing between loops of 12 inches.

* + - 1. SOURCE QUALITY CONTROL
         1. Test Procedure - Barbed Tape Security Coils: The company producing the security coils shall have test facilities available which can demonstrate that the security coils meet the following requirements.

Sampling; before delivery to job site: Samples for quality conformance inspections shall be selected in accordance with MIL-STD-105, sampling level S-1, AQL 2.5. A unit of product for sampling shall be one complete unit no less than ten feet in length.

Test Equipment: The test equipment for applying and measuring force shall be capable of measuring a minimum force of 200 pounds and shall be calibrated prior to each test with standards traceable to the National Bureau of Standards.

Test Specimen: The test specimen shall consist of 2 segments of barbed tape, taken from adjacent coil loops, each at least one- foot-long, containing and centered upon a point of attachment. This attachment shall be prepared in the normal course of production.

Test Preparation: A pair of one inch, plus or minus 0.1-inch, cubic back-up blocks shall be centered on each side of the attachment point, in as close as possible contact with the major surfaces of the barbed tape. Barbs adjacent to the attachment point may be removed to simplify the testing process. Each leg of each barbed tape segment shall be bent at a 90-degree angle so that each segment has a major surface in contact with 3 adjoining faces of a back-up cube and so that ends of each segment are parallel to each other and to the axis of the attachment. Each back-up cube shall then be restrained in place by spot welding a straining strap to each leg of a segment so that the strap is in continuous contact with the cube face opposite the point attaching the 2 segments.

Test: Two ends of one of the test segments, prepared per above, shall be joined and rigidly attached to a structure so that the retaining structure, with said attachment, will survive a minimum tensile load of 200 pounds without deflection or slippage. The 2 ends of the opposite segment shall be joined and attached to the test apparatus so that said attachment will survive a minimum tensile load of 200 pounds, without any slippage. The test equipment above shall then be used to apply up to a 200-pound minimum force (through the adjacent coil loop segment attachment point) away from the rigid retaining structure. After reaching a minimum 200-pound force, as measured by the test equipment, this force shall be maintained continuously for a least 30 seconds.

Test Results: At the completion of the 30-second pull test, the test specimen shall be removed from the attachments to the rigid retaining structure and to the test equipment. The back-up blocks shall be removed from the test specimen and each segment of the barbed tape shall be examined for breaks, cracks, or separation around their mutual attachment point. The test specimen shall have failed this test if any of the above have occurred or a 200-pound minimum pull cannot be applied continuously for 30 seconds.

* + - 1. FINISHES

Edit finishes below to suit Project. Use paragraph below for both galvanized and aluminum finished fabric.

* + - * 1. Steel Framework:

Pipe: Galvanized in accordance with ASTM A 53, 1.8 ounces zinc per square foot.

Square Tubing: Galvanized in accordance with ASTM A 123, 2.0 ounces zinc per square foot.

Class B Steel Tubing: Exterior; 1.0 ounces zinc per square foot plus chromate conversion coating and clear polyurethane. Interior; zinc rich organic coating.

Use 3 subparagraphs above or subparagraph below to suit as required.

Polyvinyl Chloride (PVC): Black plastic finish, fusion bonded to galvanized metal, minimum thickness 10 mils.

* + - * 1. Fabric; one of the following:

Galvanized Finish: ASTM A 392 class II zinc coated after weaving, with 2.0 ounces per square foot.

Aluminized Finish: ASTM A 491 aluminum coated with 0.40 ounces per square foot.

Use 2 subparagraphs above or subparagraph below to suit as required. If using 3/8”, 11 gauge steel fabric, select breaking strength of 850 pounds.

Polyvinyl Chloride (PVC) Finish: Black plastic, fusion bonded to galvanized wire, breaking strength, [**850 pounds**][**1290 pounds**], minimum thickness 7 mils. Coating in compliance with ASTM F688 Class 2b.

* + - * 1. Fence and Gate Hardware, Miscellaneous Materials, Accessories:

Wire Ties and Hog Rings: Galvanized Finish, ASTM A 90 1.6 ounces zinc per square foot, or aluminized finish, ASTM A 809 0.40 ounces per square foot.

Hardware and Miscellaneous Items: Galvanized Finish, ASTM A 153 (Table 1).

Use subparagraph below if barbed wire is required.

Extension Arms: Hot-dip galvanized after fabrication, ASTM 123, 2.0 ounces zinc per square foot.

Angle Beams, I Beams, and Steel Shapes: Galvanized in accordance with ASTM A 123, 2.0 ounces zinc per square foot.

Use 4 subparagraphs above or subparagraph below as required.

PVC coated, per manufacturer’s standards.

Edit paragraph below as required.

* + - * 1. Barbed Wire and Tension Wire; one of the following:

Galvanized Finish: ASTM A 121 class 3, 0.80 ounces per square foot.

Aluminized Finish: ASTM A 585 class 2, 0.30 ounces per square foot.

Use 2 subparagraphs above or subparagraph below as required.

PVC Coated: ASTM F1665-08.

1. EXECUTION
   * + 1. PREPARATION

Edit 2 paragraphs below as required.

* + - * 1. Begin installation of any fencing and or gates when rough grading has been completed within 4 inches of finish grading.
        2. Clear and grub along fence line as required to eliminate growth interfering with alignment. Remove debris from State property.
        3. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.
      1. INSTALLATION

Revise Paragraph below for unusual load conditions. Posts are usually spaced 10 feet o.c..

* + - * 1. Space posts equidistant in the fence line with a maximum of [**10 feet on center for fences under 16 feet in height**] [**and**] [**8 feet on center for fences 16 feet and higher**]. Post spacing can be reduced to avoid underground utilities and returned spacing as soon as practical to standard spacing.
        2. Setting Posts in Earth: Drill holes for post footings. Set posts in approximate center of hole and fill hole with concrete utilizing two-foot spiral paper tube within four inches of finished grade. When soil conditions warrant, use spiral paper tubes to maintain holes to set posts. Plumb and align posts. Vibrate or rod tamp concrete for consolidation. Finish concrete in a dome shape to shed water. Do not attach fabric to posts until concrete has cured a minimum of 7 days.

Use paragraph below with rock.

* + - * 1. Setting Posts in Rock: Drill holes into solid rock one inch wider than post diameter, 18 inches deep for end, pull, corner, and gate posts, and 12 inches deep for line posts. Set posts into holes and fill annular space with shrink-resistant grout. Provide spiral paper tubes to maintain footing diameter as required.
        2. Brace assembled sections until permanently secured in place to prevent displacement or distortion of the members. Do not utilize welding methods, nails or screws in conjunction with metal bracing to support post when plumbing or securing posts that may damage galvanization.
        3. If post tops or extension arms will not be installed prior to impending rain, provide temporary covers over tops of posts to prevent posts from filling with water.
        4. Locate corner posts at corners and at changes in direction. Use pull posts at all abrupt changes in grade and at intervals no greater than 500 feet. On runs over 500 feet, space pull posts evenly between corner or end posts. On long curves, space pull posts so that the strain of the fence will not bend the line posts.
        5. Install top rail continuously through post tops or extension arms, bending to radius for curved runs. Install expansion couplings as recommended by fencing manufacturers.

Edit paragraph below to agree with rails indicated.

* + - * 1. Install bottom and intermediate rails in one piece between posts and flush with post on fabric side using special offset fittings where necessary.

Use paragraph below when intermediate rail is not used throughout.

* + - * 1. Brace corner posts, pull posts, end posts, and gate posts to adjacent line posts with horizontal rails.
        2. Diagonally brace corner posts, pull posts, end posts, and gate posts to adjacent line posts with truss rods and truss rod tighteners were fence lines have two or more-line posts.
        3. Attach fabric to security side of fence. Maintain a 2-inch clearance above finished grade except when indicated otherwise. Thread stretcher bars through fabric using one bar for each gate and end post and 2 for each corner and pull post. Pull fabric tight so that the maximum deflection of fabric is 2 inches when a 30-pound pull is exerted perpendicular to the center of a panel. Maintain tension by securing stretcher bars to posts with metal bands spaced 15 inches oc. Fasten fabric to steel framework with wire ties spaced 12 inches oc for line posts and 24 inches oc for rails and braces. Bend back wire ends to prevent injury. Tighten stretcher bar bands, wire ties, and other fasteners securely.

Use subparagraph below when height of fabric, including buried fabric (if any) is not12 feet or less.

When fabric height exceeds 12 feet, overlap horizontal splices a minimum of 6 inches at the intermediate rail, and secure each layer of fabric to the rail with wire ties spaced 24 inches oc. Offset ties so maximum distance between any tie does not exceed 12 inches.

When fabric is indicated to be buried, the buried portion of fabric shall be separate from the main fence fabric. Overlap fence fabric and buried fabric a minimum of 6 inches at the bottom rail. Secure fence fabric to bottom rail with wire ties spaced 24 inches oc. Secure buried fabric to fence fabric, above the bottom rail, with hog rings spaced 12 inches oc. The buried fabric shall not be secured directly to the bottom rail.

To prevent settlement of the buried fabric during backfill operations, the buried fabric may be temporarily attached to the bottom rail. Remove all such temporary ties after backfilling is complete. Should any fence components become distorted as a result of installation or settlement of buried fabric, untie all fabric, re-align fence members, and re-tie fabric.

Pre-formed ties to secure the fence fabric, the “pigtail” for all ties at the 8-foot-high level and below shall be bent down parallel with the fence posts and/or rails.

* + - * 1. Position bolts for securing metal bands and hardware so nuts are located opposite the fabric side of fence. Tighten nuts and bend bolts downwards with a minimum angle of 30 degrees. Bend bolt ends of all bolts below a height of 8 feet to prevent loosening or removal of nuts.
        2. Secure post tops and extension arms with tamper-resistant cadmium plated steel screws or #10-8 x ½” round head grade 18-8 stainless steel U-drive screws.
        3. Install gates plumb and level and adjust for full opening without interference. Install ground-set items in concrete for anchorage, as recommended by fence manufacturer. Adjust hardware for smooth operation and lubricate where necessary.

Use paragraph below when an electric fence alarm system is specified elsewhere. Paragraph below is not needed if only a microwave alarm system is used. Coordinate with electrical team members.

* + - * 1. Fence Alarm System: Where a fence mounted alarm/detection system is required, install the fence in a manner that will permit satisfactory operation of the alarm/detection system. Conform to the following:

Eliminate fabric vibrations and rattles caused by wind against posts and rails for appropriate operation and usage of the detection system mounted on fence. Install additional wire ties or hog rings where necessary to prevent vibrations and rattles.

Eliminate rattles from bolted end fittings and other component connections by applying additional tightening or diagonal truss rods secured to fabric with hog rings.

Eliminate rattles from stretcher bar bands, truss rods, rail and post clamps, and other hardware.

Isolate gates from fencing to prevent transference of vibration.

Use paragraph below if tension wire is specified.

* + - * 1. Tension Wire: Where tension wire is indicated or required, weave tension wire through fabric or fasten with hog rings spaced 24 inches oc. Tie tension wire to posts with 9-gauge wire ties.

Use 2 paragraphs below if security coils are specified.

* + - * 1. Concertina Type Security Coils: Install in accordance with the manufacturer’s printed instructions and meeting the following minimum requirements:

Install security coils with coil loops (apertures) equally spaced 12 inches oc (plus or minus 2 inches).

Secure coils to the top of the fence by attaching each coil loop where it intersects the barbed wire and the top of the fabric with twistable stainless-steel wire ties spaced at a minimum of 12 inches oc (plus or minus 2 inches).

Secure coils to the side of the fence by attaching each coil loop where it intersects the fence fabric, and any adjacent coils, with twistable stainless-steel wire ties. Attach adjacent coils to each other where every other loop intersects or at 36 inches oc maximum.

Where security coils are placed on the ground, anchor each coil to the ground at 5-foot intervals using anchors formed from galvanized No. 3 reinforcement bars. Each reinforcement bar anchor shall have a 2-inch hook formed at the top and shall be driven a minimum of 30 inches into the ground.

Splices: Splice successive units to adjacent coil loops by overlapping end loops a minimum of two barbed clusters to form one continuous obstacle.

Permanently attach barb roots together with twistable stainless-steel wire ties or stainless-steel hog rings.

Cross-tie barb roots with 2 stainless steel twistable wire ties or 2 stainless steel hog rings on both barbs of a 2-barb splice or the center barb of a 3-barb splice, and at all points of the splice where factory clips are installed on adjoining sections of continuous coil.

* + - * 1. Grounding method along secure perimeter: At each grounding location (every 300 feet of fencing), drive a grounding rod vertically until the top is 12 inches below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence post at grounding location 6 inches below grade. Ground fence on each side of gates and other fence openings.
        2. Grounding Connections: Make connections with clean, bare metal at points of contact.

Make below-grade ground connections with exothermic welds.

Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

* + - * 1. Wire brush and repair welded and abraded areas of galvanized surfaces with one coat of cold galvanizing compound.
        2. Restore disturbed ground areas to original condition. Topsoil and seed to match adjacent areas.
      1. STONE GROUND COVER
         1. Filter Fabric: Install Filter Fabric continuously between double-row chain-link fence installation, overlapping edges and punctures 12 inches.
         2. Crushed Stone: Lay continuous 4-inch-deep bed of #1 crushed stone over Filter Fabric (Separation).
      2. FIELD QUALITY CONTROL
         1. Testing Agency: [**Director’s Representative will engage**] [**Engage**] a qualified testing agency to perform the following tests:

Chain Link Fabric Testing: Test fabric tension according to “Deflection Limits” paragraph in “Performance Requirements” Article.

Fence Post Rigidity Testing: Test line posts for rigidity according to "Deflection Limits" Paragraph in "Performance Requirements" Article.

Grounding Tests: Comply with requirements in Section 264113 "Lightning Protection for Structures."

* + - * 1. Prepare test report and submit to Director’s Representative.
        2. Inspections of the following items to be performed by the Director’s Representative, but not limited to:

Verify approved shop drawings, product data, samples match materials on site.

Verify selvages- top and bottom edge of chain link fabric is twisted and barbed.

Posts and rails shall be continuous without splices.

Verify the grades have been set before installing posts.

Verify post alignment, center of footing and spacing (vibrate concrete).

Tickets for concrete batch plants meets specified concrete mix.

Finish grade of concrete should shed water.

Verify depth of fence and gate footings.

Brace posts until permanently set, no welding methods allowed to brace posts.

Install post tops prior to impending rain.

Schedule inspections at gate manufacturer, pre and post galvanization inspections to happen at the galvanizer.

Coordinate locks and shipment of keys to the Facility Director.

Verify keying schedule.

Swing Gates: Verify three hinges are installed with one flipped upside down per security standard.

Vehicle, Pedestrian Slide Gates installation to be overseen by qualified installer.

Install rails using offset fitting to keep chain link fabric flush on fabric side.

Chain Link Fabric installed on secure side.

2-inch clearance above finished grade for bottom rail.

Verify steel ties are used to secure fabric rails and post, and proper number of twists and spacing have been performed.

Nuts are located opposite the fabric (secure) side.

Bend bolts min. 30 degrees towards ground below the 8 ft. height.

Install gates plumb.

Install security coils with proper ties.

5 ft diameter security coils used, verify the anchors size and spacing.

* + - 1. ADJUSTING
         1. Gates: Adjust operative units and equipment to work freely and easily, free of binding, warp, excessive deflection, distortion, nonalignment, disruption, or malefaction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
         2. Gate Operator: Energize circuits to electrical equipment and devices, start units, and verify proper motor rotation and unit operations per manufacturer’s specification.
         3. Field lubricate operating and locking systems and related components in accordance with the manufacturer’s maintenance instructions. Test and adjust equipment. Replace damaged and malfunctioning controls and equipment.
      2. DEMONSTRATION
         1. Fence contractor to train Facility’s maintenance personnel to adjust, operate and maintain chain-link fences and gates.

END OF SECTION 323113.53