

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CONSTRUCTION SPECIFICATION

CS-42: “REINFORCED CONCRETE FOR MINOR STRUCTURES”

42.1 SCOPE

The work shall consist of proportioning, forming, placing, finishing, and curing Portland cement concrete for minor structures. A minor structure is defined as one of low hazard where strength control is not critical for function and safety.

The structures shall be constructed to the line and grades as shown in the plan.

42.2 MATERIALS

Cement shall be Type II or Type IIA Portland cement. Cement that is partially hydrated or otherwise damaged shall not be used.

Concrete aggregate is defined in Material Specification, MS-201. Fine aggregate shall be between 35 and 45 percent and coarse aggregate shall be between 55 and 65 percent of the total aggregate volume by weight. The aggregate shall not contain more than 1 percent clay lumps and a total of 4 percent of material smaller than the 200 sieve.

Maximum size of the coarse aggregate shall not exceed:

- 1 inch - Concrete thickness of 4 inches or less
- 1-1/2 inch - Concrete thickness of 4 inches or more

Reinforcing steel shall be woven wire fabric or deformed steel bars as described in Material Specification MS 213, Steel Reinforcement.

Water shall be of a potable quality free from harmful chemicals.

42.3 DESIGN OF CONCRETE MIX

The person in charge of construction shall be responsible for designing a high quality concrete mix conforming to this specification. The technical representative prior to placement shall approve the concrete mix.

The mix shall contain no more than 6 gallons of water per 94 pound bag of cement, and at least 6 bags of cement per cubic yard of concrete.

The air entrainment shall be between 4 and 7 percent by volume, and the slump shall be between 3 and 5 inches.

The following table is a guide for developing a satisfactory mix intended to produce approximately 3000 PSI compressive strength for air entrained concrete.

Max. Size Aggregate Inches	Gal. Water per sack of cement	Cement per CY Sacks	Pounds Fine Aggregate per Sack Cement	Pounds Coarse Aggregate per Sack Cement
1	6.0	6.0	190-200	300-310
1-1/2	6.0	6.0	180-190	330-340

Measurement of materials shall be by weight where suitable scales are available. Volume measurements may be used provided volume-weight relationships are carefully determined. Admixtures including calcium chloride or antifreeze compounds shall not be used.

42.4 FORMS

Forms shall be made of wood, plywood, or metal. The form surfaces are to be clean and free from holes and other irregularities. The type, size, shape, quality and strength of forms will be subject to approval by the technical representative. The forms shall be moist when the concrete is placed. Forms shall be mortar tight and non-yielding. All form work shall be in place for at least 24 hours after concrete placement.

Metal ties that break off below the surface of the concrete shall have removable cones that permit their removal without damage to the concrete.

42.5 REINFORCING STEEL

The reinforcement shall be the size and grade shown on the drawings and securely fastened in place to prevent movement during placement of the concrete. The reinforcing steel in slabs on grade shall be supported on blocks or chairs. All blocks shall have a strength equal to or greater than the 28-day compressive strength of the concrete.

42.6 PLACING CONCRETE

The technical representative shall be notified a minimum of 24 hours prior to the placement of concrete to inspect the reinforcing steel, forms, subgrade, preparation for curing, and vibrating equipment.

Concrete shall be placed in final position within one and one-half hours after mixing with cement. Concrete may be consolidated by either hand spading and tamping or mechanical vibration.

All concrete placed on earth shall be placed on clean, damp surface, free of frost, ice, or running water.

Concrete shall not be dropped more than 5 feet vertically unless suitable equipment is used to prevent segregation.

Uniformed exposed surfaces in the completed work shall have a wood float or broomed finish. Concrete edges shall be chamfered 3/4 inch or finished with molding tools.

42.7 CURING CONCRETE

The air temperature shall be between 40 and 90°F. During the curing period, the concrete shall be kept moist or covered for at least 7 days after placement.

An approved curing compound may be used provided it is applied by pressure sprayer at a uniform rate of not less than 150 sq. ft per gallon.

42.8 DEFECTIVE CONCRETE

Honeycombed areas and other voids in concrete will be promptly repaired with mortar patching immediately upon discovery.

Concrete subjected to damage and/or other violations of this specification will be rejected.

42.9 DELIVERY TICKETS

The delivery tickets for the mix delivered to the site shall identify all ingredients by weight except water and admixtures that may be measured by volume.

Delivery Tickets for each load of Ready-Mix concrete shall be furnished to the technical representative.

42.10 ACCEPTANCE

The acceptance of concrete made under this specification will depend upon adherence to the procedures set forth herein and the appearance of the finished structure.