Section 2404. Reinforcement

2404.01 DESCRIPTION.
Furnish and place all reinforcing bars and fabrics used in concrete according to the contract documents.

2404.02 MATERIALS.
Use reinforcement meeting the requirements of Section 4151.

2404.03 CONSTRUCTION.

A. Cleaning.

1. Ensure that reinforcement is free from dirt, detrimental scale, rust, paint, oil, or other foreign substances.

2. For uncoated bars, thin powdery rust and tight rust is not considered detrimental and need not be removed.

3. Appreciable reduction in section caused by corrosion is sufficient cause for rejection of reinforcement.

B. Fabrication.

1. Exercise care so reinforcement is not damaged during bending. Employ proper appliances and competent workers for the work.

2. Ensure reinforcement is cold bent, except in shops where accurate control of temperature is provided.

3. Ensure Grade 60 (Grade 400) or higher deformed bars, and bars of No. 8 (No. 25) size and larger, are shop bent.

4. Ensure reinforcement is accurately bent to the dimensions and shapes shown in the contract documents. Do not field bend bars partially embedded in concrete except as shown in the contract documents.

5. When galvanized reinforcement is required, ensure cutting and bending are completed before galvanizing.

6. When epoxy coated reinforcement is required, ensure fabrication is completed according to Article 4151.03, C.

7. Ensure fabrication of reinforcement, including bending details, is completed according to ACI Code 318.

8. Ensure bar reinforcement is shipped in standard bundles, tagged, and marked according to the CRSI Manual of Standard Practice.

C. Straightening.
Straighten reinforcement that may have become bent during shipment or handling before placing in the work. Straighten without heating in a manner that minimizes damage to any coating.

D. Placing and Fastening.

1. Place reinforcement in the position indicated in the contract documents. Ensure reinforcement is held securely in place during placing and hardening of the concrete.

2. Tie reinforcement bars at all intersections except where spacing is less than 1 foot (300 mm) in each direction, in which case tie alternate intersections.

3. The Engineer will inspect and approve the locations, fastening, and condition of reinforcement before concrete is placed around it.

4. Welding of reinforcing steel will not be permitted unless specified in the contract documents or approved by the Engineer.

5. In floors of culverts and in other footings without piling, suspend reinforcement from cross wales above the tops of the forms or support on steel stakes driven into the subgrade or on chairs.

6. Install dowels, deformed bars, inserts, or other articles into existing pavements and structures as shown in the contract documents. When installed with epoxy material, complete the procedure according to Article 2301.03, E. Cut reinforcing steel, in the field, using mechanical methods. Do not flame cut.

E. Reinforcing Supports and Spacers.

1. Support horizontal reinforcement using support devices, or tie to vertical reinforcing steel.

2. Position vertical reinforcement using side-form spacers. Use support devices and side-form spacers, either plastic or steel, meeting the requirements of Materials I.M. 451.01.

3. Hold epoxy coated reinforcing steel in place with epoxy or plastic coated bar supports, and epoxy or plastic coated tie wires.

4. Do not use concrete block inserts, bricks, stones, wood blocks, wood stakes, and similar materials to support reinforcement if by their use they may become embedded in the concrete.

5. Space support devices according to the manufacturer's recommendations or as recommended by the current CRSI Manual of Standard Practice. Use a support system with spacing not to exceed 4 feet (1.2 m) in each direction for bolsters or continuous high chairs and 3 feet (0.9 m) in each direction for individual bar chairs.

6. Rest the base of chairs and support bolsters on the supporting false work. Use supporting chairs that have either upturned legs or a horizontal bar spot welded at the base of the leg.

7. Cross-tie legs at their bases or nail them to the forms if necessary to prevent spreading of upturned legs.

8. For situations where two or more separate mats of reinforcing steel are required, support each mat independently using an approved support system.

9. Place side-form spacers at intervals sufficient to ensure that all reinforcing is at the required clearance.

F. Splicing.

1. Splice reinforcement only at points shown in the contract documents or when approve by the Engineer. When lapped splices are used in reinforcement in which the critical design stress is tensile, do not use splices at points of maximum stress. Place bars in close contact and wire tightly in a manner that the specified clear distance to the surface of the concrete is maintained.

2. Lap reinforcing steel for the minimum length according to that specified in AASHTO Standard Specifications for Highway Bridges.

2404.04 METHOD OF MEASUREMENT.

A. The Engineer will compute the weight (mass) in pounds (kilograms) of reinforcement from the theoretical weight (mass) of the nominal sizes and actual lengths of the various sizes of reinforcement shown in the contract documents.

B. No adjustment will be made for galvanizing or epoxy coating.

C. If a greater or lesser quantity of reinforcement than shown in the contract documents is directed by the Engineer, the quantity will be recomputed from the theoretical weight (mass) of the reinforcement actually used.

D. The weight (mass) of reinforcement, shown in the contract documents, will be presumed to be correct and will provide the quantity used as the basis of payment; however, if the Contractor presents evidence that the weight (mass) computed is in error by more than 1.0%, the Engineer will re-compute the weights (mass).

2404.05 BASIS OF PAYMENT.

A. Payment will be at the contract unit price per pound (kilogram) for the weight (mass) of Reinforcing Steel, Galvanized Reinforcing Steel, and Epoxy Coated Reinforcing Steel computed as specified above.

B. Payment is full compensation for furnishing and placing the reinforcement, ties, and supports as may be required to hold the reinforcement in proper position.