

## ITEM 74

### MISCELLANEOUS MATERIALS

#### 74.01 WATER

Water used in mixing concrete shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable matter, or other substances injurious to the finished product. Water will be tested in accordance with AASHTO, "Standard Method of Test for Quality of Water to be Used in Concrete," Serial Designation T 26. Water known to be of potable quality may be used without test. Where the source of water is relatively shallow, the intake shall be so enclosed as to exclude silt, mud, grass, or other foreign materials.

#### 74.02 CALCIUM CHLORIDE

Calcium chloride shall conform to the requirements of AASHTO, "Standard Specification for Calcium Chloride," Serial Designation M 144, for the type specified.

#### 74.03 SODIUM CHLORIDE

Sodium chloride shall conform to the requirements of ASTM, "Standard Specification for Sodium Chloride," Serial Designation D 632, for the type specified.

#### 74.04 HYDRATED LIME

Hydrated lime shall conform to ASTM, "Standard Specification for Hydrated Lime for Masonry Purposes," Serial Designation C 207, Type N, except that Section 3 (b), 4, and 5 will not be applicable.

#### 74.05 METAL CENTER STRIP

Metal center strip shall be of an approved type, shall not be lighter than sixteen gauge, and shall be painted or galvanized.

#### 74.06 ASPHALT PLANK

Asphalt plank shall meet the requirements of AASHTO, "Standard Specification for Asphalt Plank," Serial Designation M 46, for the type specified.

#### **74.07 PRECAST MANHOLE RISERS AND TOPS**

These items shall conform to ASTM, "Standard Specification for Precast Reinforced Concrete Manhole Sections," Serial Designation C 478.

#### **74.08 PRECAST REINFORCED CONCRETE CATTLE PASS UNITS**

If these units are designed by the producer, completely detailed drawings and design computations shall be submitted to the Engineer for approval in advance of the start of manufacture. If the units are designed by the City, the applicable standard drawing sheet shall govern. Details of manufacture shall conform in all other respects to the applicable provisions of ASTM, "Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe," Serial Designation C 76. No strength tests will be required on the completed units, but the City reserves the right to conduct continuous inspection at the site of production, and to sample and test all component materials, including the concrete, for conformity of these Specifications.

#### **74.09 CHEMICAL ADDITIVES**

- (a) For Portland Cement Concrete Mixtures

These additives shall conform to the requirements of AASHTO, "Standard Specification for Chemical Admixtures for Concrete," Serial Designation M 194, covering the following five types:

Type A	Water-Reducing Admixtures
Type B	Retarding Admixtures
Type C	Accelerating Admixtures
Type D	Water-Reducing and Retarding Admixtures
Type E	Water-Reducing and Accelerating Admixtures

Before any admixture is approved for use in Portland Cement concrete mixtures under these Specifications, the manufacturer of the admixture or the Contractor shall furnish the City documentary evidence that the material proposed for use has been tested in accordance with the methods of test specified in AASHTO, "Standard Specification for Chemical Admixtures for Concrete," Serial Designation M 194, and meets the requirements of that Specification. Documentary evidence shall be the results of tests conducted by a testing laboratory inspected at regular intervals by the Cement and Concrete Reference Laboratory of the National Bureau of Standards and approved by the City. The City may from time to time require a notarized certification from the manufacturer stating that the material is identical with that originally approved and has in no way been changed or altered.

(b) Asphalt To Be Used In Hot Bituminous Mixtures

Heat-stable asphalt anti-stripping additive shall contain no ingredient harmful to the bituminous material or to the operator and shall not appreciably alter the specified characteristics of the bituminous material when added in the recommended proportions.

The manufacturer shall recommend the percentage of his compound to be used, not to exceed 1.0 percent, but in no case shall the percentage of active agent added be less than 0.5 percent by weight of the asphalt cement.

The manufacturer shall furnish the City an affidavit stating the percentage by weight of active agent in the anti-stripping additive proposed for use.

The treated asphalt cement shall show no evidence of stripping when tested in accordance with Item 73.18.

**74.10 MASONRY STONE**

Masonry stone shall be sound, dense and durable, free from cracks, pyrite intrusions and other structural defects. Stone which will be used with mortar shall be free from dirt, oil, or other material that might prevent good adhesion with the mortar.

When tested by the Los Angeles Test Method, the percent of wear shall not exceed sixty.

When the crushed aggregate is subjected to five alternations of the sodium sulfate soundness test, the weighted percentage of loss shall be not more than fifteen.

**74.11 WATERSTOPS**

Waterstops shall be of the type, shape and dimensions shown on the Plans.

(a) Metallic

Metallic waterstops shall be sheet copper conforming to the requirements of Item 908.15 of the Tennessee Department of Transportation Specifications.

(b) Nonmetallic

Nonmetallic waterstops shall be manufactured from either natural rubber, synthetic rubber, or polyvinyl-chloride (PVC) at the option of the Contractor. Waterstops shall be produced by such a process that, as supplied for use, they will be dense, homogeneous, and free from holes and other imperfections. The cross-section of the water stop shall be uniform along its length and transversely symmetrical so that the thickness at any given distance from either edge of the waterstop will be uniform.

(1) Rubber Waterstop

The waterstop shall be fabricated from a high grade thread-type compound. The basic polymer shall be natural rubber or a co-polymer of butadiene and styrene, or a blend of both. The compound shall contain not less than seventy percent by volume of the basic polymer, and the remainder shall consist of reinforcing carbon black, zinc oxide, accelerators, anti-oxidants, vulcanizing agents, and plasticizers, but shall contain no Factise.

Samples taken from the finished waterstop shall meet the following requirements when tested in accordance with the current specified ASTM method of test.

Title	<u>ASTM Method</u> Requirement of Test	
Tensile Strength (Die "C")	2500 psi, min.	D 412
Ultimate Elongation (Die "C")	450 percent min.	D 412
Shore Durometer Hardness	60-70	D 2240
Specific Gravity	1.5 +/- 0.03 (Sec. 17)	D 297
Water Absorption (% by Wt.)	5 percent	D 570
Tensile Strength after accelerated aging, oxygen-pressure method	80 percent min.	D 572

(2) Polyvinyl Chloride Waterstop

This waterstop shall be extruded from an elastomeric plastic material. The material shall be a plastic compound, the basic resin of which shall be polyvinyl chloride. The compound shall contain any additional resins, plasticizers, stabilizers, or other materials needed to insure that when the material is compounded it will meet the performance requirements of this Specification. No reclaimed polyvinyl chloride shall be used.

(3) Finished Waterstop

Samples taken from the finished waterstop shall meet the following requirements when tested in accordance with the current specified ASTM method of test.

Title	<u>ASTM Method</u> Requirement of Test	
Tensile Strength (Die "C")	2500 psi, min.	D 412
Ultimate Elongation (Die "C")	280 percent min.	D 412

(4) Sheet Material

Samples taken from the sheet material shall meet the following requirements when tested in accordance with the current specified ASTM method of test or the specified Civil Works Guide Specification CE 1402, "Metals, Miscellaneous Materials and Standard Articles."

Title	Method Requirement of Test	
Tensile Strength (Die "C")	1750 psi min.	ASTM D 412
Ultimate Elongation (Die "C")	350 percent min.	ASTM D 412
Stiffness in Flexure (1/4" span)	400 psi min.	ASTM D 747
Cracking or Chipping @ -35 F	Nil	ASTM D 746
Tensile Strength (Die "C")	1500 psi min.	Accelerated
	Extraction Test CE 1402	
Ultimate Elongation (Die "C")	300 percent min.	Accelerated
	Extraction Test CE 1402	
Change in Weight after 7 Days	0.00 to +0.25	Effect of percent Alkalies
	Test CE 1402	
Change in Weight After 30 Days	0.00 to +0.40	Effect of percent Alkalies
	Test CE 1402	
Change in Shore Durometer Hardness	+/- 5	Effect of Alkalies
	Test CE 1402	
Change in Thickness After 30 Days	+/- 1 percent	Effect of Alkalies
	Test CE 1402	

For polyvinyl chloride waterstops, the supplier shall submit a certificate stating that all of the performance requirements specified for the sheet material under polyvinyl chloride waterstops have been complied with. In addition, the supplier shall submit an affidavit to the effect that the sheet sample is of the same material in all respects as that to be used in the manufacture of the finished waterstop. The supplier shall also specify the value of the specific gravity of the finished waterstop material to within plus or minus 0.02.

Waterstops shall be manufactured with an integral cross section which shall be uniform within plus or minus 1/8" in width, and the web thickness or bulb diameter within plus 1/16" and minus 1/32".

The Contractor shall furnish the City of Chattanooga at no cost to the City a certified test report from an approved laboratory covering each lot or unit of finished waterstops. These test reports shall contain the numerical laboratory test data of the required tests.

#### **74.12 EPOXY RESIN SYSTEMS**

Two-component epoxy resin systems for application to Portland Cement Concrete, bituminous concrete, and metals shall conform to the requirements of AASHTO, "Standard Specification and Recommended Practice for Epoxy Protective Coatings," Serial Designation M 200. These systems shall be supplied in one of the following types as designated;

Type A-A Polysulfide-modified system blended with mineral filler.

Type B-A Clear or light-colored amine or polyimide-cured system.

Type C-A Coal-tar modified system.

#### **74.13 SELECT MATERIAL FOR SOIL-CEMENT BASE**

Select material for soil-cement base shall be of such general character as to be classified as Group A-1 or A-2, AASHTO, "Recommended Practice for the Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes," Serial Designation M 145. The material shall be of such size that all will pass the standard 1-1/2" sieve. Samples of the select material shall be tested in the laboratory before work is started for determination of cement content and optimum moisture content.

## 74.14 GRASS SEED

The seed shall meet the requirements of the Tennessee Department of Agriculture and no "Below Standard" seed will be accepted.

Grass seed furnished under these Specifications shall be packed in new bags or bags that are sound and not mended.

The vendor shall notify the City before shipments are made so that arrangements can be made for inspection and testing or stock.

The vendor shall furnish the City a certified laboratory report from an accredited commercial seed laboratory or from a State seed laboratory showing the analysis of the seed to be furnished. The commercial fertilizers as specified in Item 74.15 shall have a minimum of 3-1/2% nitrogen. The report from an accredited commercial seed laboratory shall be signed by a Senior Member of the Society of Commercial Seed Technologists. At the discretion of the City, samples of seed may be taken for check against the certified laboratory report. Sampling and testing will be in accordance with the requirements of the Tennessee Department of Agriculture.

When a seed group is used, the percentages forming the group shall be as follows, unless otherwise specified:

Name	Quantity Percent by Weight
Group "A"	
Lespedeza (Common or Korean)	20%
Sericea Lespedeza	15%
Ky. 31 Fescue	40%
English Rye	15%
White Dutch Clover	5%
Weeping Love Grass	5%
Group "B"	
Ky. 31 Fescue	55%
Redtop	15%
English Rye	20%
White Dutch Clover	5%
Weeping Love Grass	5%
Group "C"	
Sericea Lespedeza	50%
Ky. 31 Fescue	30%
English Rye	15%
White Dutch Clover	5%

In mixing or forming "Groups" of seed, they shall be uniformly mixed. "Group" seed shall not be mixed until after each type seed that is used to form the "Group" has been tested and inspected separately and approved for purity and germination by the City. Seed mixed before tests and inspection are made will not be accepted.

#### **74.15 COMMERCIAL FERTILIZER**

Manufactured fertilizer shall be a standard commercial fertilizer containing the specified percentages by weight of nitrogen (N), phosphoric acid (P O) and potash (K O).

The fertilizer shall be furnished in standard containers with the name, weight and guaranteed analysis of the contents clearly marked. The containers shall insure proper protection in handling and transporting the fertilizer.

All commercial fertilizer shall comply with local, state and federal fertilizer laws.

#### **74.16 AMMONIUM NITRATE**

Ammonium nitrate shall be a standard commercial product, shall conform to the requirements for other commercial fertilizers as specified in Item 74.15 and shall have a minimum of 33-1/2 percent nitrogen.

#### **74.17 AGRICULTURAL LIMESTONE**

Agricultural limestone shall contain not less than eighty-five percent of calcium carbonate and magnesium carbonate combined, and shall be crushed so that at least eighty-five percent will pass the No. 10 mesh sieve.

#### **74.18 MULCH MATERIAL**

All mulch materials shall be air dried and reasonably free of noxious weeds and weed seed, or other materials detrimental to plant growth.

Hay shall be stalks of approved grasses, sedges or legumes seasoned before baling or loading.

Straw shall be stalks of rye, oats, wheat or other approved grain crops.

Both hay and straw shall be suitable for spreading with standard mulch blower equipment.

#### **74.19 JUTE MESH**

Jute mesh shall be of a uniform, open, plain weave of single jute yarn. The yarn shall be of loosely twisted construction and shall not vary in thickness by more than one-half of its normal diameter. Jute mesh shall be furnished in rolled strips and shall meet the following requirements.

Jute mesh shall be nontoxic to the growth of plants and germination of seeds, and shall be identified by tag. It shall have 58 warp ends per yard, 41 weft ends per yard, and have an average weight of 0.9 pounds per square yard, with an allowable deficiency of not more than five percent.

All materials shall be new and unused, and the length shall be marked on each roll. Staples shall be machine made of No. 11 gauge new steel wire formed into a "U" shape.

#### **74.20 LINSEED OIL PRESERVATIVE**

Linseed oil preservative shall consist of fifty percent boiled linseed oil, and fifty percent petroleum spirits (mineral spirits), meeting the requirements of Item 604.28 of the Tennessee Department of Transportation Standard Specifications. The linseed oil and petroleum spirits shall be agitated and thoroughly mixed prior to application.

#### **74.21 GROUT**

Grout shall be mixed in small quantities as needed, and shall not be re-tempered or used after it has begun to set. Unless otherwise specified or directed, the grout shall consist of one part Portland Cement and three parts sand mixed with sufficient water to form a grout of proper consistency. When non-shrinking fast-setting grout is specified, it shall be formulated by the incorporation of an admixture, or a premixed grout may be used. The formulation and the admixture or the premixed grout used will be subject to the approval of the Engineer, and shall be mixed and used in accordance with the recommendations of the manufacturer. These special grouts will be classified as follows:

- Type I - Non-shrinking grout
- Type II - Non-shrinking, fast-setting grout

Portland Cement for grout shall conform to the requirements of Item 73.01. Sand for grout shall conform to the requirements of Item 73.02. Water for grout shall be approved by the Engineer.

#### **74.22 MANHOLE STEPS**

Steps used in manholes or catch basins shall be cast iron, aluminum or wrought iron, unless otherwise specified. The design of the steps shall be as shown on the Plans.

- (a) Cast iron steps shall conform to the requirements of Item 908.07 of the Tennessee Department of Transportation Standard Specifications.
- (b) Aluminum steps shall be fabricated from aluminum alloy 6060, T 60 with a minimum tensile strength of 3800 psi, a minimum yield strength of 3500 psi, and an elongation in two inches of not less than 10 percent.

#### **74.23 RED IRON OXIDE**

Red iron oxide for coloring concrete shall be a mineral product containing no organic coloring matter and shall conform to the following requirements:

Loss on ignition	4 percent, maximum
Iron Oxide, as F	80 percent, minimum
Passing 325 mesh sieve	97 percent, minimum

#### **74.24 INOCULANTS FOR LEGUMES**

Inoculants for treating legume seed shall be standard cultures of nitrogen-fixing bacteria that are adapted to the particular kind of seed to be treated. The inoculant shall be supplied in convenient containers of a size sufficient to treat the amount of seed to be planted. The label on the container shall indicate the specified legume seed to be inoculated and the date period to be used.

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