FENCING

CHAIN LINK FENCE

Justification:

Prevent unauthorized entry into a secured area. Providing a secure facility enhances BNSF's position in the general marketplace.

Specifications:

General

This non-restrictive specification is for a complete chain link fence with galvanized materials. (Various options are allowed for the framework materials, all of which are non-proprietary, commercially available materials.)

Materials

Framework: All line posts, terminals, braces, top rails, gate posts and gate frames shall have all surfaces hot dip galvanized. Galvanizing shall be 2.0 ounces per square foot in accordance with ASTM A-525 designation G-235, ASTM A-53 or ASTM A-123. C-section roll formed shapes, H-section, high strength pipe or schedule 40 pipe are equal alternates where indicated.

Chain Link Fence

Line posts shall be 1.875" x .625" C-section (Std-C) weighing 2.28 lbs./ft.; or 2.375" schedule 40 pipe weighing 3.65 lbs./ft.

Terminal, brace, pull, and end posts shall be 2.875" schedule 40 pipe weighing 5.79 lbs./ft.

Brace and rail (where needed) shall be 1.625" x 1.250" C-rail weighing 1.37 lbs./ft., or 1.660" schedule 40 pipe weighing 2.27 lbs./ft. Braces shall be installed from each corner, end or gatepost to the adjacent line post.

It should be trussed from line post to terminal post with a .375" diameter galvanized truss rod and truss tightener.

Fabric shall be #9 gauge hot dip galvanized with 1.2 ounces of zinc per square foot of surface, per ASTM A-392, Class 1, 2-inch mesh. Height of fabric shall be 8 feet. Selvages shall be twist on the top of the fence and twist on the bottom.

Tension wire shall be 7 gauge, marcelled or crimped coil galvanized steel wire with 1.2 ounces of zinc per square foot of surface, per ASTM A-824. Tension wire shall be placed along top and bottom of fabric.

Fittings shall be pressed steel or cast iron of good commercial quality in conformance with ASTM F-626. Steel fittings shall be galvanized with 1.2 ounces of zinc per square foot. Gate hardware shall be structurally capable of supporting the slice, swing or cantilever gate as required.

Tie wires shall be 11 gauge and galvanized with 1.2 ounces of zinc per square foot of surface with spacing on top tension wire not to exceed 24 inches and spacing not to exceed 18 inches on intermediate posts. Pig rings shall not exceed 24 inches.

Barbed wire shall be double strand twisted, 12-1/2 gauge steel line wires with four point steel barbs spaced on approximately 4-inch centers, barbed wire shall be galvanized in accordance with ASTM 1-121. Extension arms to accommodate barbed wire shall withstand a 250 pound pull-down load from end of arm. Arms shall be "V" shaped at an angle of approximately 45° and shall be fitted with clips or other means for attaching six strands of barbed wire. The top wire shall be approximately 12 inches horizontally from the fence line and the other wires spaced uniformly between the top of the fence and outside strand.

Installation of chain link fence shall be per ASTM F-567, following the lines, grades and details as indicated. Posts will be set a maximum of 10 feet on center.

Terminal, end, corner and pull posts shall be set 36 inches below grade in a minimum of 12x39 inches of concrete. Terminal posts shall be braced on all fences.

Gates

Gate frames shall be tubular shaped, 1.900" O.D., schedule 40 pipe weighing 2.72 lbs./ft. Interior gate braces shall be 1.660" O.D., schedule 40 pipe weighing 2.27 lbs./ft.

Gate posts for sliding gates shall be the same as specified for terminal posts. Gate posts for swing gates shall be as follows:

6' or less	2.875" O.D., 4.64 lbs./ft.
over 6' to 12'	4.000" O.D., 6.56 lbs./ft.
over 12' to 18'	6.625" O.D., 18.02 lbs./ft.
over 18' to 24'	8.625" O.D., 27.12 lbs./ft.

Razor Ribbon Wire (Barbed Tape Obstacle)

If used in conjunction with 8-foot high chain link fence, "V" shaped barbed wire and arms should be eliminated. Terminal, line and gate posts shall extend 12 inches vertically above chain link fabric with one strand of barbed wire attached to the top of the vertical post.

Razor ribbon wire shall be 18 inches in diameter in packaged condition. Shall be fabricated from ASTM A-176, type 430 stainless steel, hardened to Rockwall 37-41. The stainless steel strip shall be 1 inch wide x .025 inches thick before roll forming, with clusters of four needle sharp barbs on 4-inch centers. Each roll shall contain 33 loops with each loop containing 13 barb clusters. Each barb shall be a minimum of 1.2 inches long, measured from center of barb cluster (or 2.4" from tip to tip). Flange area of each barb shall be cut away to permit maximum barb penetration. Each roll of 33 loops will cover 33 feet of fence when attachment is on 12 inch centers.

Concertina Wire (Barbed Tap Obstacle)

Fabricated as above Razor Ribbon Wire with exceptions of each roll consisting of 31 loops, with adjacent loops firmly clipped together in three places per loop, continuous of the entire coil, causing the finished coil to expand in concertina fashion. Each roll will cover 20 feet of fence.

Installation:

Where not prohibited by local building codes, 8-foot high, 9 gauge industrial chain link fence topped with six strands of barbed wire on a stationary "V" shaped support arm. Where applicable, for high crime area, 18-inch diameter Razor Ribbon Wire to be placed above the chain link fence fabric.

Fence material should not be less than 8 feet high. Extension arms, barbed wire, etc., should not be used on shorter fences to raise total height to 8-foot minimum. Extension arms should be directed to the outside of the facility.

Pieces of metal should be welded to bottom of all gates, including rail gates, to prevent unauthorized entry. Where this is not feasible, railroad ties should be anchored into the ground under the gate and covered with ballast to afford similar protection. This should prevent injuries to train crews.

Metal grates should be developed and placed over all openings in or under fence material for culverts, drainage ditches and canals. Grates should be welded to fence material and placed in concrete to prevent removal.

Razor Ribbon wire and Concertina wire shall not be placed on fences or gates where height of fabric is less than 8 feet. The Razor Ribbon/Concertina wire shall be installed in such a manner as to avoid any and all contact by pedestrian traffic. It shall also present an open, obvious and highly visible condition of danger.

All bolts shall be spot welded or "peened" to prevent dismantling.

Application/Location:

Security fence, as specified, to be placed around entire perimeter of area to be secured. Interior blacktop or paving to extend two feet beyond fence line exterior to prevent erosion along fence line.

Primary Need:

Perimeter fencing is the first line of defense, the outer most circle of protection. It delineates the property and delays intrusion. It keeps persons from inadvertently trespassing and creates an obstacle for those with criminal intent.

Fence material must be anchored to asphalt, midway between each fence post.

Hinges and rollers on gates should be protected to prevent removal or vandalism.

Local building codes should be consulted as to use of barbed wire, razor ribbon/concertina wire. Some cities do not permit use of such deterrents with fences less than 8 feet high.

Razor ribbon/concertina wire should not be used as a ground barrier as small children and animals can be injured.

Security fence contractors should be consulted for each location.

Secondary Needs

Grape stake slats (privacy decorative fencing) in fencing provides additional security and prevents observation of operations. Use of such fencing material helps environmental impacts such as noise and dust control.

Additional/Associated Concerns:

Due to injurious nature of razor ribbon/concertina wire and barbed wire, it shall not be placed on fence in such a manner that it will inadvertently come in contact with pedestrians or employees.

Special Fencing

Depending on the need or severity of a particular trespassing problem or other high security area or facility, additional types of fencing may be necessary to provide a high level of protection and properly protect the fabric from cutting and, undermining or cutting.

Steel mesh overlays affixed to the chain link fabric can be effective in preventing cutting and lifting. There are a number of companies dealing with these types of upgrades.

In extreme situations, fences may be constructed from steel posts with expanded metal fabric welded directly to the posts to replace the standard chain link fabric. Due to the cost, each situation should be individually assessed to make the most practical decision possible. See photos below.