STANDARD SPECIFICATIONS
SECTION 02820
FENCES AND GATES

PART 1 GENERAL

1.1 DESCRIPTION

A. Section includes requirements for providing chain link fencing, gates, and accessories.

1.2 SUBMITTALS

A. Submit following Section 01330.
   1. Cross sectional dimensions of posts, braces, rails, fittings, accessories, and gate frames, design of gates and details of gate hardware.
   2. Spacing of posts and location of gates, abrupt changes in grade, and corner, gate, anchor, end, and pull posts.
   3. PVC coating color sample for proposed color.

PART 2 PRODUCTS

2.1 MATERIALS

A. Chain Link Fencing and Accessories: FS RR-F-191 K/GEN as modified herein.

B. Fabric: Fabricated from minimum 9-gage, 0.148 inch diameter wire, helically wound and interwoven to provide continuous 2-inch nominal mesh without knots or ties except selvages.
   1. Attach tags to every roll, indicating mesh size, coating weight, and wire gage.
   2. Height: See Drawings.
   3. Selvage: Twisted and barbed at top and bottom except top selvage may be knuckled when top rail is provided.
   4. Individual Fabric Ties: Same material as fabric for attaching fabric to line posts and top and bottom tension wires or rails.
   5. Gate Fabric: Same material as fabric for fencing.

C. Posts and Accessories.
   1. Posts: Tubular with appropriate caps driven to fit over outside section to exclude moisture.
   2. Top Rails, Braces, Tie Rods, Stretcher Bars, and Accessories: Shape, dimensions, and weights following Contract Documents.

D. Gates.
   1. Frames: Round or square tubular members, paint welds with zinc-base, aluminum-base or polyvinyl chloride paint as applicable.

2. Leaves: Space intermediate bracing so no members are more than 8 feet apart.
3. Barbed Wire Top: When shown on Drawings, extend end of gate frame members at least 1 foot above top horizontal member and attach 3 strands of barbed wire, uniformly spaced, by means of bands, clips, or hook bolts.
4. Fabric: Shop-attach gate fabric to gate frame at intervals of not more than 15 inches.
5. Each Installation: Fittings and accessories, including locking and padlocking device required making complete installation.
6. Hinges:
    a. Sufficient size and number to prevent twist or turn under action of gate.
    b. Arrange so closed gate cannot be lifted off its hinges.
7. Opening: Full with minimum 180 degree swing.

E. Type I, Galvanized Steel Fencing.
1. Fabric: FS RR-F-191/1D, Type I, with minimum zinc coating of 1.2 ounces per square foot.
2. Posts, Top Rails, and Braces: FS RR-F-191/3D, Grade A, with minimum zinc coating of 1.8 ounces per square foot.
    a. End, Corner, and Pull Post:
        1) Fabric 6 feet and less in height: Class 1, SP3, round, 2.375 inches outside diameter, 0.130 inch wall thickness, or Class 6, SS1, square, 2.00 inches outside dimension, 2.60 lb. per foot of length.
        2) Fabric over 6 feet in height: Class 1, SP4, round, 2.875 inch outside diameter, 0.160 inch wall thickness, or Class 6, SS2, square, 2.50 inches outside dimension, 5.10 lb. per foot of length.
    b. Line and Intermediate Posts:
        1) Fabric 6 feet and less in height: Class 1, SP2, round, 1.90 inches outside diameter, 0.120 inch wall thickness.
        2) Fabric over 6 feet in height: Class 1, SP3, round, 2.375 inches outside diameter, 0.130 inch wall thickness, or Class 6, SS1, square, 2.00 inches outside dimension, 2.60 lb. per foot of length.
    c. Gate Posts:
        1) Fabric 6 feet and less in height: Class 1, SP4, round, 2.875 inches outside diameter, 0.160 inch wall thickness, or Class 6, SS2, square, 2.50 inches outside dimension, 5.10 lb. per foot of length.
        2) Fabric over 6 feet: Class 1, SP5, round, 4.0 inches outside diameter, 0.226 inch wall thickness.
3. Accessories: FS RR-F-191/4D, with minimum zinc coating of 1.2 ounces per square foot.
4. Gates: FS RR-F-191/2C with same fabric as used for fence.
    a. Framing: Class 1, SP2, round, 1.90 inches outside diameter, 0.120 inch wall thickness, or Class 6, SS1, square, 2.00 inches outside dimension, 2.60 lb. per foot of length.
    b. Coating: Zinc coated after fabrication, with minimum zinc coating of 1.8 ounces per square foot.

5. Barbed Wire: ASTM A121, using 12-1/2 gauge wire with 14 gauge barbs, round, four points, spaced at maximum of 4 inches on center, with minimum zinc coating of 0.80 ounces per square foot.

F. Type II, Aluminum Alloy or Coated Steel Fencing.
   1. Fabric: FS RR-F-191/1D, Type II or III with minimum aluminum coating on steel wire of 0.40 ounces per square foot.
   2. Post, Top Rail, and Braces: FS RR-F-191/3D.
      a. End, corner and pull post:
         1) Fabric 6 feet or less in height: Class 2, AP3, 2.351 inches outside diameter, 1.264 lb. per foot of length or Class 7, AS1, square, 2.50 inches outside dimension, 1.25 lb. per foot of length.
         2) Fabric over 6 feet in height: Class 2, AP5, round, 3.960 inches outside diameter, 3.151 lb. per foot of length or Class 7, AS3, square, 3.00 inches outside dimension, 2.45 lb. per foot of length.
      b. Line and intermediate posts:
         1) Fabric 6 feet or less in height: Class 2, AP2, round, 1.869 inches outside diameter, 0.940 lb. per foot of length.
         2) Fabric over 6 feet in height: Class 2, AP4, round, 2.846 inches outside diameter, 2.004 lb. per foot of length or Class 7, AS2, square 3.00 inches outside dimension, 1.40 lb. per foot of length.
      c. Gate posts:
         1) Fabric 6 feet and less in height: Class 2, AP4, round, 2.846 inches outside diameter, 2.004 lb. per foot of length or Class 7, AS2, square, 3.00 inches outside dimension, 1.40 lb. per foot of length.
         2) Fabric over 6 feet in height: Class 2, AP5, round, 3.960 inches outside diameter, 3.151 lb. per foot of length.
   3. Accessories: FS RR-F-191/4D.
   4. Gates:
      a. FS RR-F-191/2D with fabric same as used for fence.
      b. Framing: Class 2, AP2, round, 1.869 inches outside diameter, 0.940 lb. per foot of length or Class 7, AS1, square, 2.50 inches outside dimension, 1.25 lb. per foot of length.
   5. Barbed wire: ASTM A121, using 12-1/2 gauge wire with 14 gauge barbs, round, four points, spaced at maximum of 4 inches on center with minimum aluminum coating of 0.30 ounce per square foot.

G. Type IV, Polyvinyl Chloride Coated Steel Fencing.
   1. Fabric: FS RR-F-191/1D, Type IV, with minimum zinc coating of 0.30 ounces per square foot and minimum PVC coating of 0.007 inch.
      a. Color: Unless otherwise indicated, dark green.
   2. Posts, Top Rail, and Braces: FS RR-F-191/3D with polyvinyl chloride coating thickness of not less than 0.010 inch.
   3. Dimensions: Same as required for Type I, galvanized steel fencing or Type II aluminum alloy or coated steel fencing.

4. Accessories: FS RR-F-191/4D with polyvinyl chloride coating of not less than 0.007 inch.
5. Gates:
    a. FS RR-F-191/2D with fabric same as used for fence.
    b. Dimensions: Same as required for Type I and Type II fencing with polyvinyl chloride coating of not less than 0.010 inch.
6. Barbed Wire: ASTM F1665-01, using 12-1/2 gauge wire with 14 gauge barbs, round, four points, spaced at maximum of 4 inches on center and with polyvinyl chloride coating of not less than 0.007 inch.

H. Fan Guards: Same type materials as fence of which they are a part.

I. Padlocks: Furnished by the Commission.

J. Touch-Up Paint
1. Galvanized: Zinc-rich paint, See ASTM A780.
2. Aluminum: Approved paint recommended by manufacturer.
3. Polyvinyl Chloride: Approved vinyl paint recommended by manufacturer.

K. Concrete: 3000 psi, see Section 03300.

L. Grout: Mixture of 1 part cement to 3 parts concrete sand with required water added for placing.

M. Non-Shrink Grout: See Section 03300.

PART 3 EXECUTION

3.1 FENCE INSTALLATION

A. Clearing: Perform necessary clearing, excavation, and filling to provide clear line-of-fence runs.

B. Encasement.
1. Post:
    a. Extend concrete at least 4 inches below bottom of posts.
    b. Extend concrete to 1 inch above ground line at posts and slope to drain away from posts.
    c. Encase minimum 10 inch diameter for line posts and 12 inch diameter for end, corner, pull, and gate posts.
    d. Coat aluminum alloy posts with approved zinc chromate paint from bottom to 2 inches above concrete, prior to placement and touch up with specified aluminum paint after concrete is placed.
2. Fence Encasement:
    a. 5 feet and less in height: Minimum of 2.5 feet deep.
    b. Over 5 feet in height: Minimum of 3.0 feet deep.

3. Gate Post Encasement:
    a. For gates with swing of 6 feet and less: Minimum of 3.0 feet deep.
    b. For gates with swing over 6 feet: Minimum of 3.0 feet deep and at least 16 inch diameter.

C. Post Placement.
1. Evenly space posts at not more than 10 feet or less than 8 feet on centers. Place additional posts at each change in line and abrupt change in grade.
2. Posts on rock: Drill holes 2 inches deeper than depth shown or specified.
    a. Drill holes 2 inches greater all around than outside diameter of post or square section.
    b. Fill rock portion of hole with grout.
3. Posts on Concrete Structure: Cast section of steel pipe at least 12 inches long in concrete at correct location for fence posts.
    a. Steel pipe sleeve: Inside diameter not more than 3/8 inch larger all around than post to be inserted.
    b. Grout fence posts into steel pipe with non-shrink grout.
4. Set corner or pull posts at each horizontal or vertical angle point of 15 or more degrees and at no more than 500-foot intervals.
5. Set corner, end, and pull posts with horizontal or diagonal brace rail and tie rod to nearest line post.

D. Rails, Tension Wire, and Braces.
1. After posts are installed and concrete has set firmly, place top rail or tension wire, following Drawings, and bottom tension wire approximately 4 inches above grade.
    a. Anchor and brace end, corner, and pull posts before hanging fabric.
    b. Brace gate posts for fabric 6 feet or more in height.

E. Fabric Placement.
1. Secure ends of fabric using tension bars threaded through loops in fabric, and secure to posts by means of bands with bolts and nuts.
2. Splice fabric lengths together by reweaving without breaking continuity of knuckled or twisted and barbed selvage.
3. Place fabric by securing 1 end and applying sufficient tension by means of mechanical fence stretchers to remove slack before making attachments.
4. Fasten fabric with appropriate tie wires to top rails and bottom tension wire at 24 inches on center maximum, and to posts at 15 inches on center maximum.
5. Hold bottom of fabric uniformly as possible to not more than 2 inches above finished grade.

F. Barbed Wire: Where indicated, provide 3 strands of barbed wire above fence fabric.
1. Stretch strands to remove sag and anchor firmly to extension arms.
2. Incline extension arms on line posts away from the Commission property at approximately 45 degree angle.
3. Make extension arms on corner posts and gates vertical.
4. When barbed wire is required, use tension wire at top of fabric instead of top rail.

G. Gates:
   1. Install fence gates, gate stops, and fan guards as shown.
   2. Locate gate stops set in concrete accurately so that gate stop or latch can be fully engaged.

H. Line Post Anchorage: Acceptable Alternate Method.
   1. Drive post into ground and hold rigidly in position by means of 2 steel angle anchors driven diagonally and attached to post on opposite sides.
   2. Anchors, attachments, and methods: Follow MSHA Standard Details.

3.2 DEFECTIVE WORK

A. Remove and replace fencing improperly located, not true to line and grade, and unplumb posts.

B. Remove loose and cracked zinc coating and repair damaged galvanizing following ASTM A780, and paint following manufacturer's recommendation.

C. Repair damaged aluminum coated components by cleaning as specified above, and painting with 2 coats of approved aluminum paint.

D. Repair damaged polyvinyl chloride by following fence manufacturer's recommendations.

3.3 EXISTING CHAIN LINK FENCE

A. When required to remove chain link fence to permit construction, remove and store fence to prevent damage.
   1. Restore fence to original location following applicable requirements herein or relocate as shown.
   2. Repair damaged chain link fence or when directed, replace with applicable in-kind material following requirements specified herein.

B. When connecting to existing chain link fence, connect as shown on Drawings, or as directed, following requirements specified herein.

PART 4 MEASUREMENT AND PAYMENT

4.1 FENCING

A. Measurement: By linear foot for each type and height actually placed when listed on Bid Schedule.

B. Payment: At unit price for each linear foot listed in Bid Schedule.
   1. Payment includes provision of posts, post foundations, fabric, fittings, and all accessories and incidentals required for complete fence installation.

C. When no item is provided in Bid Schedule for fencing, no measurement for payment will be made, but cost will be considered incidental to Contract.

4.2 GATES

A. Measurement: By each of various type, size, and height actually placed when listed in Bid Schedule.

B. Payment: At unit price for each listed in Bid Schedule.
   1. Payment includes provision of gates, posts, post foundations, fittings, locking devices, all accessories, and incidentals required for complete gate installation.

C. When no item is provided in Bid Schedule for gates, no measurement for payment will be made, but cost will be considered incidental to Contract.

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