CONSTRUCTION SPECIFICATION

92. LIVESTOCK EXCLUSION FENCES

1. SCOPE

The work shall consist of furnishing and installing farm field fences, including gates and fittings.

2. MATERIALS

Materials for farm field fences shall conform to the requirements of Material Specification 591. All wooden posts shall be of the same species.

3. SETTING POSTS

Concrete or wood posts shall set in holes and backfilled with earth except where otherwise specified. Steel posts shall be driven unless otherwise specified.

Posts holes shall be at least 6 inches larger than the diameter or side dimension of the posts.

Earth backfill around posts shall be thoroughly tamped in layers not thicker than 4 inches and shall completely fill the post hole up to the ground surface. Concrete backfill around posts shall be rodded into place in layers not thicker than 12 inches at the bottom of the hole then tamped with earth and crowned around the post at the ground surface.

No stress shall be applied to posts set in concrete until at least 24 hours after the concrete has set.

4. CORNER ASSEMBLY

Unless otherwise specified, corner assemblies shall be installed at all points where the fence alignment changes 15 degrees or more.

5. END PANELS

End panels shall be built at gates and fence ends.

6. PULL POST ASSEMBLY

Pull post assemblies shall be installed at the following locations:

a. In straight fence sections, at intervals of no more than 660 feet.

b. At any point where the vertical angle described by two adjacent reaches of wire is upward and exceeds 10 degrees (except as provided in Section 9 of this specification).

c. At the beginning and end of each curve.

7. ATTACHING FENCING TO POSTS

The fencing shall be stretched and attached to posts as follows:

a. The fencing shall be placed on the side of the post opposite the area being protected, except on curves.

b. The fencing shall be placed on the outside of curves.

c. The fencing shall be fastened to each end post, corner post and pull post by wrapping each horizontal strand around the post and tying it back on itself with not less than three tightly wound wraps.

d. The fencing shall be fastened to wooden line posts by means of staples. Woven wire fencing shall be attached at alternate horizontal strands. Each strand of barbed wire shall be attached to each post. Staples shall be driven diagonally with the grain of the wood and at a slight downward angle and shall not be driven so tightly as to bind the wire against the post.

e. The fencing shall be fastened to steel or concrete line posts with either two turns of 14 gauge galvanized steel or iron wire or the post manufacturer's special wire fasteners.

f. Wire shall be spliced by means of a Western Union splice or by suitable splice sleeves applied with a tool designed for the purpose. The Western Union splice shall have not less than 8 wraps of each end about the other. All wraps shall be tightly wound and closely spaced. Splices made with splice sleeves shall have a tensile strength no less than 80 percent of the strength of the wire.

8. STAYS

Stays shall be attached to the fencing in a manner to insure maintenance of the proper spacing of the fence wire strands.

9. CROSSINGS AT DEPRESSIONS AND WATERCOURSES

Where fencing is installed parallel to the ground surface, the line posts subject to upward pull shall be anchored by means of extra embedment or by special anchors as detailed on the drawings.

a. If the fence wire is installed parallel to the ground surface, the line posts subject to upward pull shall be anchored by means of extra embedment or by special anchors as detailed on the drawings.

b. If the wire fence is installed with the top wire straight and parallel to the ground surface on either side of the depression, extra length posts shall be used to allow normal post embedment. Unless otherwise specified, excess space between the bottom of the fence and the ground shall be closed with extra strands of barbed wire.

10. MEASUREMENT AND PAYMENT

Method 1 The length of each type and kind of fence will be measured to the nearest foot along the profile of the fence, including gate openings. Payment for each type and kind of fence will be made at the contract unit price for that type and kind of fence. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the performance of the work including fabricating and installing gates.

Method 2 The length of each type and kind of fence will be measured to the nearest foot along the profile of the fence, excluding gate openings. Payment for each type and kind of fence will be made at the contract unit price for that type and kind of fence. Such payment will constitute full compensation for all labor, materials, equipment and all other items necessary and incidental to the completion of the work, except fabricating and installing gates. Payment for each type and size of gate will be made at the contract price each for fabricating and installing that type and size of gate.

All Methods The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 11 of this specification.

11. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

a Bid Item - Special Area Fence (Barbed Wire)

This item shall consist of construction of a new barbed wire fence and gates at the location shown on the drawings or as determined by the engineer.

Subsidiary items to this work are the establishment of reference markers and the fabrication and installation of stiles. The fence shall be as detailed on the drawings except that wood line posts may be used as an alternate to steel line posts.

(1) Class 1 Zinc coating of barbed wire, stays, fasteners and tension wire is substituted for specification 591 requirements.

(2) Steel line posts shall be Style 1 (T-Section) or Style 2 (U-Section) with a steel anchor plate. The anchor plate shall be securely fastened to the post to prevent displacement when the posts are driven, shall weigh not less than 0.67 pounds, and shall be 20+ or - square inches in area.

The minimum weight per linear foot of steel post without anchor plate shall be 1.33 pounds for Style 1 and 1.12 pounds for Style 2. Steel posts shall be painted.

(3) Wood posts shall be of Osage Orange.

(4) Wood line posts shall be 6 inches in diameter and of the length and depth of embedment shown on the drawings for steel line posts. Backfill may be either tamped earth or concrete. Every fourth line post shall be a wood post to provide lateral support.

(5) Wooden corner, brace, and end posts shall have a minimum 6 inch diameter top and a minimum length of 9 feet. Posts will be set 4' in the ground. Place wooden posts by the following manner: First 12" of hole, fill with concrete, allow set up time of 24 hours. Then tamp, 4" earth per tamp, to top of hole. Crown earth around the post.

(6) Gates, as required, will be commercially constructed of tubular steel and shall be standard 15 ga., 50" high, 16'long gates. They will be attached to the pull post section with commercial hinges and a chain closure. A rest for the closure end will be as shown on the plans.

The top wire of the fence shall be below the crest of the emergency spillway of the structure where the fence crosses the entrance and exit channel of the emergency spillway.

(7) The requirements for material certifications for the following materials are hereby waived. No certification of materials will be necessary for the listed items when present in the contract:

Wood post, Barbed Wire, Steel Fence Posts, Wire Stays, Wires, Tension Wires, Staples, Gate Closer, Horizontal Brace Pipe, Concrete

(8) Each horizontal strand of fence placed around an end, corner, or pull post shall be wrapped with at least two full loops.

(9) Pull post assemblies (3-post) shall be installed at any point in the fence line where an upward angle will require additional embedment to properly anchor the upward pull of the stretched wire. Changes in slope exceeding 10 percent are to be considered for this assembly. The center post of the pull post assembly shall be set as near the point where the slope breaks as possible.

(10) One 9-foot, 6-inch diameter wooden post shall be set in the fence line at the top of the slope where the downward pull of the stretched fence is the greatest. Fence wires are to be fastened to the post with staples and two wraps of 14-gauge or heavier galvanized wire.

(11) Bracing is required at all corners, double horizontal brace assemblies, end panels, and pull post assemblies. A single piece of steel pipe will be used for the horizontal brace member.

(12) Use double horizontal brace assemblies on all corners and end panels when the fence interval between end panels, corners, or pull post assemblies exceeds 330 feet.

(13) Posts installed within the rock barriers will be of 2 3/8" oil pipe casing 10' long filled with concrete.

(14) Crossings at depressions and watercourses shall be anchored in the following method: A 3/8" cable shall be placed around a sufficient size rock (min. 60#) and attached with a clamp then attached to the 5 strands of fence wire.

(15) Measurement and payment will be by Method 2.

CONSTRUCTION SPECIFICATION

93. IDENTIFICATION MARKERS OR PLAQUES

1. SCOPE

The work shall consist of furnishing and installing identification markers or plaques at the designated locations.

2. MATERIALS

The markers or plaques shall be constructed of the specified materials, and shall meet all requirements for lettering, painting, finishing, and related items as shown on the drawings or as specified in Section 6 of this specification.

3. CONSTRUCTION METHODS

The markers or plaques shall be installed at locations and in the manner or condition specified.

4. MONUMENTS

Unless otherwise specified the markers or plaques shall be mounted on concrete monuments or on existing structures. The monuments shall be of the type, kind, and size and located as specified.

5. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, payment for each type, kind, and size of marker or plaque complete in place, will be made at the contract unit price for that type, kind, and size.

For items of work for which specific lump prices are established in the contract, payment for identification markers or plaques will be made at the contract lump sum price.

Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 6 of this specification.

6. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

Bid Item - Identification Marker - Establishment

(1) This item shall consist of all work and materials (except the bench mark cap) required for the establishment of permanent reference markers.

(2) The required number and approximate location of the markers are shown on the drawings or as directed by the engineer.

(3) Markers shall be cast-in-place, reinforced, concrete cylinders installed flush with the ground line and with a standard bench mark cap mounted on the top.

(4) The concrete mix shall be proportioned as follows: 1 part cement, 2 parts sand, and 3 parts gravel (maximum size 1 1/2 inches).

Sufficient water will be added to obtain a slump between 3 and 5 inches. The concrete shall be placed within 1 hour after mixing.

(5) The concrete cylinder shall have a minimum diameter of 12 inches and a minimum depth of 3.5 feet except that a lesser depth may be approved by the engineer where rock is encountered. The top 18 inches shall be formed in such a manner that a smooth surface is achieved. No surface finish will be required for the lower 2 feet of the marker.

(6) The bench mark cap will be furnished without cost to the contractor.

(7) Material certification is not required for any materials in the permanent reference markers.

(8) Payment will be made for this item of work at the lump sum price per marker.

CONSTRUCTION SPECIFICATION

220. PLASTIC PIPELINES AND CONDUIT

1. SCOPE

The work shall consist of furnishing and installing PVC pipe or conduit complete with appurtenances and fittings as specified on the drawings.

2. MATERIALS

PVC pipe, appurtenances and fittings shall conform to the requirements of Material Specification 310 and as specified in Section 9 of this specification.

3. HANDLING THE PIPE

Pipe stored outdoors for prolonged periods shall be covered. Pipe must be delivered to the job site by means which shall provide adequate support and not subject it to undue stresses. The load shall be so supported that the bottom rows of pipe are not damaged by crushing. All special requirements of the manufacturer shall be strictly observed. Pipe shall be unloaded carefully and stored as close to the final point of placement as practical.

4. JOINTS AND CONNECTIONS

Pipe joints shall conform to the details shown on the drawings and shall be in accordance with the specified instructions and recommendations of the pipe manufacturer. A copy of the instructions and recommendations shall be submitted to the engineer prior to the start of the installation.

All fittings, such as couplings, reducers, bends, tees and crossing shall be made of material that is recommended for use with the pipe and shall be installed in accordance with the recommendations of the pipe manufacturer.

Fittings made of steel or other metals subject to corrosion shall be adequately protected by wrapping with plastic tape or coating with high corrosion preventive qualities. Where plastic tape is used for corrosion protection, all surfaces to be wrapped shall be thoroughly cleaned and then coated with a primer compatible with the tape prior to wrapping.

All field cut pipe ends shall have all burrs removed prior to making the joints.

5. LAYING AND BEDDING

The pipe shall be uniformly and continuously supported. Blocking or mounding shall not be used to bring the pipe to final grade. Bell-holes shall be made in the bedding under bells or couplings and other fittings to prevent from being supported by fittings. The pipe shall be laid to the line and grade shown on the drawings. The pipe shall be placed with care and shall not be dropped or dumped on the drain fill or into the pipe trench. The pipe shall not be dragged in a manner which will cause scratching of the pipe surface. Pipe with scratches or gouges (penetration of more than 10% of wall thickness) shall be rejected.

The ends of the pipe and the couplings shall be free of foreign material when assembled. At the termination of pipe laying, the open end of the pipeline shall be closed off by a suitable cover or plug until operations are resumed.

The pipe shall be firmly and uniformly bedded throughout its entire length. The subgrade upon which the pipe is placed and the bottom of the pipe trench where drain filter material is not used shall consist of a fine grained material and shall be free from rocks, clods, or other sharp edged objects. When rock, hard pan or boulders or any other material which might damage the pipe are encountered, the trench shall be undercut a minimum of six inches below final grade and backfilled with an approved material. Extra care will be taken in the selection and placement of these materials to provide uniform bedding.

6. PRESSURE TESTING

When required, the completed pipeline shall be thoroughly and completely tested for pressure strength and leakage. When cemented or chemically welded joints are used, the assembled pipeline shall be allowed to lie in the trench for approximately 12 hours before flushing and testing to insure complete setting of the joints. The line shall be filled with water taking care to bleed all entrapped air. The pressure shall be slowly built up to not more than 30% above the maximum design working pressure. After the specified pressure has been reached, the pressure shall be maintained constant and the pipe and fittings examined for leaks. All visible leaks shall be promptly repaired. The installation will be considered acceptable when the specified test pressure has been maintained without loss for a period of two hours. The pipeline must function properly at design capacity. At or below design capacity, there shall be no objectionable surge or water hammer. Objectionable flow conditions shall include continuing unsteady delivery of water, damage to the pipeline or detrimental overflow from control valves.

7. BACKFILLING

Prior to backfilling the pipe shall be allowed to come to within a few degrees of the temperature that it will have after complete covering. The method of compaction shall be as specified in Section 9 of this specification.

The initial backfill material shall be selected soil free from rocks or stones larger than one inch in diameter and earth clods greater than approximately two inches in diameter. At the time of placement, the moisture content of the material shall be such that the required degree of compaction can be obtained with the backfill method to be used. The initial backfill material shall be so placed that the pipe will not be displaced, excessively deformed, or damaged.

When hand or mechanically backfilling, the initial fill shall be compacted firmly around and above the pipe as required to provide adequate lateral support to the pipe.

Final backfill material shall be free of large rocks, frozen clods and other debris greater than 3 inches in diameter. The material shall be placed and spread in approximately uniform layers in such a manner that there will be no unfilled spaces in the backfill and the backfill will be level with the natural ground or at the design grade required to provide the minimum depth of cover after settlement has taken place. Rolling equipment shall not be used to consolidate the final backfill until the specified minimum depth of cover has been placed.

All special backfilling requirements of the pipe manufacturer shall be met.

8. MEASUREMENT AND PAYMENT

For items of work for which specific unit prices are established in the contract, the quantity of each type and size of pipe will be determined to the nearest foot by measurement along the centerline of the pipe. Payment for each type and size of pipe will be made at the contract unit price for that size and type of pipe.

Such payment will constitute full compensation for furnishing, transporting, and installing in place, including the necessary fittings, appurtenances, and all other items necessary and incidental to the completion of the work. Compensation for any item of work described in the contract, but not listed in the bid schedule, will be included in the payment for the items of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in Section 9 of this specification.

9. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. Bid Item - Drainage Pipe

(1) This item shall consist of furnishing and installing the drainage pipe and slotted pipe complete with all fittings and all other items

necessary and incidental to the installation as shown on the drawings.

(2) The pipe shall be of size, thickness, length and dimension ratio as shown on the drawings.

(3) The backfill around the pipe shall be hand compacted as described in Specification 23 under Earthfill Hand Compacted.

(4) Measurement and payment shall be as described in Section 8 of this section

MATERIAL SPECIFICATION

310. PLASTIC PIPE AND CONDUIT

1. SCOPE

This specification covers the quality of polyvinyl chloride, polyethylene, and acrylonitrile-butadiene styrene plastic pipes and fittings.

2. MATERIAL

The pipe shall be homogeneous throughout and free from visible cracks, holes, foreign inclusion or other defects. The pipe shall be as uniform as commercially practicable in color, opacity, density and other physical properties.

Polyvinyl Chloride (PVC) shall meet requirements of ASTM D1784: 12454-B, 12454-C and 14333-D.

Acrylonitrile-Butadiene Styrene(ABS) shall meet most current version of ASTM D3965: Type 1, Grade 1 or 2.

Polyethylene(PE) shall meet requirements of ASTM D1248: P33 and P23.

3. PIPE

The pipe shall be furnished in accordance with one of the following as specified in Section 9 of Construction Specification 220 or as shown on the drawings.

When couplings with gaskets are specified or shown on drawings, the pipe shall have tapered ends.

A. Polyvinyl Chloride (PVC)

PVC High Pressure Pipe

(a) PVC Standard Dimension Ratio (SDR) Cast Iron Outside Diameter Pipe Shall be manufactured under the most current issue of AWWA Standard C900 or C905.

(b) PVC Standard Dimension Ratio Pipe (SDR) Iron Pipe Size (IPS) shall meet all applicable requirements of ASTM D2241.

(c) PVC Schedule 40, 80, 120 Pipe (OD) shall meet all applicable requirements of ASTM D1785.

B. Acrylonitrile-Butadiene-Styrene (ABS)

ABS High Pressure Irrigation or Stock Water Pipe

(a) ABS High Pressure Irrigation Pipe (PIP) shall meet all applicable requirements of ASTM D2282.

(b) ABS Standard Dimension Ratio Pipe (SDR, IPS) shall meet all applicable requirements of ASTM D 2282.

(c) ABS Schedule 40, 80 Pipe (OD) shall meet all applicable requirements of ASTM D1527.

C. Polyethylene (PE)

PE High Pressure Irrigation or Stock Water Pipe

(a) PE High Head Irrigation Pipe (PIP) shall meet all applicable requirements of ASTM D2239.

(b) PE Schedule 40, 80 Pipe (OD) shall meet all applicable requirements of ASTM D2447.

(c) PE Schedule 40 Pipe (ID) shall meet all applicable requirements of ASTM D2104.

4. MARKING

High pressure plastic pipe shall be adequately marked at intervals of not more than 5 feet. Markings shall include the following:

1. The nominal pipe size and the size system that applies.

2. The type of plastic pipe material in accordance with the designation code; e.g., PVC 1120.

3. The pressure rating in p.s.i. for water at 73.4 degrees F.; e.g.,200 p.s.i.

4. The Product Standard (PS) or ASTM specification designation with which the pipe complies for IPS-sized pipe or the designation PIP for pipe in this size system; e.g., PS 256 or PIP.

5. For potable water the National Sanitation Foundation (NSF) marking.

6. The manufacturer's name (or trademark) and code.

Other types of pipe shall be marked according to appropriate National Bureau of Standards (NBS) Voluntary Product Standards or ASTM specifications.

5. FITTINGS

Fittings for PVC and ABS Schedule 40, 80 (OD) pipe shall meet the following applicable specifications or the most current version of:

ASTM D2464 - PVC Fittings Threaded, Schedule 80

ASTM D2465 - ABS Fittings Threaded, Schedule 80

ASTM D2466 - PVC Fittings Socket, Schedule 40

ASTM D2467 - PVC Fittings Socket, Schedule 80

ASTM D2468 - ABS Fittings Socket, Schedule 40

ASTM D2469 - ABS Fittings Socket, Schedule 80

ASTM D2672 - PVC Belled End Sockets

Fittings including joints for other types of pipe shall be capable of withstanding pressures equal or greater than the pipe they are to be used with. Fittings shall have a flow opening at least equal to that of the pipe and shall be capable of serving their function during the full life expectancy of the pipe. These fittings shall be fittings recommended for use with the pipe by the manufacturer.

Field manufacture or fabrication of belled end joints will not be allowed.

Rubber rings used in "O" ring type joints shall conform to ASTM Specification D1869. Twin type gasket couplings shall have grooves to retain the gaskets and have a positive pipe stop that will automatically and accurately position the pipe ends within the coupling. For joints using elastomeric seals the joints shall meet the requirements of ASTM Specification D3139 or D3212.

6. SOLVENTS

Solvents for solvent welded joints on PVC pipe shall conform to ASTM Specification D2564.

7. POTABLE USE PIPELINE

Pipelines specified on the drawings for use as potable waterline shall be constructed with "National Sanitation Foundation" (NSF) approved materials.

MATERIAL SPECIFICATION

521. AGGREGATE FOR DRAINFILL AND FILTERS

1. SCOPE

This specification covers the quality of mineral aggregates for the construction of drainfill and filters.

2. QUALITY

Drainfill and filter aggregates shall be sand, gravel or crushed stone or mixtures thereof. They shall be composed of clean, hard, durable mineral particles free from organic matter, clay balls, soft particles or other substances that would interfere with their free-draining properties.

Aggregates of crushed limestone shall be thoroughly washed and screened. Course aggregate containing crushed limestone shall have not more than 3 percent by weight of particles finer than the No. 4 sieve. Crushed limestone shall not be used for fine aggregates except in combination with other materials such that not more than 5 percent of the portion finer than the No. 4 sieve shall be crushed limestone.

Aggregates shall be tested for soundness by Kansas Department of Transportation Test Method KTMR-21 "Soundness and Modified Soundness of Aggregates by Freezing and Thawing." The report shall show the percentage loss of weight and the results of the qualitative examination.

3. GRADING

Drainfill and filter aggregates shall conform to the specified grading limits after being placed in the work, and after being compacted if compaction is specified. Grading shall be determined by ASTM Method C 136. The percentage of material finer than the No. 200 sieve shall be determined by the method in ASTM Designation C 117.

4. STORING AND HANDLING

Drainfill and filter aggregates shall be stored and handled by methods that prevent segregation of particle sizes or contamination by mixing with other materials.

MATERIAL SPECIFICATION

523. ROCK FOR RIPRAP

1. SCOPE

This specification covers the quality of rock to be used in the construction of rock riprap.

2. QUALITY

Individual rock fragments shall be dense, sound and free from cracks, seams and other defects conducive to accelerated weathering. The rock fragments shall be angular to subrounded in shape. The least dimension of an individual rock fragment shall be not less than one-third the greatest dimension of the fragment.

Except as provided below, the rock shall have the following properties:

a. Bulk specific gravity (saturated surface-dry basis) not less than 2.5.

b. Absorption not more than 4 percent.

c. Soundness: Weight loss in 25 cycles of freezing and thawing not more than 15 percent.

The bulk specific gravity and absorption shall be determined by ASTM Method C 127. The test for soundness shall be performed by Kansas Department of Transportation Test Method KTMR-21 "Soundness and Modified Soundness of Aggregates by Freezing and Thawing." The report shall show the percentage loss of weight and the results of the qualitative examination.

Rock that fails to meet the requirements stated in a, b, and c above, may be accepted only if similar rock from the same source has been demonstrated to be sound after 5 years or more of service under conditions of weather, wetting and drying, and erosive forces similar to those anticipated for the rock to be

installed under this specification.

3. GRADING

The rock shall conform to the specified grading limits after it has been placed in the barrier.

MATERIAL SPECIFICATION

529. ROCK FOR ROCK FENCE BARRIERS

1. SCOPE

This specification covers the quality of rock to be used in the construction of rock fence barriers.

2. QUALITY

Individual rock fragments shall be dense, sound and free from cracks, seams and other defects conducive to accelerated weathering. The rock fragments shall be angular to subrounded in shape. The least dimension of an individual rock fragment shall be not less than one-third the greatest dimension of the fragment.

Except as provided below, the rock shall have the following properties:

a. Bulk specific gravity (saturated surface-dry basis) not less than 2.5.

b. Absorption not more than 4 percent.

c. Soundness: Weight loss in 25 cycles of freezing and thawing not more than 15 percent.

The bulk specific gravity and absorption shall be determined by ASTM Method C 127. The test for soundness shall be performed by Kansas Department of Transportation Test Method KTMR-21 "Soundness and Modified Soundness of Aggregates by Freezing and Thawing." The report shall show the percentage loss of weight and the results of the qualitative examination.

Rock that fails to meet the requirements stated in a, b, and c above, may be accepted only if similar rock from the same source has been demonstrated to be sound after 5 years or more of service under conditions of weather, wetting and drying, and erosive forces similar to those anticipated for the rock to be installed under this specification.

3. GRADING

The rock shall conform to the specified grading limits after it has been placed in the barrier.

MATERIAL SPECIFICATION

581. METAL

1. SCOPE

This specification covers the quality of steel and aluminum alloys.

2. STRUCTURAL STEEL

Structural steel shall conform to the requirements of ASTM Specification A 36.

High-strength low-alloy structural steel shall conform to ASTM Specification A 242 or A 588.

Carbon steel plates of structural quality to be bent or formed cold shall conform to ASTM Specification A 283, Grade C.

Carbon steel sheets of structural quality shall conform to ASTM Specification A 1011, Grade D or A 1008, Grade D.

Carbon steel strip of structural quality shall conform to ASTM Specification A 1011, Grade C.

3. COMMERCIAL OR MERCHANT QUALITY STEEL

Commercial or merchant quality steel shall conform to requirements of the applicable ASTM specifications listed below:

Product	ASTM Specification
Carbon steel bars	A 575, Grade M 1015 to Grade M 1031
Carbon steel sheets	A 1011
Carbon steel strip	A 1011
Zinc-coated carbon steel sheets	A 653

4. ALUMINUM ALLOY

Aluminum alloy products shall conform to the requirements of the applicable ASTM specifications listed below. Unless otherwise specified, alloy 6061-T6 shall be used.

Product	ASTM Specification
Standard structural shape	B 308
Extruded structural pipe and tube	B 429
Extruded bars, rods, shapes and tube	B 221
Drawn seamless tubes	B 210
Rolled or cold-finished bars, rods and wire	B 211
Sheet and plate	B 209

5. BOLTS

Steel bolts shall conform to the requirements of ASTM Specification A 307. If high-strength bolts are specified they shall conform to the requirements of ASTM Specification A 325.

When galvanized or zinc-coated bolts are specified, the zinc coating shall conform to the requirements of ASTM Specification A 153; except that bolts 1/2 inch or less in diameter may be coated with electrodeposited zinc or cadmium coating conforming to the requirements of ASTM Specification B 633, Service Condition SC 3 or ASTM Specification B 766, Type TS, unless otherwise specified.

6. RIVETS

Unless otherwise specified, steel rivets shall conform to the requirements of ASTM Specification A 502, Grade 1. Unless otherwise specified, aluminum alloy rivets shall be Alloy 606-T6 conforming to the requirements of ASTM Specification B 316.

7. WELDING ELECTRODES

Steel welding electrodes shall conform to the requirements of American Welding Society specification AWS A5.1. "Specification for Mild Steel Covered Arc-Welding Electrodes," except that they shall be uniformly and heavily coated (not washed) and shall be of such a nature that the coating will not chip or peel while being used with the maximum amperage specified by the manufacturer.

Aluminum welding electrodes shall conform to the requirements of American Welding Society specification AWS A 5.10, "Specification for Aluminum and Aluminum-Alloy Welding Rods and Bare Electrodes."

MATERIAL SPECIFICATION

582. GALVANIZING

1. SCOPE

This specification covers the quality of zinc coatings applied to iron and steel products.

2. QUALITY

Zinc coatings shall conform to the requirements of ASTM Specification A 123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products or as otherwise specified in the items of work and construction details of the Construction Specification.

ASTM A 123 covers both fabricated and unfabricated products e.g., assembled steel products, structural steel fabrications, large tubes already bent or welded before galvanizing, and wire work fabricated from uncoated steel wire. It also covers steel forgings and iron castings incorporated into pieces fabricated before galvanizing or which are too large to be centrifuged (or otherwise handled to removed excess galvanizing bath metal). Items to be centrifuged or otherwise handled to remove excess zinc shall meet the requirements of ASTM A 153, except: Bolts, screws and other fasteners 1/2 inch or less in diameter may be coated with electrodeposited zinc or cadmium coating conforming to the requirements of ASTM Specification A 165, Type TS, or ASTM Specification B 633, Service Condition SC-3 unless otherwise specified.

MATERIAL SPECIFICATION

591. FENCING MATERIALS

1. SCOPE

This specification covers the quality of materials used in the construction of farm field fences.

2. WIRE GAUGE

When the size of steel wire is designated by gauge number, the diameter shall be as defined for U.S. Steel Wire Gauge.

3. FENCING

Barbed wire, woven wire and wire netting fencing shall conform to the requirements of Federal Specification RR-F-221 for the specified types and styles of fencing. Barbed wire and woven wire shall have zinc coating of at least 0.50 ounce per square foot of wire surface unless otherwise specified.

4. STAYS, FASTENERS, AND TENSION WIRE

Stays and fasteners shall conform to the requirements of Federal Specification RR-F-221 unless otherwise specified.
Tension wires shall have a tensile strength not less than 58,000 pounds per square inch. Stays, fasteners and tension wire shall have Class 3 zinc coating as specified in ASTM Specification A 641.

5. WOOD FENCE POSTS AND BRACES

Wood posts shall be of Osage orange (Bois d'Arc). The posts shall be sound, new, free from decay, with all limbs trimmed substantially flush with the body. They shall be substantially straight throughout their length. Wood braces shall also be Osage orange.

6. STEEL FENCE POSTS AND BRACES

Steel fence posts and braces shall conform to the requirements of Federal Specification RR-F-221. Posts with punched tabs for fastening the wires shall not be used.

7. CONCRETE FENCE POSTS

Concrete fence posts shall be manufactured to the specified requirements of size, shape, and strength.

8. PANEL GATES

Panel gates shall be the specified types, sizes, and quality and shall include the necessary fittings. The fittings shall consist of not less than two hinges and two latches or galvanized chains for fastening. Latches shall be of such design that a padlock may be used for locking. All fittings shall be equivalent to the gate manufacturer's standard.

9. WIRE GATES

Wire gates shall be the type shown on the drawings, constructed in accordance with these specifications at the locations and to the dimensions shown on the drawings. The materials shall conform to the kinds, grades, and sizes specified for new fence, and shall include the necessary fittings and stays.

10. STAPLES

Staples used to fasten fence wire to wood posts shall be 9-gage galvanized wire with a minimum length of 1-1/2 inches for soft woods and a minimum length of one inch for close-grain hardwoods.

11. GALVANIZING

All iron and steel fencing materials, except as otherwise specified, shall be zinc coated by the hot dip process, except that clips, bolts, and other small hardware may be protected by electrodeposited zinc or cadmium coating.