ATHENS & TREVINO CHANNEL IMPROVEMENTS

BID & CONTRACT DOCUMENTS

VOLUME 2 of 2: PROJECT SPECIFICATIONS

Southern Sandoval County Arroyo Flood Control Authority

IFB # 2025-04

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The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal as a professional engineer licensed to practice in the state of New Mexico, is affixed below:

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SECTION 107

JOINT FILLER AND SEALANTS

107.1 GENERAL

This section specifies the joint fillers and sealants that are applicable to concrete pavements, concrete channel linings, sidewalks, driveways, and other concrete surfacing applications.

107.2 REFERENCES

107.2.1 ASTM:

C 179	D 994
D 881	D 1751
D 217	D 1752
D 297	D 2007
D 412	D 2240
D 794	

107.2.2 AASHTO:

M 153	T 72
T 59	T 132

107.2.3 Federal Specifications:

LP-590
TT-S-0022 7E

107.3 JOINT FILLERS

107.3.1 PREMOLDED JOINT FILLER:

107.3.1.1 Expansion joint filler material shall consist of premolded strips of a durable resilient compound.

107.3.1.2 Where stiffness is lacking in premolded expansion joint filler, the strips shall be encased in saturated felt, asphalt impregnated cotton webbing, or other satisfactory material. Any material or fabric used for encasement shall be firmly sealed to the body of the joint filler and shall not be detached therefrom after immersion in water for a period of forty-eight hours.

107.3.1.3 Unless otherwise specified, premolded joint filler may be either pre-molded Expansion Joint Filler (nonextruding and Resilient Bituminous types) conforming to the requirements of ASTM C 1751 or Preformed Expansion Joint Filler (Bituminous Type) conforming to the requirements of ASTM D 994.

107.3.1.4 Expansion joint filler material shall be manufactured in a workmanlike manner; and when ten percent or more of any lot or shipment is of nonuniform or improper construction, the entire lot or shipment may be rejected.

107.3.2 ASPHALT-LATEX JOINT FILLER:

107.3.2.1 Asphalt-latex joint filler shall consist of asphalt-latex emulsion and sodium fluosilicate furnished in separate containers and mixed on the site. The emulsion shall consist by volume of 60 parts 200-300 asphalt conforming to the requirements of Section 112, 40 parts of synthetic latex (GRS Type 4 and 5) to 10 parts of sodium fluosilicate, half strength. The emulsion and sodium fluosilicate shall not be mixed until the joint is ready to be filled. The amount of sodium fluosilicate to be mixed with the emulsion shall be approximately 3 percent to 5 percent by weight of the emulsion. The joint to be filled shall be thoroughly cleaned and surface dry.

107.3.2.2 The sealing compound shall consist of paving asphalt, Grade 200-300, conforming to the provisions of Section 112 of these specifications, emulsified with rubber latex in the presence of a suitable emulsifying agent; rubber latex designated as GRS Type 4; or any other approved type containing approximately 40 percent solids.

107.3.2.3 The resulting emulsion shall consist of a minimum of 55 percent of paving asphalt and a minimum of 36 percent of rubber latex and shall conform to the requirements set forth in the Table 107.3.2.3.

107.3.2.4 Test Report and Shipment Certification for Asphalt-Latex Joint Fillers: Each shipment shall be accompanied by a certificate from the vendor that the material will comply with the above specifications and such certificate shall be delivered to the ENGINEER. The certificate shall show the shipment number for the entire lot of material contained in the shipment and shall also show a list which will enable the ENGINEER to identify each individual container by the vendor's batch number, with which each container shall be plainly marked.

107.3.2.5 Application for Asphalt-Latex Joint Filler:

107.3.2.5.1 At no time shall the emulsion be subjected to a temperature below 4 degrees F. Prior to application, the material may be warmed, if necessary, to permit proper pouring of the joints. The method of heating shall be carefully controlled to avoid overheating of any part of the container or mixture and under no circumstances shall the emulsion be heated to a temperature greater than 130 degrees F.

107.3.2.5.2 Joints and cracks shall be thoroughly cleaned by hand or mechanical means immediately in advance of pouring the filler material. When new pavement has been

cured by the Pigmented Sealing Compound Method, the joints and cracks shall be thoroughly scrubbed by means of a wire brush or a cloth mop saturated with gasoline or by other approved means.

107.3.2.5.3 All joints and cracks shall be surface dry before application of the joint sealer. No sealer shall be placed during unsuitable weather or when the atmospheric temperature is below 50 degrees F or when weather conditions indicate that the temperature may fall to 32 degrees F within 24 hours. Immediately before pouring joints and cracks, the emulsion shall be mixed with from 1 percent to 4 percent by weight of powdered sodium fluosilicate.

107.3.2.5.4 The joints and cracks shall be filled in a neat and workmanlike manner by means of cornucopia pot or other approved method.

107.3.3 POLYETHYLENE FOAM JOINT FILLER:

107.3.3.1 Material: Polyethylene foam filler material shall conform to specification ASTM D 1751 and ASTM D 1752 and shall have a density of 2.5 to 3.0 pounds per cubic ft. It shall be constructed of closed cell, cross linked, polyethylene foam.

107.3.3.2 Installation: The closed cell polyethylene filler shall be cut to size and shape of the joint to be filled as shown on the plans and the Standard Details. The filler shall be held in place against previously poured concrete with metal or wood stakes or forms which shall be removed as newly placed concrete holds the filler in place. Nails or other fasteners are not to be driven into concrete mortar or nosing material for the purpose of holding filler material in place.

107.4 JOINT SEALANT

107.4.1 ETHYLENE VINYL ACETATE FOAM SEALANT (EVA FOAM):

107.4.1.1 Material:

107.4.1.1.1 EVA foam to be used to seal joints shall be preformed foam sealant per AASHTO M 153, Type II or III, ultra-violet resistant. It shall be a nonextruding expansion/contraction, waterproof material, closed cell, cross linked, with a density range of 2.5 to 3.5 pounds per cubic foot. EVA foam shall be used to seal joints where the width of joint to be sealed is 1 inch or greater. EVA foam sealants shall be 25 percent wider than the joint width and compressed into the joint per the manufacturer's recommendations.

107.4.1.1.2 The bonding agent to be used to bond EVA foam to concrete or mortar shall be a 100 percent solid 2 part epoxy which meets ASTM C 881, Type II, Grade 2, Class B and C as approved by the ENGINEER. The bonding agent shall be used according to the manufacturer's recommendations. Care shall be taken to assure that the bonding agent does not adhere to the exposed surface of the EVA foam sealant.

107.4.1.2 Preparation and Application:

107.4.1.2.1 Immediately prior to application joints shall be sand-blast-cleaned to remove laitance, curing compound, and other bond inhibitors. At the time of application, concrete must be cured at least 7 days and attain at least 80 percent of design strength. The vertical sides of the joint area to be sealed shall be clean, dry, smooth, sound, and free of any foreign material. The bottom of the area to be sealed, if concrete, shall be covered with a polyethylene bondbreaker, minimum 1/16 inch thick, before applying the bonding agent to this vertical sides. The bonding agents shall be applied to completely cover both the nosing and the sealant surfaces which are to be bonded and to no other surface.

107.4.1.2.2 Sealant shall be extruded to the bottom of the joint groove and tooled to work the sealant into close contact with the joint surfaces to eliminate air bubbles. Any sealant that does not cure properly, fails to establish a satisfactory bond, protrudes more than one half inch above the finished concrete surface adjacent to the joint, does not completely adhere to the sides of the joint, is damaged by the CONTRACTOR'S operations, or is not satisfactory in the opinion of the ENGINEER must be removed and the joint recleaned and resealed.

107.4.1.2.3 After the bonding agent has set, sealant that protrudes 1/8 to 1/2 inches shall be cut with a power sander to the concrete surface. The sealant will then be coated with two coats of ultra-violet proofing, opaque, vinyl coating, which will produce approximately 6 mils thickness, as approved by the ENGINEER.

107.4.2 TWO COMPONENT URETHANE SEALANT:

107.4.2.1 Materials:

107.4.2.1.1 Two Component Urethane Sealant to be used to seal joints shall meet Federal Specifications No. TT-S-0022 7E, Type I Class A (Pour Grade) or No. TT-S-0022 7E, Type II, Class A (Non-Sag). Two Component Urethane Sealant shall be used to seal expansion joints less than 1 inch in width.

107.4.2.1.2 The bonding agent to be used to bond the Two Compound Urethane Sealant to the concrete or mortar nosing shall be a one-component solvent based system, as furnished by the sealant manufacturer.

107.4.2.1.3 Urethane sealants shall not be placed when the temperature of the concrete or air is below 40 degrees F. The non-sag sealant shall be used in joints other than horizontal. Dimensions or urethane sealants shall be as shown on the drawings.

107.4.2.2 Preparation and Application: Two Component Urethane Sealants and Bonding Agents shall be installed in accordance with the manufacturer's recommendations and Subsection 107.4.1.2 of this specification.

107.4.3 ASPHALT RUBBER SEALANT:

107.4.3.1 Materials and Mixing (Method A)

107.4.3.1.1 Bituminous Material. The bituminous material shall be asphalt cement, having a maximum penetration of 120-150, complying with the requirements of Section 112.

107.4.3.1.2 The granulated crumb rubber (100 percent Vulcanized) shall meet the following requirements:

PASSING SIEVE	PERCENT
#8	100
#10	98 - 100
#30	0 - 10
#40	0 - 4

NOTE: The granulated crumb rubber shall be accepted if accompanied by the certificate of compliance from the supplier that the material has been tested during the grinding process and meets the gradation specified.

107.4.3.1.2.1 The specific gravity of the granulated rubber shall be 1.15 ± 0.02. The rubber material shall be free of fabric, wire, or other contaminating materials except that up to 4 percent of calcium carbonate may be included to prevent the particles from sticking together.

107.4.3.1.3 Diluent for diluting the asphalt cement and granulated crumb rubber mixture shall have a boiling point of not less than 350 F, and the temperature of the hot asphalt-rubber shall not exceed 350 F, at the time the diluent is added.

107.4.3.1.4 Mixing. The percentage of the granulated crumb rubber shall be 33 1/3 percent ± 2 percent of the asphalt weight.

107.4.3.1.4.1 The materials shall be combined as rapidly as possible for such a time and at such a temperature that the consistency of the mix approaches that of a semi-fluid material. The temperature of the asphalt cement shall be between 350 and 395 degrees F.

107.4.3.1.4.2 After the full reaction between the asphalt cement and the granulated rubber has occurred and before application, the mix may be cut back with diluent. The maximum amount of diluent used shall not exceed 7 1/2 percent by volume of the hot asphalt cement-granulated crumb rubber composition required for adjusting the viscosity for spraying.

107.4.3.1.4.3 In the event that a delay occurs after the full reaction has taken place, the material may be slowly reheated to an acceptable spraying temperature with no detrimental effect but, because of the polymer reversion that can occur when the granulated crumb rubber is held at high temperature(s) for a prolonged time, the material shall not be reheated to temperatures above 350 degrees F.

107.4.3.2 Materials and Mixing (Method B):

107.4.3.2.1 Bituminous Material. The bituminous material shall be Asphalt cement, having a maximum penetration of 120, complying with the requirements of Section 112 and shall be fully compatible with the ground rubber.

107.4.3.2.2 Rubber Extender Oil. The extender oil shall be a resinous, high flash point aromatic hydrocarbon meeting the following test requirements:

Viscosity, SSU @ 100 degrees F. (ASTM D 88)	2500 Min.
Flash Point, C.O.C., degrees F.	392 Min.
Molecular Analysis (ASTM D-2007)	
Asphaltenes, percent by weight	0.1 Max.
Aromatics, percent by weight	55 Min.

107.4.3.2.3 Rubber Components. The rubber shall be U.S. Rubber Reclaiming Company designation G 274, or approved equal meeting the following physical requirements:

107.4.3.2.3.1 Composition: The rubber shall be a dry, free flowing blend of 40 percent powdered reclaimed (that is, Devulcanized), rubber and 60 percent ground vulcanized rubber scrap with a high natural rubber content and shall be free from fabric, wire or other contaminants except that up

to 4 percent of a dusting agent such as calcium carbonate may be included to prevent cracking of the particles.

107.4.3.2.3.2 Sieve Analysis:

Sieve No.	Percent Passing
8	100
30	60-80
50	15-40
100	0-15

107.4.3.2.3.3 Mill Test: When 40 to 50 grams of rubber retained on the No. 30 sieve are added to a tight set 6-inch rubber mill, the material shall band on the mill roll in one pass. This will indicate the presence of a suitable quantity of reclaimed, devulcanized rubber.

107.4.3.2.3.4 Natural Rubber Content. Minimum 30 percent by weight. (ASTM D-297).

107.4.3.2.4 Mixing. The Asphalt Rubber Blend shall be a combination of the asphalt cement, extender oil, and ground rubber mixed together at an elevated temperature in accordance with the following procedure and proportions:

107.4.3.2.4.1 Preparation of asphalt-extender oil mix. Blend the preheated asphalt cement (250-400 degrees F) and sufficient rubber extender oil, (usually from 2 to 6 percent), to reduce the viscosity of the asphalt cement to within the range of 600 to 1800 Poises at 140 degrees F, when tested in accordance with the requirements of AASHTO M 266. Mix thoroughly by recirculation, stirring, air agitation or other appropriate means.

107.4.3.2.4.2 Addition of Rubber. Increase the temperature of the asphalt cement-extender oil blend with appropriate heat exchanges to within the range of 350-425 degrees F, and then add an amount of specified ground rubber equal to 20 percent, ± 2 percent by weight of the total asphalt-rubber blend. Add the rubber as rapidly as possible and continue recirculating for a period of not less then 30 minutes after the incorporation of all the rubber.

107.4.3.2.4.3 Sufficient recirculation and/or stirring of the total combined material shall be maintained to provide good mixing and dispersion. Temperature of the total blend shall be kept between 350-425 degrees F.

107.4.3.3 Construction Requirements:

107.4.3.3.1 the equipment used for application shall be capable of maintaining a continuous uniform, homogeneous mixture throughout the sealing operation. The method and equipment for heating and preparing the asphalt-rubber mixture for application shall be so designed as to provide a continuous supply of the prepared mixture that will assure sealing operations without delays due to the mixing-heating operation. The equipment shall incorporate a mechanical mixing device within the heating unit such that a continuous mixing of the sealant compound is maintained.

107.4.3.3.2 The ENGINEER shall be satisfied that the material and the mixing process the CONTRACTOR proposes to use has been successfully used in similar circumstances on comparable projects.

107.4.3.3.3 Nozzles shall be of adequate design to provide for uniform application of the asphalt-rubber material without clogging, or other irregularities in distribution.

107.4.3.3.4 Should clogging or irregularities in distribution occur, operations shall cease until corrective action is effected.

107.4.3.3.5 Defective equipment shall be removed from the project.

107.4.3.3.6 Weather Limitations. Asphalt rubber joint sealant shall not be placed during wet or adverse weather, on a wet surface, or unless the atmospheric temperature is at least 40 degrees and rising, or when the wind conditions are such that a satisfactory seal cannot be achieved.

107.4.3.3.7 The ENGINEER will be the sole judge of when the mixed material has reached a consistency for application. Application shall proceed immediately after the proper consistency is attained.

107.4.3.3.8 Immediately prior to placing the sealant, the joints shall be cleaned of all loose particles, dust, and other deleterious substances by means of high velocity compressed air, or any other methods approved by the ENGINEER.

107.4.3.3.9 Only asphalt-rubber sealant shall be used to fill the joints.

107.4.3.3.10 No Vehicular Traffic will be permitted on the asphalt-rubber sealed joints until sufficient time has elapsed for the asphalt-rubber sealant to become non-tacky.

107.4.3.3.11 The ENGINEER shall be the sole judge as to when the joints are properly cleaned and sealed.

107.4.4 SILICONE RUBBER SEALANT: This work shall consist of cleaning the joint, and installation of low modulus silicone sealant in the roadway joints specified on

the plans. The plans will designate the type of joint (transverse or longitudinal) and location of joint.

107.4.4.1 Materials: All materials shall meet the requirements of the following:

107.4.4.1.1 Silicone Sealant: Silicone sealant shall be furnished in a one-part silicone formulation. The compound shall be compatible with the surface to which it is applied. Acid cure sealants are not acceptable for use on concrete. Movement capability shall be +100 percent and -50 percent of the joint width. The physical requirements are:

107.4.4.1.1.1 Accessory Items: The backup material shall be compatible with the sealant or any component of the joint sealant system. No bond or adverse reaction shall occur between the backup material, sealant, or primer if primer is specified.

107.4.4.1.1.2 Test Requirements:

Tensile Stress: 150 percent Elongation 7 days cure @ 77 F ±3°F and 45-55 percent R.H.	45 psi maximum
Specific Gravity	1.01- 1.515
Durometer Hardness, Shore A:	10-25 (0°F) cured 7 days @ 77°F ±3°F and 45-55 percent R.H.
Shelf Life	6 mo. minimum from date of manufacture
Ozone and U.V.	No chalking, Resistance cracking, or bond loss after 5000 hours
Bond to concrete mortar	50 psi minimum concrete Briquettes air cured 7 days @ 77°F ±3°F
Tack Free Time	6 Hrs. minimum
Movement Capability and cohesive failure after 10 cycles at 0°F	No adhesive or Adhesion

107.4.4.1.1.3 Test Methods:

Tensile Stress	ASTM D-412 (DIE C)
Specific Gravity	ASTM D-794, Method A
Durometer Hardness	ASTM D-2240
Ozone and UV Resistance	ASTM D-793

107.4.4.1.1.4 Bond to Concrete Mortar:

Three briquets molded in accordance with AASHTO T-132 and moisture cured for at least 28 days shall be sawed in half, cleaned, and oven dried to a constant weight in an oven at 100 degrees C ± 5 degrees. After cooling, they shall be bonded with approximately 10 mils of silicone sealant and tested using clips meeting AASHTO T 132. They shall be tested in tension at a loading rate of .3 inch/minute.

107.4.4.1.1.5 Tack Free Time:

Prepare specimen in a mold with an area larger than the brass weight described below and 1/4 inch thick. Place a 30 gram brass weight 1-5/8 inch by one inch by 1/8 inch on a polyethylene strip applied to the specimen after they have cured for the specified time. After removing the weight, peel the polyethylene strip by pulling it at 90 degrees to the compound at a rate of 1 inch in 5 seconds. No material should adhere to the polyethylene when it is tack free.

107.4.4.1.1.6 Movement Capability and Adhesion:

Prepare 1 inch x 1 inch x 3 inch concrete blocks in accordance with ASTM C-719. A sawed face shall be used for bond surface. Seal 2 inch of block leaving 1/2 inch on each end of specimen unsealed. The depth of sealant shall be 3/8 inch and the width 1/2 inch. Cure the specimen 7 days in air at 77 degrees F ±3 degrees F and then 7 days in water at 77 degrees F ±3 degrees F. Subject sealant to movement in accordance with ASTM C 719. The rate of extension or compression shall be 1/8 inch per hour. One cycle is defined as extension to one inch width and return to the initial 1/2 inch width.

107.4.4.1.1.7 Certification: The manufacturer of the joint sealant shall furnish certification test results of each lot of the joint sealant material furnished to the project to meet all of the above requirements except the bond to cement mortar. Certification shall show use of primers where applicable.

107.4.4.1.1.8 Acceptance: Even though a sealant meets all requirements of the specification failure to perform adequately in actual use shall be just cause for rejection.

107.4.4.1.2 Bond-breaking Adhesive Tape shall be polyethylene and Backer-Rod shall be closed cell poly-ethylene. Backer-rod shall be of circular cross section with a diameter 25 percent greater than the joint width.

107.4.4.2 Construction Requirements:

107.4.4.2.1 Cleaning the Joint: The joints shall be thoroughly cleaned of all foreign material (oil, asphalt, curing compound, sealant adhesive, paint, rust, etc.), including existing sealant, if any. The CONTRACTOR may use any one or combination of methods below in his cleaning operation, except Method 2, sawing is to be used only if Method 1 will not properly clean the joint.

107.4.4.2.1.1 Method 1 - High Pressure Water Jet:

The joint shall be thoroughly cleaned with a high-pressure water jet blaster (3000 psi at the tip) and other tools as necessary. After blasting, the joint shall be blown out with compressed air. This process shall be repeated until the joint is thoroughly cleaned of all foreign material, including old sealant, and a new, clean concrete face is exposed on the faces of the joint.

107.4.4.2.1.2 Method 2 - Sawing:

If this method of cleaning is selected (and approved as noted previously), the CONTRACTOR shall exercise utmost care to minimize enlarging the existing width of the joint. Sawing shall be limited to only exposed clean, new concrete faces on the joint with a maximum allowable cut of 1/16 inch on each face of the joint. All dust, sawing residue, and other contamination will be removed from the joint faces. If dry sawing with diamond or abrasive blades is used, the sawing residue shall be thoroughly removed by blowing out the joint and immediate area with compressed air. If wet sawing with diamond or abrasive blades is used, the resulting saw latence or slurry shall be completely removed from the joint and immediate area by flushing clean with a high-pressure jet of clean water. After flushing, the joint shall be blown out with compressed air and allowed to dry 4 hours minimum.

107.4.4.2.2 Installing Backer-Rod in Joint: Prior to placing the backer-rod, the joint must be thoroughly dry and clean. Any necessary cleaning, air blasting, or air-drying will be completed before placing backer-rod (and sealant). On joints less than 1 inch wide after cleaning, a round backer-rod of resilient material, compatible with silicone sealant, and slightly oversized to prevent movement during the sealing operation will be installed in the joint at the depth specified on the appropriate joint detail in the plans or as recommended by the sealant manufacturer. (The thickness of the backer-rod will be greater after squeezing it into the joint and some "rebound" may occur--allowance must be made for this to insure placing at correct depth.) On joints larger than 1 inch after cleaning, use a backup material cut from an approved resilient material which is compatible with silicone sealant.

107.4.4.2.3 Installing Silicone Sealant: The installation of the silicone sealant is to be done as soon after placing the backer-rod as reasonably possible to insure that joint is still clean and dry. In the event the joint does become contaminated, damp, or wet, the backer-rod is to be removed, the joint cleaned and dried, and backer-rod reinstalled prior to placing the sealant material. The sealant material used shall be a low modulus silicone sealant meeting the movement requirements of Section 107.4.4.1.1. The temperature at time of placement must be 35 degrees F or higher. The silicone sealant shall be applied by pumping or manual means. If pumping is used, the pump shall be a sufficient capability to deliver the necessary volume of material to completely fill the joint to the specified width and height of sealant in one pass. The nozzle shall be of sufficient size and shape to closely fit into the joint and introduce the sealant inside the joint with sufficient pressure to prevent voids occurring in the sealant and to force the sealant into contact with the joint faces. The sealant after being placed shall be tooled to provide the specified recess depth and thickness and shape of sealant as shown on the plans. Sufficient force or pressure shall be applied to the sealant in this tooling operation to force the sealant against the joint faces to insure satisfactory wetting and bonding of the sealant to the joint faces. The silicone sealant is not self-leveling and will not position itself correctly in the joint under its own weight. The sealant shall be placed to reasonably close conformity with the dimensions and shape shown on the plans. Any unreasonable deviation will be cause for rejection and necessary corrective action will be made by the CONTRACTOR. See Sketch 107.4.4.2.3 for installation detail.

107.4.4.2.4 Cleaning Pavement: After a joint has been sealed, all surplus sealant or other residue on the pavement or structure surfaces shall be promptly removed.

107.4.4.2.5 Opening to Traffic: Traffic shall not be permitted over sealed joints until the sealant is tack free and until debris from traffic does not imbed into the sealant.

107.4.4.2.6 Special Requirements: The following special requirements apply to this work:

107.4.4.2.6.1 Air compressors used for cleaning joints shall be equipped with suitable traps capable of removing all surplus water and oil in the compressed air. The compressed air will be checked daily by the ENGINEER for contamination. No contaminated air shall be used. The compressor shall be capable of delivering compressed air at a continuous pressure of at least 90 psi.

107.4.4.2.6.2 Unless otherwise specified on the plans, the joints are to be resealed after any required pavement repair.

107.4.4.2.6.3 Any failure of the sealed joint due to (1) adhesion or cohesion failure of joint material (2) unsatisfactory or improper workmanship by CONTRACTOR (3) damage by CONTRACTOR's operations or public traffic will be cause for rejection, and the joint shall be repaired to ENGINEER's satisfaction at no additional cost to the OWNER.

107.5 POLYETHYLENE SHEET BEARING PLATE AND SLEEPER

107.5.1 MATERIAL: Ultra high molecular weight, high density, or low density polyethylene sheet to be used as a bearing plate or sleeper shall conform to Federal Specification LP-590. This material is only used for concrete channel expansion joints.

107.5.2 Installation: The polyethylene sheet shall be cut to size and shape of the horizontal surfaces to be covered. The concrete surface to be covered with polyethylene sheet shall be smooth and flat to within ±1/8 inch when checked with a 10 foot straightedge. The subgrade upon which the polyethylene sheet is to be placed shall not vary more than 1/4 inch from the specified grade when checked with a 10 foot straightedge.

107.6 PRECAUTION

The manufacturer's recommendation for clearance between surface of sealant to top of concrete or joint shall be closely observed. Certain sealants will fail if the joint is over filled and sealant is allowed to spread onto the concrete surface. All joint material that does not comply with the manufacturer's installation recommendations or these specifications shall be removed, joint cleaned and material correctly installed by the CONTRACTOR at no cost to the OWNER.

107.7 MEASUREMENT AND PAYMENT

Filler materials and sealants shall be considered as incidental to concrete joint treatment and no measurement or payment will be made for these materials and installation thereof.

TABLE 107.3.2.3
ASPHALT-LATEX EMULSION JOINT SEALING COMPOUND

Specification Designation	Test Method	Limits	
Furol Viscosity at 77°F	AASHTO T 72	50-250 Seconds	Before adding gelling agent.
Sieve Test	AASHTO T 59	1% Max.	Before adding gelling agent.
Penetration at 77°F	ASTM D 217	50-250	The penetration test is made on a specimen prepared by stirring 5 percent of sodium fluosilicate into the asphalt-latex emulsion in a 6-ounce deep ointment can. The specimen is then allowed to stand in the air at a temperature of 77 degrees F ±2 degrees F for a period of 30 minutes and is then penetrated with a grease cone under a total load of 150 grams in accordance with ASTM D 217.
Elasticity		70% Min.	After addition of 5 percent of sodium fluosilicate and curing for 24 hours at 100 degrees F ±2 degrees F the specimen shall have an elastic recovery of not less than 70 percent.
Dehydration Loss		30 Max.	Twenty-five grams of emulsion, prior to adding the gelling agent, is placed in an 8-ounce flat ointment can and dehydrated in a suitable oven maintained at a temperature of 200 degrees F ±2 degrees F for a period of 24 hours. Weight loss from dehydration shall not exceed 30 percent of sample tested.
Time of "Set"		15 to 60	After mixing the emulsion with 1 percent to 4 percent by weight powdered sodium fluosilicate, the emulsion shall harden or develop a "set" in from 15 to 60 minutes, under field conditions.

SECTION 201

CLEARING AND GRUBBING

201.1 GENERAL

This work shall consist of removing natural and man-made objectionable material from the right-of-way, construction areas, road approaches, material and borrow sites, areas through which ditches and channels are to be excavated, and such other areas as may be shown on the plans. Clearing and grubbing shall be performed in advance of grading operations except that in cuts over 3 feet in depth, grubbing may be done simultaneously with excavation, provided stumps, roots, embedded wood, foundations and slabs are removed as specified. Clearing and grubbing shall be in accordance with the requirements herein specified, such as erosion control requirements. Demolition of structures, other than foundations or slabs, shall be as shown on the plans.

201.2 REFERENCES

201.3 PRESERVATION OF PROPERTY

Existing improvements, adjacent property, utility and other facilities, and trees and plants not to be removed shall be protected from injury or damage resulting from the CONTRACTOR's operations. Only trees and plants designated or marked for removal by the ENGINEER shall be removed.

201.4 CONSTRUCTION METHODS

201.4.1 The natural ground surface shall be cleared of vegetable growth, such as trees, tree stumps, logs, roots or downed trees, brush, grass, weeds, and surface boulders, as well as fences, walls, rubbish, foundations and slabs.

201.4.2 Unless otherwise shown on the plans, the entire area of the project within the limit lines specified below shall be cleared and grubbed. No payment will be made to the CONTRACTOR for clearing and grubbing outside these limits, unless such work is authorized by the ENGINEER.

201.5 LIMIT LINES: Except when limit lines for clearing and grubbing are shown on the plans or are staked by the ENGINEER, clearing and grubbing shall extend only within reasonable limits of the work area.

201.6 REMOVAL OF TREES AND TREE BRANCHES

201.6.1 Trees shall be removed in such a manner as not to injure standing trees, plants, and improvements which are to remain. Tree branches extending over a roadway and which clear finish grade by 12 feet or less shall be cut off close to the boles in a workmanlike manner.

201.6.2 Trees requiring trimming to facilitate normal construction operations shall be trimmed by a tree surgeon.

201.7 REMOVAL AND DISPOSAL OF DEBRIS

Debris to be removed shall be disposed of outside the right-of-way at a location satisfactory to the ENGINEER, except when burning of combustible debris is permitted. The area to be graded and adjacent areas shall be left with a neat and finished appearance. No accumulation of flammable material shall remain on or adjacent to the property line. In case burning precedes construction operations, the piles may be placed in the center of the area; otherwise, the piles shall be placed in the most convenient location at the side of the area and beyond slope lines where they may be burned without damage to surrounding forest cover or adjacent property. Burning shall be done in conformance with local regulations and at such times and in such manner as to prevent the fire from spreading to areas adjoining the construction site. In areas where burning is prohibited by local regulations, all removed material shall be disposed in an approved solid waste disposal site.

201.8 REMOVAL AND DISPOSAL OF SALVAGEABLE ITEMS

Items and materials of salvage value as shown on the plans or as determined by the ENGINEER, unless incorporated in the new work, shall remain the property of the OWNER and shall be delivered to approved storage areas as directed by the ENGINEER. Such items and materials shall be carefully removed and delivered in such a manner as to permit re-use.

201.9 MEASUREMENT AND PAYMENT

201.9.1 CLEARING AND GRUBBING:

201.9.1.1 When the proposal includes an item for clearing and grubbing, the quantity for measurement shall be as indicated in the Bid Proposal.

201.9.1.2 The unit price per acre paid for clearing and grubbing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in clearing and grubbing as shown on the plans, as provided in these specifications and as directed by

the ENGINEER, including the removal and disposal of resulting material.

201.9.1.3 When the Bid Proposal does not include a pay item for clearing and grubbing as above specified and unless otherwise specified in the Supplementary Specifications, full compensation for any necessary clearing and grubbing required to perform construction operations specified shall be considered as included in the price paid for other items of work and no additional compensation will be allowed therefore.

201.9.2 REMOVAL AND DISPOSAL OF TREES: If the Bid Proposal includes separate estimates of quantities for the removal of trees, the trees shall be classified by size as follows:

201.9.2.1 Trees less than 12 inches in circumference at 3 feet above the original ground surface shall be considered as included in the price for clearing and grubbing or excavation, and no additional compensation will be allowed therefor.

201.9.2.2 Trees between 12 and 30 inches in circumference shall be measured as a unit price for each tree in the item provided in the Bid Proposal for trees of this dimension.

201.9.2.3 Trees more than 30 inches in circumference shall be measured as a unit price for each tree in the item provided in the Bid Proposal for trees of this dimension.

SUPPLEMENTAL TECHNICAL SPECIFICATION

APWA (2006) SECTION 201

CLEARING AND GRUBBING

Revised 07/24/2020

1. In the Subsection 201.1 GENERAL, delete the second sentence and replace with the following: Clearing and grubbing shall be performed in advance of the grading operations.

2. In the Subsection 201.4.1 CONSTRUCTION METHODS, add the following:

   Clearing and grubbing operations shall include stripping of the existing ground surface. Stripping shall be achieved only by cutting, i.e., ground depressions or narrow sections of tributary arroyos should not be inadvertently filled during the foundation preparation. The resulting area shall be cut to provide a uniform, relatively level surface.

3. In Subsection 201.5 LIMIT LINES, add the following:

Unless otherwise approved by the Engineer or otherwise specifically designated on the plans, limits of clearing & grubbing shall not exceed slope limits as shown with finished grade contours on plans.

END OF SECTION

SECTION 301

SUBGRADE PREPARATION

301 GENERAL

301.1 The work performed under this specification shall include. but not be limited to providing the equipment. labor and materials for the preparation of soil subgrade and maintenance of the prepared subgrade for the construction of graded aggregate base, asphalt treated base, cement treated base, asphalt concrete, Portland cement concrete, sidewalks, curb and gutter. drive pads, valley gutter, median pavements and/or any other roadway improvements.

301.2 REFERENCES

301.2.1 ASTM:

C136	D423
D424	D698
D1140	D1557
D2844	D2922
D3017	

301.2.2 This publication

Section 204

301.3 MATERIAL

301.3.1 Subgrade material may be on site soil, combinations of pulverized asphalt concrete and soil, and/or pulverized Portland cement concrete and soil, imported soils, complying with the requirements of this specification. Flowing, sugar sands shall not be used for subgrade material.

301.3.2 All soft and unstable material and other portions of the subgrade which will not compact readily or serve the intended purposes shall be removed and replaced with suitable material from excavation or borrow or suitable materials shall be added and. by manipulations, be incorporated into the subgrade to produce a material meeting subgrade requirements.

301.3.3 All subgrade material shall have a minimum Resistance Value (R-Value), as determined by ASTM D-2844, equal to or greater than the design R-Value for the pavement section. If the subgrade soils encountered during construction have a R-Value less than the design R-Value, those subgrade materials shall be removed to a depth of not less than two (2') feet below the finished subgrade elevation or as authorized by the ENGINEER and to the horizontal limits authorized by the ENGINEER, and replaced with subgrade material having an R-Value greater than the design R-Value. On small projects, in areas that just involve replacement of existing roadway items or when no design R-Value has been established this R-Valve requirement may be waived if authorized by the ENGINEER.

301.4 SUBGRADE COMPACTION

301.4.1 Subgrade preparation shall extend to one foot (1') beyond the limits of the improvement to be placed on the subgrade except when that improvement abuts an existing structure and/or the limits of the right of way. Where an improvement abuts an existing structure and/or the limits of right of way, the subgrade preparation shall extend to the edge of the existing structure and/or the limits of right of way, as specified in the plans, specifications, supplemental technical specifications or as directed by the ENGINEER. Where existing structures are in the right of way or construction easements, subgrade preparation shall extend to the face of the structure, as specified above. Subgrade preparation shall not extend below the bottom of the foundation of an existing structure without specific authorization by the ENGINEER.

301.4.1.1 Subgrade preparation for roadway improvements shall be performed after completion of earthwork construction, subsurface utility installation and trenching back fill within the limits specified, as directed by the ENGINEER. The subgrade preparation shall extend the full width of the roadway to either one (1) foot back of new curb and gutter, and/or to the face of existing structures. and or the limits of right of way, as specified in the plans and specifications. as directed by the ENGINEER.

301.4.1.2 Subgrade preparation for sidewalks and drive pads shall extend a minimum of one (1') beyond the free edge of the improvement, and/or to the limits of right of way, and/or to the face of existing structures.

301.4.1.-3 The subgrade preparation for roadway construction without curb and gutter, shall extend one (1 ') beyond the edge of the pavement, and/or to the face of existing structures, and/or to the limits of right of way, as specified in the plans and specifications, as authorized by the ENGINEER.

301.4.1.4 Subgrade preparation shall extend the full width of roadway medians four (4) feet wide or less. In areas that the medians are wider than four feet (4') the subgrade compaction shall extend one foot

(1') beyond the median edge of the pavement or back of the median curb.

301.4.2. The subgrade for arterial/collector roadway shall be ripped to a minimum depth of one (1) foot, brought to uniform moisture content, and compacted to the requirements of plans and specification, as authorized by the ENGINEER. Subgrade material with either 20 per cent or more material passing a no. 200 sieve sha11 be uniformly mixed and moisture conditioned using a tractor mounted mixer or disced after ripping, as specified in the plans and specifications, as authorized by the ENGINEER. The subgrade for reconstructed curb and gutter, sidewa1ks, drive pads, residential roadways, bicycle paths and other roadways shall be scarified to a minimum depth of six (6) inches, brought to uniform compaction moisture content, and compacted to the requirements of p1ans and specification, as authorized by the ENGINEER.

301.4.3 Subgrade area shall be compacted to a dry density greater than 95 per cent of maximum dry density in a moisture range of optimum moisture +/- 2% as determined in accordance with ASTM D1557, unless the material contains 35% or more material finer than the No.200 sieve. If the subgrade material has 35% or more material finer than the No.200 sieve, the subgrade shall be compacted to a dry density greater than 95 percent of maximum dry density in a moisture content range of at least optimum moisture to optimum moisture +4%, as determined in accordance with ASTM D698.

301.4.4 Areas on which roadway pavement items are to be placed shall be compacted uniformly to the required subgrade density at the same time. Obtaining the required subgrade density in trench areas at a different time than obtaining the required subgrade density in the adjacent pavement areas will not be permitted.

301.4.5 Upon completion of the subgrade preparation, the CONTRACTOR shall maintain the compacted subgrade density and moisture content at the specified levels until the next lift of material is completed. The CONTRACTOR shall provide continuous moisture protection of the subgrade by either sprinkling or the application of a prime coat, as directed by the ENGINEER.

301.5 SUBGRABE TOLERANCES

Subgrade upon which pavement, sidewalk, curb and gutter, drive pads, or other structures are to be placed shall not vary more than +1/4 inch or -1/2 inch per 10 foot in any direction from the specified grade and cross section. Subgrade upon which base material is to be placed shall not vary more than +1/2 inch or -1 inch per 20 foot in any direction from the specified grade and cross section. Variations within the above specified tolerances shall be compensating so that the average grade and cross section specified are met.

301.6 TESTING:

301.6.1 A sample of each type of soil encountered shall be classified in accordance with the requirements of ASTM D2487, the moisture density relationship determined in accordance either ASTM D698 or D1557, whichever is applicable and an estimated resistance R-value assigned based on plasticity index, PI, and percent material passing the No.200 sieve.

301.6.2 Compaction tests shall be taken for each 500 sy or less, as directed by the ENGINEER. Compaction tests shall be taken in accordance with ASTM D2922 and D3017. Areas represented by non complying tests shall be reworked as specified, and retested for compliance.

301.6.3 Test reports shall include but not be limited to the requirements of TABLE 301.A.

TABLE 301.A
TEST REPORT INFORMATION

A. Field Data
- Date of Sampling/Field Test
- Project Number or
- Permit Number
- Project Title
- Location of sample/field test as defined by the project plans and specifications
- Time of Sampling/field testing
- Field test results with reference specification limits

B. Laboratory Data
- Soil classification
- Soil gradation
- Plasticity index

Liquid limit
Optimum moisture/maximum dry density relationship and graph
Estimated soil resistance R-Value

301.6.4 Test results shall be reported to the ENGINEER, CONTRACTOR, and Materials and Testing Laboratory, Construction Division, Public Works Department, in writing, within 4 working days of completion of the sampling and or field test. Non-complying test shall be reported within 1 working day of completion of the test.

301.7 MEASUREMENT AND PAYMENT:

301.7.1 Measurement for payment of roadway subgrade preparation will be by the square yard to the limits of the surfacing, as authorized by the ENGINEER. Payment for subgrade preparation shall include all labor and equipment required to shape, mix, add moisture, compact, bring to grade and maintaining the prepared subgrade moisture and density until the next course of material is placed.

301.7.2 The measurement of payment for subgrade preparation for non-pavement roadway items such as curb and gutter, valley gutter, drive pads and sidewalks etc., shall be included in that item. No separate payment will be made.

SECTION 302

AGGREGATE BASE COURSE CONSTRUCTION

302.1 GENERAL

The work provided under this specification shall include the furnishing, placement and compaction of aggregate base course (ABC) to the lines, grades, dimensions, moisture, density and typical sections as specified in the plans and specifications, and or as directed by the ENGINEER. The CONTRACTOR shall be solely responsible for the aggregate base course either batched at and/or delivered to the site. A job mix formula for aggregate base course, shall be certified in accordance with the requirements of Section 13 of these specifications. Each job mix formula submitted and authorized for use under this specification shall be identified by a number, unique to that job mix formula and aggregate production plant/pit. If a change in material(s) from that specified in the job mix formula occur during a project, the CONTRACTOR shall submit a new job mix have formula to include the changed materials for approval by the ENGINEER. A job mix formula shall not be used on a project without written approval of the ENGINEER. A job mix formula, upon request by an aggregate supplier, may be authorized by the OWNER for a period of 14 months, from the date of sampling of aggregates used in the job mix formula.

302.2 REFERENCES

302.2.1 ASTM:

C136	D75
D422	D423
D424	D1557
D2419	D2844
D2922	D2940
D3017	

302.2.2 This Publication:

Section 113
Section 301

302.3 MATERIALS

302.3.1.1 Aggregate base course shall be coarse aggregate of either crushed stone, or crushed gravel, or crushed asphalt concrete, or crushed Portland cement concrete, or any combination, and natural sand, the combination of materials conforming to the requirements of ASTM D2940 and the plans and specifications, as authorized by the ENGINEER.

302.3.1.2 Coarse aggregates retained on the No.4 sieve shall consists of durable particles of either crushed gravel, or crushed asphalt concrete pavement, or crushed portland cement concrete, or any combination, capable of withstanding the effects of handling, spreading and compacting without degradation production of deleterious fines. At least 50% of the particles retained on the 3/8-inch sieve, shall have two or more fractured faces. Coarse aggregate shall comply with the requirements of TABLE 302.A.

302.3.1.3 Fine aggregate passing the No.4 sieve shall consists of fines from the operation of crushing coarse aggregate; where available and suitable, natural sand or finer mineral matter or both, may be added. Fine aggregate shall comply with the requirements of TABLE 302.A.

302.3.1.4 The job mix formula and gradation shall comply with the requirements of TABLE 302.B, and have the same or similar characteristic gradation curve as either range limit, when graphically plotted on a standard "0.45 POWER" Gradation Chart.

302.3.1.5 Aggregate base course furnished and placed under this specification shall have a resistance value, (R-Value), not less than 76 as determined by ASTM D2844.

302.3.1.6 A job mix formula, certified by a Registered New Mexico Professional Engineer to comply with the requirements of this specification, shall be submitted to and authorized for use by the ENGINEER before the material may be incorporated in the construction. A submittal shall include, but not be limited to, the items in TABLE 302.C. Prior to delivery of the material, the CONTRACTOR may be required to furnish samples of the aggregates base course to the ENGINEER for testing. Gradations for the aggregate base course used in a particular day's placement shall be submitted to the ENGINEER upon request.

302.3.2 Prime coat for surface sealing of compacted aggregate base course shall comply with the requirements of CSS-1H Cationic Emulsified Asphalt as specified in Section 113.

302.4 TRANSPORTATION AND PLACEMENT

302.4.1 Aggregate base course shall be transported in suitable vehicles with a cover. A load shall be covered immediately after loading and remain covered until unloading.

302.4.2 The CONTRACTOR shall provide to the ENGINEER with each load of batched and/or delivered to the job site, before unloading at the site.

a copy of the delivery ticket on which is printed, stamped or written. the information defined in TABLE 302.D.

302.4.3 Aggregate base course shall be placed on prepared subgrade, prepared in accordance with the requirements of SECTION 301, the plans and specifications, and or as directed by the ENGINEER.

302.4.4 Aggregate base course shall be placed in lifts which will provide not less than four (4) inches and not more than 6 inches compacted thickness. The material shall be moisture conditioned within a range of optimum moisture plus or minus two percent (+/-2%), and compacted to a dry density greater than ninety-five (95) percent of maximum dry density as determined in accordance under the procedures specified in ASTM D1557.

302.4.5 The finish surface of the compacted aggregate base course shall not deviate from finish grade in excess of 1/2 inch in 10 feet when tested with a 10-feet straight edge in any direction. All deviations in excess of the specified shall be corrected by the CONTRACTOR prior to authorization for placement of the next life of material.

302.4.6 Immediately upon completion of compaction, the CONTRACTOR shall seal the surface of the compacted aggregate base course with a prime coat. The prime coat shall be applied as required to provide a uniform coverage of the surface. Application shall be between 0.05 and 0.15 gallons per square yard of surface. If final surfacing is to be placed within twenty four (24) hours after completion of compaction, the prime coat may be waived as authorized by the ENGINEER. The surface shall be kept at compaction moisture until the final surfacing is placed in the event the prime coat is waived.

302.4.7 Traffic on compacted aggregate base course shall be limited to moisture control application and final surfacing traffic only, as authorized by the ENGINEER.

302.5 TESTING

302.5.1 A sample of material delivered to the project shall be taken for each 300 tons placed or each days placement, whichever is greater, and tested for gradation and moisture density relationship. The average value of individual gradation tests, for all sieve size determinations, shall comply with the job mix formula within the tolerances specified in TABLE 302.B. Individual sample gradation test results, for all sieve size determinations, shall comply with the tolerance range plus two (2) percent. Non complying material shall be re-sampled and tested for compliance. Material not in compliance after the initial and follow up testing shall be removed and replaced by the CONTRACTOR at no cost to the OWNER, as directed by the ENGINEER.

302.5.2 Compaction tests shall be taken at the rate of one test for each 500 sy/lift placed, or as directed by the ENGINEER, in accordance with the requirements of ASTM D 2922 and D 3017. Areas represented by non complying tests shall be reworked and retested for compliance.

302.5.4 Test reports shall include but not be limited to the requirements of TABLE 302.E.

302.5.5 Test Results shall be reported to the ENGINEER, CONTRACTOR, and OWNER in writing, within 4 working days of completion of the sampling and or field test. Non-complying test shall be reported within 1 working day of completion of the test.

302.6 MEASUREMENT AND PAYMENT

302.6.1 Measurement of aggregate base course shall be by the square yard per each thickness required, complete in place.

302.6.2 Payment shall be at the contract unit price per square yard per each thickness required, complete in place which shall include all material, labor and equipment required in placing, grading and compacting the aggregate base course.

Table 302.A
ENGINEERING REQUIREMENTS

CHARACTERISTIC	SPECIFICATION LIMIT(S)	
Aggregate Type	Fine	Course
Los Angeles Abrasion Wear (ASTM C 131)		40% max.
Soundness (5 cycles ASTM C 88)	15% max.	15% max.
Crushed Aggregate (% Material Retained on 3/8inch sieve by wt., having at least two (2) fractured faces)		50% max.
Maximum % passing No. 200	60% of -No.30	
Plasticity Index (Material finer than No.40 sieve)	4.0 max.	
Sand Equivalent Value	35 min.	

TABLE 302.B
GRADATION RANGES AND TOLERANCES

	PRODUCTION RANGE (% passing)		PRODUCTION TOLERANCES (+/-%)
SIEVE SIZE/TYPE	I	II	
1-1/2 inch	100	100	
1 inch	95-100	100	
¾ inch		90-100	8
½ inch	64-75		8
3/8 inch		65-80	8
No.4	35-46	48-55	8
No.30	12-18	18-25	5
No.200	5-12	6-15	3

TABLE 302.C
SUBMITTAL REQUIREMENTS

A. Supplier
B. Date
C. Design Mix Identification Number
D. Contractor
E. Construction project number
F. Construction Project Title (contract)
G. Certification of compliance
H. Target Gradation of Material
I. Optimum moisture and maximum dry density relationship of material and graph

The submittal shall be rejected without review if the specified data is not included.

TABLE 302.D
DELIVERY TICKET INFORMATION

A. Name of Supplier
B. Date of Delivery
C. Delivery Ticket Number
D. Name of Contractor
E. Project Name (optional)
F. Job mix formula identification number
G. Weight of load
H. Time loaded

TABLE 302.E
TEST REPORT INFORMATION

A. Field Data

Date of Sampling/Field Test
Project Number or
Permit Number
Project Title
Location of sample/field test as defined by the project plans and specifications
Time of Sampling/field testing
Field test results with reference specification limits

B. Laboratory Data

Base course classification
Gradation
Plasticity index
Liquid limit
Optimum moisture/maximum dry density relationship and graph
Estimated soil resistance R-Value

SECTION 340

PORTLAND CEMENT CONCRETE CURBS, GUTTERS, WALKS, DRIVEWAYS, ALLEY INTERSECTIONS, SLOPE PAVING, AND MEDIAN PAVING

340.1 GENERAL:

340.1.1 Portland cement concrete curbs, walks, gutters, cross gutters, valley gutters, driveways, alley intersections, slope paving and median paving constructed of concrete having a minimum compressive strength as specified in Section 101, unless otherwise noted on the plans or specified in the Supplementary Technical Specifications.

340.1.2 Subgrade preparation for concrete curbs, gutters, walks, driveways, alleys, intersections, and slope paving conform to the requirements of Section 301, unless otherwise noted on the plans or specified in the Supplementary Technical Specifications.

340.1.3 Unless otherwise specified or indicated on the plans and except as otherwise prescribed in Subsection 340.8, the minimum thickness of walks shall be 4 inches. The minimum thickness of gutters, driveway aprons, and alley intersections shall be 6 inches unless otherwise shown on the plans. The height and thickness of the curb section including other details of construction for items in Section 340 will be shown on the plans, or Standard Detail Drawings.

340.2 REFERENCES:

340.2.1 American Society for Testing and Materials (Latest Edition) (ASTM):

D1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort

340.2.2 This Publication:

SECTION 101 PORTLAND CEMENT CONCRETE
SECTION 102 STEEL REINFORCEMENT
SECTION 105 CONCRETE CURING COMPOUND
SECTION 107 JOINT FILLER AND SEALANT MATERIAL
SECTION 301 SUBGRADE PREPARATION
SECTION 337 PORTLAND CEMENT CONCRETE PAVEMENT
SECTION 349 CONCRETE CURING

340.3 FORMS:

340.3.1 Form material shall be free from warp, with smooth and straight upper edges and, if used for the face of curb, shall be surfaced on the side against which the concrete is to be placed. Timber forms may be used for forming curved sections but shall not be used for straight work unless authorized in writing by the ENGINEER. Metal forms for such work being of a gauge that will provide proper rigidity and strength for the purpose for which they are intended. Wood forms used on curb returns shall be not less than 3/4 of an inch in thickness, cut in the length and radius as shown on the plans and held rigidly in place by the use of metal stakes and clamps. The curb face forms shall be cut to conform exactly with the curb face batter, as well as being cut to the required length and radius. In every case, however, the forms shall be of sufficient rigidity and strength and shall be so supported as to adequately resist springing or deflection as a consequence of the placing and consolidation of the concrete.

340.3.2 All formed curb and combined curb and gutter shall be divided into blocks or stones in lengths not to exceed 12 feet long using metal templates' not less than 1/16 inch thick cut to the same cross section as the curb or curb and gutter being constructed. Templates shall be securely attached to forms to prevent movement during concrete placement.

340.3.3 Form material shall be thoroughly clean at the time it is used and shall be given a coating of light oil or other suitable material immediately prior to the placing of the concrete.

340.3.4 Forms, except curb back planks, shall be set with the upper edges thereof flush with the specified grade of the finished surface of the adjacent portion of the work and shall be not less than a depth equivalent to the full specified depth of thickness of the concrete to be supported thereby.

340.3.5 Back forms shall be held securely in place by means of stakes driven in pairs, one at the front form and one at the back, at intervals not to exceed 4 feet; clamps, spreaders, and braces being used in connection therewith to such extent as may be necessary to insure proper rigidity of the forms. Forms for walks, gutters, and similar work shall be firmly secured by means of stakes driven flush with the upper edge of the forms at intervals not to exceed 5 feet. The stakes shall be of sufficient size and shall be so driven as to properly and adequately support the forms.

340.3.6 Form clamps, specifically designed and manufactured for the curb and gutter to be constructed, may be used if, in the opinion of the ENGINEER, they fulfill the requirements above specified for curb and gutter forms.

340.4 PLACING CONCRETE:

340.4.1 The concrete shall be placed on a thoroughly dampened subgrade sufficiently moist to insure that no moisture will be absorbed from the fresh concrete.

340.4.2 Surfaces of structures in sidewalks, curbs, and gutters shall be adjusted as necessary prior to placing of concrete to meet the contiguous sidewalk surfaces.

340.4.3 Concrete shall be placed in horizontal layers not to exceed 6 inches each in thickness, each layer being spaded along the forms and thoroughly consolidated. However, if the section is more than 6 inches in depth, the concrete may be placed to provide the thickness shown or specified, if mechanical internal vibrators are used or if, in the opinion of the ENGINEER, the spading and tamping is sufficient to consolidate the concrete for its entire depth.

340.4.4 After the concrete has been placed between the side forms, a strike off shall be used to bring the surface to the proper section to be compacted. It shall then be spaded along the form faces.

340.4.5 After the concrete has been placed and consolidated, the upper surface shall be struck off uniformly smooth and true to the specified grade.

340.5 EXPANSION JOINTS:

340.5.1 Expansion joints shall be constructed in curbs, walks, and gutters as hereinafter specified, being filled with premolded joint filler strips conforming with the requirements prescribed therefor in Section 107. No such joints shall, however, be constructed in cross gutters, alleys, intersections, or driveway aprons.

340.5.2 Spacing: Unless otherwise shown on the plans or authorized by the ENGINEER, the location and spacing of expansion joints shall be as specified in the Standard Detail Drawings and herein.

340.5.2.1 Expansion joints in all types of curb and gutters shall be placed at both ends of returns except where cross gutters are being constructed, and at regular intervals not to exceed 200 feet between expansion joints. Expansion joints shall be placed at both ends of the cross gutter transitions.

340.5.2.2 Expansion joints in all types of sidewalk shall be placed where the sidewalk abuts Wheel Chair Ramps and drivepads; at regular intervals not exceeding 18 feet between expansion joints; between the walk and any building or structure; around utility pads and light foundations; and between the walk and water meter areas.

340.5.2.3 Expansion joints at wheel chair ramps and drivepads shall be placed between these items of work and the back of the curb and gutters and the adjoining sidewalks.

340.5.2.4 Expansion joint filler strips shall be vertical and shall extend to the full depth and width of the work in which they are installed, being constructed at right angles or radially to the line of the curb or gutter as the case may be. The filler strips shall completely fill these joints at least to within 1/4 of an inch of any surface of the concrete that will be exposed upon completion of the work and must fully extend at least to those surfaces that will not be exposed. However, before the work will be accepted, any joint filler that protrudes beyond a surface that will not be exposed or beyond 1/4 of an inch below a surface that is exposed shall be trimmed off to the specified dimension in a neat and workmanlike manner. During the placing and consolidation of the concrete, the filler strip shall be held rigidly and securely in proper position.

340.5.3 CONTRACTION JOINTS

340.5.3.1 Contraction joints shall be constructed in slip formed curbs, curb and gutter, walks, and gutters as hereinafter specified. The joint shall be either cut or tooled to a minimum depth of 1 inch at curb, curb and gutter, and gutter, and the greater of either 1 inch or 1/4 the actual depth of the concrete at sidewalks and slabs on grade. The contraction joint shall be tooled at all exposed faces of the fresh placed concrete.

340.5.3.2 Spacing: Unless otherwise shown on the plans or authorized by the ENGINEER, the location and spacing of contraction joints shall be as specified in the Standard Detail Drawings and herein.

340.5.3.3 Contraction joints in extruded curb, curb and gutter, and gutters shall be placed at regular intervals not to exceed 12 feet.

340.5.3.4 Contraction joints shall be placed in all types of sidewalk at regular intervals not less than the width of the sidewalk nor greater than 6 feet.

340.6 FINISHING: Surfaces of the various items of work shall be finished as specified herein. Edges of concrete at expansion joints shall be rounded to 1/4 inch radius. Upon completion, the finished surface shall be true to line and grade and free from irregularities.

340.6.1 CURB:

340.6.1.1 The front forms may be stripped as soon as the concrete has set sufficiently but must be removed before the expiration of 6 hours after pouring. Immediately following the stripping of these forms, Class A mortar, as prescribed therefor in Section 106

thinned to the consistency of grout, shall be applied to the curb face. If monolithic curb and gutter is being constructed, this mortar shall be applied to the full exposed face; otherwise, it shall extend for an additional 2 inches below the gutter.

340.6.1.2 The face and top of the curb shall then be carefully troweled with a “steel mule” shaped to match the profile of the curb, curb and gutter, to a smooth and even finish, the top being finished to a transverse slope of 1/4 of an inch toward the front, with both edges rounded to a radius of 3/4 of an inch. Contraction joints, perpendicular to the flow line and in returns radial to the curve, shall be placed in the curb top and face and in the gutter. The surface shall be finished with a fine hair broom parallel with the line of the flow line.

340.6.2 SIDEWALK:

340.6.2.1 Following the placing of concrete, the surface shall be struck and floated to a true and even grade, free from waves and irregularities. After the floating contraction joints shall be made to a depth of 1 inch. The work shall then be carefully floated to a smooth and even finish, with the contraction joint and expansion joint edges rounded to a radius of 1/8 of an inch. The finished surface shall be given a fine hair broom finish, applied transverse the direction of travel of the sidewalk.

340.6.2.2 Contraction joints or block joints shall not exceed intervals of 6 feet. On straight work, the joints shall be parallel with and at right angles to the line of the work; at curves the joints shall, in general, be along lines concentric with the curve radius. The contraction joint shall be made with jointer tools that will round the edges to a radius of 1/8 of an inch, with a depth of not less than 1 inch. The finished joint opening, exclusive of radii, shall not be not less than 1/8 inch nor greater than 3/16 inch. The CONTRACTOR will be required to have a sufficient number of jointer tools on the job to accomplish the above specified requirements.

340.6.2.3 The concrete shall be cured in accordance with the requirements of SECTION 349.

340.6.3 GUTTER:

340.6.3.1 After the concrete has been thoroughly consolidated the surface shall be worked to a true and even grade by means of a float. Contraction joints shall be sawed or tooled at intervals not to exceed 6 feet, perpendicular to the flow line. The finished surface shall be textured longitudinally with a fine hair broom finish.

340.6.3.2 Side forms shall remain in place until the concrete is sufficiently set, after completion of the gutter, but must be removed before the work will be accepted. The concrete shall be cured in accordance with the requirements of SECTION 349.

340.6.3.3 Valley gutter or cross gutter sections reinforcement steel and steel placement shall be constructed accordance with the plans and detail drawings. The reinforcement steel shall be in accordance with Section 102. The finished surface shall conform to the required roadway section as to both line and grade. The gutter sections will not be opened to traffic until specimen cylinders have attained a compressive strength of not less than 85% of its design strength or after 14 days or as authorized by the ENGINEER.

340.6.4 CONCRETE SLOPE PAVEMENT:

340.6.4.1 All subgrade preparation required for this item shall be done in accordance with applicable provisions of Section 301 with the exception that minimum density requirements will be 90% of maximum density as determined by ASTM D1557 or ASTM D698.

340.6.4.2 Reinforcement shall be included where shown on the plans or as specified.

340.6.4.3 Thickness of concrete shall be as specified or as shown on the plans. Concrete shall be screeded and finished with ten foot straight edge , lapped at ½ its length or equivalent, to a plane surface having no variation when measured with a 10 foot straight edge in excess of 1/4 inch, unless a curvilinear surface is designated for a particular job. All concrete work shall be in accordance with Sections 101 and 349.

340.7 CURING:

340.7.1 GENERAL: Immediately after the operations have been completed on all concrete, the CONTRACTOR shall initiate the curing of the concrete as specified in Section 349 and/or as approved by the ENGINEER.

340.8 DRIVEWAY ENTRANCES:

340.8.1 Driveway entrances shall be provided in new curbs at all existing driveways along the line of the work and at locations shown on the plans or as directed by the ENGINEER.

340.8.2 The location and construction details for driveways shall conform to the construction plans or Standard Detail Drawings, or as authorized by the ENGINEER.

340.8.3 Where walks are to be constructed across driveways, the thickness of the walk shall be not less

than 6 inches, unless otherwise specified or shown on the plans.

340.9 DRAINAGE OUTLETS THROUGH CURB: The CONTRACTOR will be required to construct suitable outlets through the new curb for all existing building drains along the line of the work, as per Standard Detail Drawings.

340.10 MISCELLANEOUS TYPES OF CURB, GUTTERS, SIDEWALKS: Extruded type concrete curb and gutter, precast curb and gutter sections, cut stone curbs, brick sidewalks, flagstone " sidewalks, etc., will permitted where approved by the ENGINEER and in accordance with the plans and Supplementary Technical Specifications.

340.11 REPAIRS AND REPLACEMENTS:

340.11.1 New work that is found to be defective or damaged prior to acceptance and/or existing work damaged by the CONTRACTOR's operation shall be repaired or replaced by the CONTRACTOR at no expense to the OWNER. Defective or damaged concrete areas shall be repaired by neatly saw cutting at right angles to the face of curb and removing and replacing the effected area. Removals of defective concrete shall be either the entire area between existing joints or if a minimum of 6 feet can be maintained to an existing joint, an intermediate saw cut may be permitted when approved by the ENGINEER.

340.12 TESTS: Testing procedures shall be as provided for in SECTION 101.

340.13 BACKFILLING AND CLEANUP: Backfilling and compaction to the finished surface of the newly constructed improvement must be completed before acceptance of the work.

340.14 MEASUREMENT AND PAYMENT:

340.14.1 MEASUREMENT:

340.14.1.1 Concrete curbs and gutters shall be measured by the linear foot per each type of curb and gutter.

340.14.1.2 Concrete sidewalks, driveways, valley gutters, gutters alley intersections shall be measured by the square foot per each type of improvement.

340.14.2 PAYMENT:

340.14.2.1 The payment for concrete curb and gutter shall be at the contract unit price and SECTION 101 per linear foot per each type of curb and gutter, complete in place, which shall include all materials, equipment and labor required in the final grading, subgrade preparation (subgrade compaction), placing, finishing, curing, backfilling and cleanup.

340.14.2.2 The payment for concrete sidewalks, drivepads, valley gutters, gutters and alley intersections shall be at the contract unit price and SECTION 101 per square foot per each type of improvement, complete in place, which shall include all materials, equipment and labor required in the final grading, subgrade preparation (subgrade compaction), steel reinforcement (when and where required), placing, finishing, curing, backfilling and cleanup.

SECTION 423: HOT MIX ASPHALT (HMA) (MAJOR PAVING)

423.1 DESCRIPTION

This Work consists of constructing one (1) or more pavement courses of Hot-Mix Asphalt (HMA) on a prepared base, to include crushing, stockpiling, hauling, binder, mineral admixture, mix design, mixing, providing cold feeds, process control testing and placement.

423.2 MATERIALS

423.2.1 General

HMA is a mixture of asphalt binder, aggregate, blending sand, mineral filler, and mineral admixture. Unless otherwise prohibited in the Contract, the Department will allow Recycled Asphalt Pavement (RAP) in HMA mixtures as long as the resulting mixture conforms to all Specification requirements.

The Contractor shall size, uniformly grade, and combine aggregate fractions in accordance with the Contract. The Contractor shall test Materials in accordance with applicable AASHTO/ASTM methods, as modified by the Department (if applicable) or other test procedures as directed by the Department. The State Materials Bureau will decide all questions pertaining to the interpretation of test procedures.

423.2.2 Aggregate

The Contractor shall ensure the aggregate gradation of the HMA mixture meets the requirements of Table 540
.2.2.1:1, “HMA Aggregate Gradation Control Points.” The Project Manager may require, at no additional cost to the Department, wet preparation, per AASHTO T 146, Method A, if the Project Manager determines there are Deleterious Materials present in the aggregate stockpiles before aggregate gradation testing. The Contract will specify the type of HMA the Contractor is to use. The Department will allow the Contractor to combine Materials from two (2) or more sources to produce aggregate only when each individual aggregate source meets all applicable quality requirements.

423.2.2.1 Gradation and Quality Requirements

Table 423.2.2.1:1
HMA Aggregate Gradation Control Points

	% passing per HMA type							
	SP-II		SP-III		SP-IV		SP-V	
Sieve size	Min	Max	Min	Max	Min	Max	Min	Max
Two (2) inch	—	—	—	—	—	—	—	—
1 1/2 inch	100	—	—	—	—	—	—	—
One (1) inch	90	100	100	—	—	—	—	—
3/4 inch	—	90	90	100	100	—	—	—
1/2 inch	—	—	—	90	90	100	100	
3/8 inch	—	—	—	—	—	90	90	100
No. 8	19	45	23	49	28	58	32	67
No. 200	1.0	7.0	2.0	8.0	2.0	10.0	2.0	10.0

423.2.2.1.1 Aggregate Quality

For each Material source, the Contractor shall ensure the HMA coarse aggregate has an AI of 25 or less when calculated in accordance with Section 901, "QUALITY CONTROL/QUALITY ASSURANCE (QC/QA)."

The Contractor shall regulate the crushing of aggregate to:

1. Minimum Fractured Faces content of the plus No. 4 Material complies with the requirements of Table 423.2.2.1.2:1, "Fractured Faces, Sand Equivalent, and Fine Aggregate Angularity," and evaluation by AASHTO 335-09, "*Fractured Face Determination for Coarse Aggregate;*"
2. Ensure the combined plus 3/8 inch material contains no more than 20% flat, elongated particles with a dimensional ratio of 3:1 or greater as determined by ASTM D 4791 (TTCP Modified);
3. Ensure the combined Material, excluding RAP; passing the No. 40 sieve is non-plastic;
4. Ensure that before the addition of mineral admixtures, the minimum sand equivalent value and the minimum fine aggregate angularity value of the combined aggregate, excluding RAP, complies with the requirements of Table 423.2.2.1.2:1, "Fractured Faces, Sand Equivalent, and Fine Aggregate Angularity;" and
5. Determine the Sand Equivalent value in accordance with AASTHO T 176, Alternate Method No. 1, and Fine Aggregate Angularity value in accordance with AASHTO T 304, Method A.

423.2.2.1.2 Fractured Faces

The Department will consider a face to be fractured when at least one-half of the projected particle area exhibits a rough, angular, or broken texture with well-defined edges.

Table 423.2.2.1.2:1
Minimum Fractured Faces, Sand Equivalent, and Fine Aggregate Angularity for Virgin Aggregates

Design Traffic, ESALs[a] x 10^6	Fractured Faces[b]	Sand Equivalent (%)	Fine Aggregate Angularity
< 3.0	75.0 / —	45.0	40.0
≥ 3.0 – < 10.0	85.0 / 80.0	45.0	45.0
≥ 10.0 – < 30.0	95.0 / 90.0	45.0	45.0
≥ 30.0	99.0 / 95.0	50.0	45.0

[a]ESALs are based on a 20-year design life for all scenarios.

[b]Under "Fractured Faces," 85.0 / 80.0 denotes that 85.0% of the coarse aggregate has at least one (1) Fractured Face and 80.0% has at least two (2) Fractured Faces.

Ensure RAP provided from sources outside the Project has at least 75% Fractured Faces (one (1) Fractured Face); however, Sand Equivalent and Fine Aggregate Angularity do not apply.

423.2.2.2 Production

When producing aggregates for HMA, the Contractor shall:

1. Remove natural fines by screening and stockpiling separately;

2. Use a No. 4 screen, minimum, or a larger screen if needed to properly control the crushing and screening operation;
3. Crush the aggregate retained on the scalping screen and separate the crushed Material into at least two (2) stockpiles of fine and coarse aggregates; and
4. Regulate crushing operations to produce Material that meets design requirements when combined.

423.2.2.3 Stockpiling

The following requirements apply to stockpiles, the Contractor shall:

1. Place stockpiles upon prepared sites;
2. Make stockpiles neat and regular to prevent segregation;
3. Provide enough storage space for each size of aggregate;
4. Separate the aggregate stockpiles far enough apart to prevent mixing, or with walls or partitions;
5. Prevent contamination (store stockpiles away from vehicular and Equipment traffic);
6. Keep the storage yard neat and orderly and keep the stockpiles accessible for sampling; and
7. Keep the aggregate sizes separated until delivered to the cold feed system that feeds the drier.

423.2.2.4 Combining

When combining crushed Materials from different stockpiles, including RAP (if in the mixture); the Contractor shall ensure the product is in accordance with the mix design gradation requirements. The Contractor shall use controlled feeders from each stockpile to combine crushed Material.

423.2.3 Asphalt Binder

The Contract will specify the type and grade of asphalt binder. The Contractor shall provide asphalt binders in accordance with Section 402, “Asphalt Materials and Mineral Admixtures.” The Contractor shall not change the asphalt source after approval of the mix design without written approval of the State Materials Bureau.

423.2.4 Mineral Admixtures

The Contractor shall provide mineral admixtures in accordance with Section 402, “Asphalt Materials and Mineral Admixtures.”

423.2.5 Blending Sand

Blending sand consists of the following:

1. Natural fines from the scalping process;
2. Concrete sand;
3. Sandy Material; or
4. A combination of these, graded to the mix design requirements.

The Contractor shall determine the need for and percentage (a maximum of 20.0%) of blending sand using mix design tests on samples taken from stockpiles during crushing operations and submitted to an approved testing Laboratory.

423.2.6 Mineral Filler

The Contractor shall, if required by mix design, provide mineral filler in accordance with AASHTO M 17 and approved by the State Materials Bureau. The Department will not allow fly ash as mineral filler for HMA.

423.2.7 Reclaimed Asphalt Pavement (RAP)

Unless otherwise specified in the Contract, the Contractor may use RAP removed under the Contract consisting of salvaged, milled, pulverized, broken, or crushed asphalt pavement. The Contractor may use RAP produced from outside sources provided the following is met: after the Contractor obtains sufficient quantities of RAP aggregate samples in accordance with AASHTO T 308; the Department will Accept RAP for which the coarse aggregate has a percent wear of 40.0 or less, at 500 revolutions, when tested in accordance with AASHTO T 96. The Contractor shall provide plus No. 4 RAP Material with a minimum of 75% Fractured Faces content (one (1) face). The Department will make no additional payment for the asphalt binder in the RAP or asphalt binder due to asphalt binder grade adjustment.

The Contractor may use a maximum of 15% RAP (by weight) in the production of HMA mixtures without changing the asphalt binder.

For quantities greater than 15% and up to 25% RAP, the Contractor shall:

1. Either lower the asphalt binder's high and low temperature grades by one (1) grade (e.g. lower a PG 76-22 to a PG 70-28); or
2. Extract, recover, and combine the RAP's asphalt binder with a virgin asphalt binder per AASHTO M 323, Appendix A, ensuring the resultant binder meets the entire AASHTO M 320 (excluding direct tension) required Project PG asphalt binder properties indicated on the approved mix design.

For quantities greater than 25% and up to 35% RAP, the Contractor shall:

1. Extract, recover, and combine the RAP's asphalt binder with a virgin asphalt binder per AASHTO M 323, Appendix A; and
2. Ensure the resultant binder meets the entire AASHTO M 320 (excluding direct tension) required Project PG asphalt binder properties indicated on the approved mix design.

The Department will not allow the Contractor to use more than 35% RAP in the production of HMA mixtures.

For Projects of entirely new construction, the Contractor shall:

1. Limit the RAP to 15% in the top mat or extract, recover and combine the RAP's asphalt binder with a virgin asphalt binder per AASHTO M323, Appendix A; and
2. Ensure the resultant binder meets the entire AASHTO M320 (excluding direct tension) required Project PG asphalt binder properties indicated on the approved mix design.

If Plus Grades of PG asphalt binder is specified on the project, for quantities greater than 15% RAP, the Contractor shall extract, recover, and combine the RAP's asphalt binder with a virgin asphalt binder per AASHTO M 323, Appendix A. The Contactor shall ensure the

resultant binder meets the entire AASHTO M 320 required Project PG asphalt binder properties indicated on the approved mix design including the additional Plus Grade requirements for Elastic Recovery and Solubility.

The Contractor shall:

1. Process RAP so that 100% passes a 1-1/2-inch sieve;
2. Maintain adequate stockpile management (i.e. sufficient quantities and shaping of the stockpiles);
3. Address in the Quality Control Plan how RAP will be controlled, such as which screen will be used to split into two (2) stockpiles, or by what method the RAP will be controlled to keep the resultant mix within Acceptable limits;
4. Account for the weight of the binder in the RAP when batching aggregates;
5. Provide RAP that is free of Deleterious Materials; and
6. Perform process control testing in accordance with Section 901, "Quality Control/Quality Assurance (QC/QA)" and Table 901.5:3, "Minimum Process Control Guidelines for Aggregates, Base Course, and RAP (QC);" as RAP is produced and prepared for inclusion in the HMA.

If problems with HMA consistency or compliance with Project Specifications occur, additional efforts taken to achieve Acceptable levels of consistency and compliance with Contract Specifications, at the Contractor's discretion (at no additional cost to the Department), include, but are not limited to:

1. Reduce the top size of the RAP from 1-1/2 inch to one (1) inch;
2. Fractionate the aggregates on a second screen, such as the 3/8 inch or ¼ inch Screen so that the RAP is maintained in three (3) stockpiles, one being RAP larger than 1-1/2 inch to two (2) inches, Coarse RAP and the third being Fine RAP;
3. Ensure that the RAP used in the HMA mix design is representative of the RAP available on the Project;
4. Cover the RAP pile(s) so that ambient moisture is not absorbed; and
5. Process and maintain the stockpiles so that the RAP Material is equally and uniformly distributed throughout the entire stockpile(s) and is withdrawn such that uniform, non-segregated RAP is delivered to the hoppers.

423.2.8 Mix Design

The Contractor shall provide a mix design developed by a Department approved testing Laboratory, reviewed and signed by a professional Engineer licensed by the New Mexico Board of Registration for Professional Engineers and Land Surveyors. A list of approved private testing laboratories is available from the State Materials Bureau. The Contractor shall develop the mix design at no additional cost to the Department. The Contractor may develop the mix design at any time prior to the Project Pre-Paving Conference.

The Contractor shall provide to the State Asphalt Engineer the mix design developed in accordance with the Contract documents and AASHTO R35 as modified by NMDOT for review and concurrence. The Contractor shall summarize the mix design results from the Department approved testing Laboratory in a format approved by the State Materials Bureau. Department concurrence of a mix design will not relieve the Contractor of full responsibility for producing an Acceptable mixture. The mix design may require adjustment in accordance with Section 423.2.9, "Job Mix Formula."

The Department will require a minimum of one percent (1.0%) for mix designs that include hydrated lime, anhydrite based Material, or Portland cement. The Contractor shall include these mineral admixtures in the gradation for developing the mix design. AASHTO T 354 may be used in lieu of AASHTO T 84/T 85. If lubricating antistrip is used as a mineral admixture, the percent dosage shall be done in accordance with the manufacturer's recommendation and approved by the Contractor's design Lab. Lubricating antistrip shall be approved by the Department and included in the most current Approved Products List (APL). The mix design shall be in accordance with Table 423.2.8:1, "HMA Superpave Design Requirements for Aggregates with Less Than three percent (3.0%) Absorption," or Table 423.2.8:2, "HMA Superpave Design Requirements for Aggregates with three percent (3.0%) or Greater Absorption."

The Contractor shall test the HMA in accordance with AASHTO T 283, as indicated below:

1. Use six (6) inch diameter specimens; Compact all test specimens in accordance with AASHTO T 312;
2. Conditioned specimens shall include one (1) freeze thaw cycle;
3. On the AASHTO T283 Section 11.3 scale of zero (0)-five (5), with five (5) exhibiting the most damage from moisture, visually estimate the amount of damage caused by moisture on the interior surfaces of each broken specimen; and
4. The tensile stress ratio shall be a minimum of 85%.

The Contractor shall provide a mixture that meets all applicable criteria. If tests indicate the need for additives or modifiers not specified in the Contract or a change in source of binder to satisfy mix design requirements, the Contractor shall perform the required changes at no additional cost to the Department.

Table 423.2.8:1
HMA Superpave Design Requirements for Aggregates with Less Than 3.0% Absorption

20-year design ESALs (a)	**N initial**	**N design** (b)	**N max**	**Percent Voids in the Mineral Aggregate (VMA) per nominal maximum aggregate size**				**Voids Filled with Asphalt (VFA) Range, %** (c)	**Dust to Binder Ratio Range**
				One (1) inch (SP-II)	**3/4 inch (SP-III)**	**1/2 inch (SP-IV)**	**3/8inch (SP-V)**		
< 0.3	<91.5	96.0	< 98.0	12.5 – 14.0	13.5 – 15.0	14.5 – 16.0	15.5 – 17.0	72.0–80.0	0.6 to 1.4
0.3-3.0	<90.5							68.0–78.0	
≥3.0	<89.0							68.0–75.0	

Table 423.2.8:1
HMA Superpave Design Requirements for Aggregates with Less Than 3.0% Absorption

20-year design ESALs	N initial	N design (b)	N max	Percent Voids in the Mineral Aggregate (VMA) per nominal maximum aggregate size	Voids Filled with Asphalt (VFA)	Dust to Binder Ratio Range

[a]In Millions.

[b]Design Air Void Content of four percent (4%).

[c]For one (1) inch nominal maximum size mixtures, the specified lower limit of the VFA shall be 70% for the design traffic level <0.3 million ESALs.

Table 423.2.8:2
HMA Superpave Design Requirements for Aggregates with 3.0% or Greater Absorption

20-year design ESALs (a)	N initial	N design (b)	N max	Percent Voids in the Mineral Aggregate (VMA) per nominal maximum aggregate size				Voids Filled with Asphalt (VFA) Range, % (c)	Dust to Binder Ratio Range
				One(1) inch (SP-II)	3/4 inch (SP-III)	1/2 inch (SP-IV)	3/8 inch (SP-V)		
<0.3	<91.5							70.0–80.0	
0.3–<3.0	<90.5	96.5	< 98.0	12.0 – 14.0	13.0 – 15.0	14.0 – 16.0	15.0 - 17.0	65.0–78.0	0.6 to 1.4
≥3.0	<89.0							65.0–78.0	

[a]In Millions.

[b]Design Air Void Content of 3.5%.

[c]For one (1) inch nominal maximum size mixtures, the specified lower limit of the VFA will be 70% for the design traffic level <0.3 million ESALs.

Department reviewed commercial mix designs are Acceptable for use on NMDOT Projects with the concurrence of the State Asphalt Engineer. The commercial mix design will be submitted for review and concurrence by the State Asphalt Engineer for conformance with the Contract documents and re-issued with Project information.

An approved mix design is valid up to one (1) year from the date of review. If the Aggregate Index expires within that year, a new Aggregate Index needs to be established in order to keep the mix design valid. The Contractor shall submit a new mix design if changing the source of Materials.

For Projects that are longer than one (1) year and aggregate Materials are produced and stockpiled the mix design and Aggregate Index (AI) may be approved for an extension by the State Asphalt Engineer.

423.2.9 Job Mix Formula

The Job Mix Formula (JMF) must be in accordance with all aggregate gradation requirements and result in a mix that meets all specified mix design requirements. The Department will refer to the result of the Laboratory mix design developed in accordance with Section 423.2.8, “Mix Design,” as JMF1.

423.2.9.1 Job Mix Formula Adjustment

The Contractor may request a modification to the JMF based on field testing of Material produced through the plant. Test results and calculations that verify a proposed JMF adjustment complies with the Specifications will be required prior to being reviewed by the Project Manager, District Lab Supervisor, and concurred by the State Asphalt Engineer. Review and concurrence of a JMF adjustment can only be made after:

1. JMF adjustment results in a new TV that is within the tolerance from the design TV. (Example: If design TV for No. 4 sieve is 30%, then a new TV may be approved in the field from 23% - 37%);
2. Submittal by the Testing Laboratory responsible for the original mix design to the Project Manager with a copy to the State Asphalt Engineer;
3. Confirmation by the Project Manager that the Quality Control Plan is being followed; and
4. If the JMF is adjusted after the Shakedown Period, the Contractor shall terminate the current lot. Once the adjusted JMF has been reviewed and concurred by the Project Manager, Assistant District Engineer for Construction and the State Asphalt Engineer; the Contractor shall begin a new lot with the adjusted JMF.

423.3 CONSTRUCTION REQUIREMENTS

423.3.1 General

The Contractor shall:

1. Provide sufficient storage space for each size of aggregate and RAP;
2. Keep the different sizes separate and ensure that segregation, degradation, or combination of Materials of different aggregate sizes does not occur until delivery to the cold feed system;
3. Re-screen or waste segregated or degraded Material;
4. Provide separate storage and feeder for mineral filler if the Contract requires mineral filler; and
5. If the Project Manager determines that uncoated aggregate exists, the Contractor shall take corrective action.

423.3.2 Mix and Laydown Temperature Requirements

The Contractor shall not allow the temperature of the HMA discharged from the mixer into the transport vehicle to be greater or less than ten percent (10%) of the target mixing temperature specified in the mix design, not to exceed 350° F, unless written concurrence by the asphalt binder supplier and design lab are provided to the Project Manager.

HMA delivered to the Project with mix temperatures outside the acceptable laydown temperature range as specified in the mix design shall, at the sole discretion of the Project Manager, be removed and replaced at no cost to the Department.

423.3.3 Addition of Mineral Admixtures

The Contractor shall:

1. Monitor the out feed of the mineral admixture with sensors that provide audible and visual signals to control the out feed with an accuracy of ± three percent (3.0 %) by weight;
2. Control the mineral admixture content such that it meets the range specified in the approved mix design;
3. Add the mineral admixture to the aggregate in an enclosed pug mill immediately after leaving the cold feed and just before introduction into the drier drum or aggregate drier; and
4. Minimize the loss of mineral admixture while adding to the aggregate.

When mixing the aggregate and mineral admixture, the Contractor shall maintain the moisture content of the combined aggregate at the recommended moisture content as shown on the approved mix design.

423.3.4 Equipment

423.3.4.1 Mixing Plants

423.3.4.1.1 Plant Scales

The Contractor shall ensure that the scales are accurate to 0.5% of the maximum allowable load in accordance with the Federal Motor Carrier Safety Administration (FMCSA) publication, as certified by a licensed scale technician. The Contractor shall submit a copy of the certification to the Project Manager.

423.3.4.1.2 Storage of Asphalt Binder Materials

The Contractor shall provide storage tanks for asphalt binder capable of holding, heating and circulating the asphalt at the required temperatures and measuring the temperature of the asphalt in the tank.

The Contractor shall allow measuring and sampling of asphalt binder from the delivery trucks upon arrival.

423.3.4.1.3 Feeder for Drier

The Contractor shall equip the plant with an accurate feeding mechanism to deliver the aggregate into the drier and maintain uniform production.

423.3.4.1.4 Drier

The Contractor shall equip the plant with a system to continuously agitate the aggregate during the heating and drying process. The Contractor shall use a drier that can dry and heat the aggregate and prevent fuel oil or carbon from coating the aggregate. The Contractor shall take corrective action if the aggregate becomes coated with burner fuel.

423.3.4.1.5 Bins

The Contractor shall equip the plant with storage bins large enough to supply the mixer when it is operating at full capacity and arrange the bins to ensure separate and adequate

storage of the appropriate aggregate sizes. The Contractor shall equip the bins with warning devices that notify the control panel when the bins are low.

423.3.4.1.6 Asphalt Binder Control Unit

The Contractor shall equip the plant with a scale or meter to control the rate of flow to determine the amount of asphalt binder added to the mix.

423.3.4.1.7 Thermometers

The Contractor shall equip the discharge chute of the drier with a recording thermometer to register the temperature of the heated aggregates or mix. The Contractor shall provide the Project Manager with a record of discharge temperatures at the end of each week's production or as requested by the Project Manager.

423.3.4.1.8 Truck Scales

The Contractor shall weigh the HMA on approved plant or truck scales provided by the Contractor or public scales in accordance with Section 109.1, "Measurement of Quantity."

423.3.4.1.9 Requirements for Batching Plants

423.3.4.1.9.1 Weigh Box or Hopper

The Contractor shall provide a batching plant that can accurately weigh aggregate in a weigh box or hopper suspended on scales. The Contractor shall use a weigh box or hopper that can hold a full batch. The Contractor shall ensure that the gate of the weigh box or hopper does not allow Material to leak into the mixer while being weighed. The Contractor shall test the scales in accordance with Section 109.1, "Measurement of Quantity."

423.3.4.1.9.2 Mixer

The Contractor shall provide a batch mixer with a capacity of at least 2,000 lb, capable of producing a uniform mixture within specified tolerances.

423.3.4.1.9.3 Control of Mixing Time

The Contractor shall equip the mixer with an accurate timing device that signals the end of the mixing time.

423.3.4.1.10 Drum Mix Plants

The Contractor shall equip the drum mix plant with the following auxiliary Equipment and capabilities:

1. Separate cold feed controls for each Material;
2. An automatic interlocking device for cold feed, asphalt, and mineral admixtures;
3. A means for controlling moisture content of aggregate. A means for sampling individual cold feeds and provisions for sequential sampling of aggregate, RAP, asphalt binder, and mineral admixtures;
4. Equip the bins with mechanical or electrical devices that provide an audible or visual warning when the bins are less than 1/4 full;
5. Bins shall be designed and equipped to prevent segregation;

6. Equip the bin containing fine aggregate and filler, if required, with a device that prevents Material hang-up during plant operation;
7. A minimum of one (1) cold feed bin for each aggregate size in the mix;
8. Equip the cold feed with mechanical or electrical devices that indicate with an audible or visual warning when the cold feed belt is not carrying the proper amount of Material;
9. A separate cold feed for RAP Material. Introduce RAP so that it does not come into direct contact with the burner flame; and
10. Couple the asphalt feed control with the total-aggregate-weight measurement device to automatically vary the asphalt feed rate to maintain the required proportion.

423.3.4.2 Haul Equipment

The Contractor shall haul asphalt mixtures with trucks that are tarped and have tight, clean, smooth metal beds and a thin coat (a minimal amount) of a Department approved release agent in accordance with Section 423.3.4.2.1, "Asphalt Release Agent (ARA)."

423.3.4.2.1 Asphalt Release Agent (ARA)

The Contractor shall use Asphalt Release Agents (ARA) for prevention of asphalt mixtures adhering to haul trucks and any other type of Equipment that is used for asphalt paving operations. ARA shall meet the requirements of Table 423.3.4.2.1:1, "Asphalt Release Agent Properties" and shall be on the NMDOT's Approved Products List. All testing will be in accordance with NTPEP Evaluation of Asphalt Release Agents AASHTO ARA 14.

Table 423.3.4.2.1:1
Asphalt Release Agent Properties

Test	Result
7-Day Asphalt Stripping Test	
Diluted	No Stripping
Full Strength	No Stripping
Mixture Slide Test (truck beds)	10 g retained, maximum
Asphalt Performance Test	Does not fall after 3 pours

423.3.4.3 Pavers

The Contractor shall use self-contained, self-propelled pavers, with activated screeds or strike-off assemblies, heated if necessary, and capable of spreading and finishing courses of HMA in accordance with the Plans.

423.3.4.4 Compaction Equipment

The Contractor shall provide a sufficient number, weight, and type of rollers to obtain the required compaction and specified pavement density while the HMA is in a workable condition. All rollers must be capable of reversing direction without shoving or tearing the mixture.

423.3.5 Placement Operations

For cold milled surfaces, the Contractor shall prepare the surface in accordance with Section 414, "Cold Milling." The Contractor shall clean the existing surfaces and apply a tack coat as required in the Plans or at an application rate as approved by the Project Manager in accordance with Section 407, "Tack Coat."

The Contractor shall place HMA on prepared Base Course in accordance with Section 303, “Base Course.” The Contractor shall apply prime coat as required in the Plans or at an application rate as approved by the Project Manager in accordance with Section 408, “Prime Coat.”

The Contractor shall place the HMA on the Accepted surface, spread and compact to specified width, lift thickness, and cross slope in accordance with the Plans.

Materials Transfer Vehicle (MTV): The Contractor shall use a MTV with storage and remixing capabilities on all mainline construction that utilizes greater than 25% RAP when placing HMA State approved designs. The MTV will independently remix and deliver mixture from the hauling Equipment to the paving Equipment.

The Contractor shall furnish an MTV with the following capabilities:

1. An unloading system to receive mixtures from the hauling Equipment;
2. A minimum storage capacity of 13 tons with a remixing system in the MTV storage bin;
3. A discharge conveyor to deliver the mixture to the paver hopper; and
4. The MTV system cannot exceed maximum legal loading on Structures.

Pick-up machines, hopper inserts and Material transfer devices are not considered MTVs.

In the event the MTV malfunctions during paving operations, the Contractor can finish the Day without the MTV. The Contractor shall not resume further mainline mix placement until the MTV is operational.

Consistently overloading the HMA mix into the paving machine is not Acceptable. The Contractor shall coordinate the speed of the paving machine with the production of the plant and keep enough haul Equipment available to achieve continuous operation.

The Contractor shall use the control system on the paving machine to control the grade and the transverse slope by either of the following methods:

1. One end directly and the other indirectly through controlling the transverse slope; or
2. Each end independently, including screed attachments.

The Contractor shall suspend operations if the control system does not achieve the typical section in accordance with the Plans. The Contractor shall place, spread, and finish the courses of HMA according to the following:

1. Without segregation or tearing;
2. True to the line, grade, and crown in accordance with the Plans; and
3. With self-propelled pavers, except as otherwise directed.

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing Equipment impracticable, the Contractor shall dump, spread, and level the HMA by other methods to achieve the required compacted thickness.

423.3.5.1 Weather Limitations

The Contractor shall not place HMA on wet or frozen surfaces or if weather conditions prevent proper handling, finishing, and compacting. The Contractor shall place HMA when the

Chill Factor is at least 40 °F and rising. If the air temperature is 60 °F or warmer do not consider the Chill Factor.

423.3.5.2 Compaction

The Contractor shall:

1. Compact the HMA thoroughly and uniformly immediately after placement. Operate rollers at speeds slow enough to minimize displacement of the HMA, including the lines and grades of the asphalt edges. Remove marks from pneumatic rollers;
2. Prevent the HMA from sticking to the roller wheels by keeping the wheels moistened with water; water mixed with very small quantities of detergent or other approved Material. Do not use diesel fuel or other petroleum diluents;
3. At locations inaccessible to the rollers, the Contractor shall compact the HMA with hot hand tampers, smoothing irons, or mechanical tampers;
4. Use a trench roller or cleated compression strips under the roller to transmit compression to depressed areas; and
5. Remove areas that become loose, broken, mixed with dirt, segregated or defective, replace with fresh HMA, and compact to match the surrounding area, at no additional cost to the Department.

423.3.5.3 Not Used

423.3.5.4 Joints

The Contractor shall off set longitudinal joints at least six (6) inches relative to the longitudinal joints of the underlying course.

Unless otherwise specified, the Contractor shall taper transverse and longitudinal joints as follows:

1. At least a three (3) ft taper for transverse joints, with a taper slope no steeper than 24:1;
2. At least a one (1) ft taper or a notched taper, for longitudinal joints, with a taper slope no steeper than 6:1 or a notched taper with a one (1) inch vertical edge at the top of the taper connected to a slope no steeper than 6:1;
3. Cut and square off transverse tapers before commencing new Work;
4. Clean and tack coat longitudinal joints from previous operations; and
5. Avoid placing longitudinal joints in the wheel paths, unless approved by the Project Manager.

The Contractor shall completely bond joints and provide smooth surface for each course at the joints. The Department will not allow deviations greater than 3/16 inch when tested with a ten (10) ft straightedge in any direction. When paving under traffic, the Contractor shall schedule the daily surfacing operations so that tapered longitudinal joints are not exposed for longer than seven (7) Days.

423.3.5.5 Surface Tolerances

The Contractor shall provide a final HMA surfacing course that conforms to Section 401, “Pavement Smoothness Measurement.”

423.3.5.6 Plan Surfacing Thickness

The Contractor shall:

1. Place pavement at the thickness specified in the Contract;
2. Monitor thickness by calculating continuous production yields using the formula found in the MT-1, as maintained by the State Materials Bureau;
3. Calculate the required yield and the corresponding yields for 0.25 inch increase (upper limit) and decrease (lower limit). The Project Manager may adjust the required yield to fit field conditions. If adjusted, the new target yield will be communicated to the Contractor in writing;
4. Control production to keep yield within the upper and lower limits;
5. Correct deficiencies at no cost to the Department;
6. Correct deficient depths during placement; and
7. Address Plan Surfacing thickness in the Quality Control Plan.

423.3.5.7 Test Strip & Shakedown Period

Prior to the Test Strip & Shakedown Period, the Contractor shall provide binder ignition oven calibration samples in accordance with the State Materials Bureau's, current *Binder Ignition Calibration Procedure.* All Quality Control, Quality Assurance and Independent Assurance ovens must be calibrated by this procedure. The Project Manager will suspend paving operations until calibration of the ovens has been completed. No additional time or compensation will be granted for completion of this requirement.

The "NMDOT Binder Ignition Calibration Procedure" is available by accessing the NMDOT website, and navigating within the Construction and Civil Rights Bureau's (CCRB) link.

The Contractor shall construct a test strip for each HMA mix design to be incorporated in the Project prior to placing the Material on mainline. The test strip will consist of a maximum of 1,000 tons, the minimum test strip size will be 500 tons or as approved by the Project Manager. The Contractor shall construct test strip on shoulders, low volume segments of the pavement, or area approved by the Project Manager.

The Contractor shall obtain a minimum of three (3) Contractor and three (3) agency samples to evaluate the JMF, process control, and placement operations. If necessary, based on the results obtained from the test strip, the Contractor shall develop a revised JMF, modify placement operations, and/or implement adjustments to process control procedures. Production and placement operations performed prior to approval of a revised JMF are at the Contractor's risk.

The test strip will be evaluated for Acceptance according to Table 423.3.5.7:1, "Test Strip Acceptance Limits." If Accepted, the test strip will be paid at the unit price for HMA Complete or HMA per Section 423.5, "Basis of Payment." If rejected, said Material shall be handled in accordance with Section 423.3.6.3.2," Adherence to Specifications and Rejection of Non-Specification Material." The Contractor shall remove rejected test strip Material placed within the Roadway Prism at no cost to the Department. If the Contractor disagrees with removing and replacing unacceptable Material placed in test strips outside the Roadway Prism, the Assistant District Engineer for Construction, based on engineering judgment, will decide if the Material can remain in place with a maximum pay factor of 50%, or shall be removed and replaced at no cost to the Department.

If the test strip is rejected, the Contractor shall construct a subsequent test strip. The Contractor shall not proceed to full production until an Accepted test strip is produced. After the test strip is Accepted, the Contractor shall continue to evaluate the mix properties and the JMF during the placement of the first two (2) sublots in the first lot. Changes may be made to the JMF or the mix proportions and/or properties with the concurrence of the State Materials Bureau, Project Manager, and Assistant District Engineer for Construction. For changes made prior to the completion of the first two (2) sublots, the adjustments will be applied to the entire lot for purposes of payment.

The Project Manager may waive test strip requirements for the Project, if requested by the Contractor based on prior experience with the JMF.

The Shakedown Period is defined as the first two (2) sublots produced in the first lot.

As the test strip is placed, the Contractor shall evaluate the mix properties and the JMF. Changes may be made to the JMF or the mix proportions and/or properties with the concurrence of the State Materials Bureau, Project Manager, and the Assistant District Engineer for Construction.

Table 423.3.5.7:1
Test Strip Acceptance Testing Limits [a,c]

Characteristic	Allowable Tolerances from TV
Air Voids, %	± 2.0
Pavement Density %[c]	90% to 97%
Mineral Admixture %	±0.2%
Voids in the Mineral Aggregate (VMA), % [a]	± 2.0
Asphalt Content %[a,b]	± 0.50

[a] Asphalt Content will be determined using AASHTO T308 as modified by TTCP.

[b] HMA will not be rejected based on Asphalt Content Determined by AASHTO T 308.

[c] Acceptance will be based on the average test values.

423.3.6 Sampling and Testing

The Contractor shall sample and test in accordance with Section 901, “Quality Control Quality Assurance General Provisions,” and Section 906, “Minimum Testing Requirements.” The Department will sample and test in accordance with Section 901, “Quality Control /Quality Assurance General Provisions,” and Section 906, “Minimum Testing Requirements.”

423.3.6.1 Contractor Quality Control

The Contractor shall administer a Quality Control Plan, referred to hereafter as “the Plan”. The Contractor shall ensure the Plan conforms to Section 902, “Quality Control.” The Contractor shall submit the Plan a minimum of two (2) weeks prior to commencement of crushing operations and at a minimum comply with “Contractor Quality Control Plan Guidelines.” No HMA operations are allowed until the Plan has been approved by the Project Manager and the District Lab Supervisor. The Contractor shall sample and test the mixture and pavement on a statistically random basis in accordance with Section 906, “Minimum Testing Requirements.”

423.3.6.1.1 Contractor Quality Control of Aggregate

The Contractor shall obtain samples in accordance with Section 902.5, “Sampling.”

The Project Manager may sample and test the aggregate at any time during production or stockpiling, or may request to split samples with the Contractor.

423.3.6.1.2 Contractor Quality Control for Compaction

The Contractor shall:

1. Monitor the compaction process by determining the density of the HMA with a portable densometer in accordance with the Plan;
2. Establish calibration of the portable densometer from cut pavement samples;
3. Determine the density readings of the cut pavement samples in accordance with AASHTO T 166 (weight, volume method); determine the density readings of the pavement with the portable densometer and correlate these test results;
4. Conduct Quality Control testing in accordance with Division 900, “QUALITY CRITERIA” and provide test results to the Project Manager;
5. Perform Quality Control density testing while the asphalt mixture is hot enough to permit further compaction;
6. Not roll for compaction when it becomes ineffective or damages the HMA; and
7. Not use vibratory mode when it becomes ineffective or damages the HMA.

423.3.6.2 Department Quality Assurance

The Department will sample and test the mixture and pavement on a statistically random basis in accordance with Section 906, “Minimum Testing Requirements.”

423.3.6.3 Acceptance

The Department will evaluate Materials using Contractor and Department test data from each Random sampling Plan for Acceptance in accordance with this section.

Table 423.3.6.3:1
Acceptance Testing Tolerances[a]

Characteristic	Specification limit, percentage points from TV
Air Voids, %	± 1.4
Pavement Density %[c]	± 2.5
Mineral Admixture%[e]	Minimum of JMF Target Value
Voids in the Mineral Aggregate (VMA), % [a,d]	± 1.6
Asphalt Content %[a,b]	± 0.50

[a] All gradation, Asphalt Content, VMA, and VFA values shall be determined using the AASHTO T 308 testing results.

[b] HMA will not be rejected based on Asphalt Content Determined by AASHTO T 308.

[c] Density payment will be adjusted in accordance with Section 901.3.11, “QLA.”

[d] If Gmm fluctuates more than ±0.03 on a consistent basis, it is recommended that the Specific Gravity of the aggregates be checked in order to verify VMA.

[e] If Mineral Admixture is below Design TV cease hot mix production, investigate and correct.

Department personnel may test locations other than the random locations generated for statistical analysis. These tests will not be used for pay factor determination, but may be used to determine Acceptance or rejection of localized Material.

423.3.6.3.1 Quality Level Analysis (QLA)

The Department will determine Acceptance of the Materials in accordance with Section 904, "Quality Level Analysis (QLA)," using the Acceptance limits in Table 423.3.6.3, "Acceptance Testing Tolerances." Acceptance lot sizes shall be determined at the Pre-Paving Conference. The Department will have the final authority for determination of Acceptance lot size. For all QLA Projects, if a composite pay factor of more than one (1.00) is calculated, the composite pay factor will be a one (1.00) for the purposes of payment.

423.3.6.3.1.1 Acceptance of Pavement Density

The target density for Acceptance of HMA will be 94.50% of the theoretical maximum density as determined from AASHTO T 209. For determination of maximum specific gravity, the Contractor shall obtain and test a minimum of two (2) samples and ensure the Department obtains and tests a minimum of one (1) sample for each Day that the HMA is placed, in accordance with the random sampling Plan. Each individual density test value obtained less than 92.0% or more than 97.0% of the theoretical maximum density will be evaluated in accordance with Section 423.3.6.3.2, **"**Adherence to Specifications and Rejection of Non-specification Material."

For purposes of Acceptance and pay factor determination:

1. Determine the density from cut pavement sections (cores) with six (6) inch diameters extending through the full thickness of the HMA;
2. Determine the pay factor in accordance with Section 904, "Quality Level Analysis;"
3. To be prepared for dispute resolution, the Contractor shall provide one (1) additional core for each core tested by the Department for Acceptance of density in accordance with section 423.3.7, "Dispute Resolution;" and
4. If a composite pay factor of more than one (1.00) is calculated, the composite pay factor will be a one (1.00) for the purposes of payment.

For Projects consisting of single lift overlays or mill and inlay with a single lift of two and a half inches or less, the Project Manager may grant an exception to the mean density target requirement of at least 94.5% of the theoretical maximum density if the Contractor can demonstrate that a minimum of 92.0% cannot be reasonably obtained because of the existing conditions of the Pavement Structure or Subgrade Materials. The Contractor demonstrates this by providing non-destructive density results obtained during paving operations witnessed by a State Inspector at the location in question. If the Project Manager grants this exemption, the Contractor shall construct a Roadway test strip and develop an HMA compaction process to get the highest possible density based on an approved roller's density gain per pass, in accordance with Section 423.3.4.4, "Compaction Equipment." The Project Manager will approve the process, establish a new target value for density and establish a new Acceptance lot only for the portion of the Project addressed herein (except for the Roadway test strip) before paving begins or continues. Lot density shall not fall below 91%. If a lot does not meet either of the revised density requirements, the Project Manager will, with the concurrence of the Assistant District Engineer for Construction do the following:

1. Accept and pay for the lot of HMA at 50% of the Bid Item Unit Price; or
2. Reject the in-place Material and require the Contractor to remove and replace at no cost to the Department.

423.3.6.3.2 Adherence to Specifications and Rejection of Non-Specification Material

The Contractor shall produce Material in substantial compliance with all Specification requirements. The Department will evaluate Air Voids, Pavement Density, Void in Mineral Aggregate (VMA), and Asphalt Content test results for Specification compliance. Evaluation of Material that does not meet Specifications will be in accordance with the following:

Individual Test Results. If an individual test is outside the Specification limits but is less than two (2) standard deviations from the mean of previously produced Material of the current lot, investigate and propose corrective actions but production may continue and the result will be entered into QLA. If an individual test result (for the current lot) is outside the Specification limits and is two (2) or more standard deviations from the mean of previously produced Material, the Contractor shall cease production, investigate the causes of the failure, and propose corrective actions. The Contractor shall not resume production until the proposed corrections are approved by the Project Manager.

Consecutive Test Results. If two (2) consecutive test results of the same property (for the current lot) are outside the Specification limits, cease production, investigate the causes of the failure, and propose corrective action. The Contractor shall not resume production until the proposed corrections are Accepted by the Project Manager in writing. Limit production to a maximum of 1,000 tons, production will include a minimum of two (2) Contractor tests and one (1) Department test. If testing indicates that the problem has been corrected, the Contractor shall resume full operations. If the problem has not been corrected, the Contractor shall perform further trial runs and testing.

Pavement Density Below 90.000%. All pavement density tests that are below 90.000% are rejected and the Contractor shall remove and replace all Material represented by the test with Specification Material at the Contractors expense. The Contactor shall submit a Plan in writing for approval by the Project Manager that determines the limits of Material to be removed within 48 hours of reporting a Quality Control test or receiving a Quality Assurance test for pavement density below 90.000% density. If the test below 90.000% is a Department test, the Department will obtain a new test from the Material replaced by the Contractor to replace the density test reported by the Department. If the test below 90.000% is a Contractor test, the Contractor shall obtain a new test from the Material replaced by the Contractor to replace the test reported by the Contractor. The test obtained from the replaced Material will be input into the QLA to replace the test below 90.000%.

All Material that is rejected, at the sole discretion of the Department, shall be removed and replaced with Specification Material at the Contractor's expense. If the Material is allowed to remain in place by the Department all random, sample data will be entered into QLA, this does not apply to pavement density below 90.000% that shall be removed and replaced. Sampling for corrective action will not be entered into QLA.

The Project Manager may reject Material that appears to be defective based on visual inspection.

423.3.6.4 Independent Assurance Testing

The Department will perform Independent Assurance sampling and testing in accordance with Section 906, "Minimum Testing Requirements."

423.3.7 Dispute Resolution

For any test incorporated into the pay factor, if a dispute exists the Project Manager and Contractor will investigate to determine why and make corrections if possible. If the

discrepancy cannot be resolved, then either party may invoke the dispute resolution process. The State Asphalt Engineer will maintain a list of labs that are willing and capable of performing referee testing. All referee Labs shall be AASHTO Materials Reference Laboratory (AASHTO RE: SOURCE) certified for the test(s) to be performed. Neither the Department's Project staff, nor the Contractor will know who is performing the referee testing. The State Asphalt Engineer will select a Laboratory, without disclosing the name of the Lab to Department Project personnel or Contractor personnel, from the following, not in priority order:

1. A District Laboratory not from the District in which the Project resides;
2. A Laboratory currently listed on the State Material's Bureau's list of approved testing labs not involved in the subject Project in any manner, such as mix design submittal, preliminary testing for design, etc. Only Laboratories that are in the routine business of providing testing and designs will be considered; or
3. State Materials Bureau Laboratory.

For all testing incorporated into the pay factor, an additional sample from the Department's Acceptance Samples and the Contractor's Quality Control Samples shall be obtained for referee testing purposes. Failure to provide the referee samples will result in the Project Manager suspending the Project at no cost to the Department. Additional time will not be added to the Contract for Project suspension caused by failure to comply with Dispute Resolution Process. Work shall not resume until the Contractor provides the sample(s) and satisfies the Project Manager, in writing, that future samples will be provided in compliance with this requirement. The referee sample(s) is (are) to be retained by the Department. The Department will retain the referee samples at a location determined by the Project Manager. Once the pay factor is determined, the Contractor shall dispose of the unused samples at no cost to the Department. In no case will the unused samples be disposed of prior to the ten (10) Calendar Day period in which the Dispute Resolution process may be invoked.

For Pavement Density, the additional core(s) will be stored and retained in a location approved by the Project Manager. Should the Dispute Resolution Process for Density be invoked, the additional core will be provided to the Referee Lab per the NMDOT REFEREE TESTING POLICY. The original density value obtained will be replaced by the data obtained from the Referee Lab result.

When a referee Lab is used, the referee Lab's test results will be used in determining the pay factor. The request to referee must be invoked in writing within ten (10) Calendar Days of receiving the test results from the other party. If not invoked within ten (10) Calendar Days, the test results are deemed Accepted. The test results from the referee Lab will replace the Department's or the Contractor's test results for the sample in question. If the composite pay factor decreases from applying the referee Lab's results, the Contractor shall pay for the testing performed by the referee Lab. If the composite pay factor increases from applying the referee Lab's results, the Department will pay for the testing performed by the referee Lab. If the composite pay factor remains unchanged, the cost shall be split with each party responsible for 50% of the total cost.

The "NMDOT REFEREE TESTING POLICY" will be used to coordinate the efforts of managing Dispute Resolution by both the Department and Contractor. This policy is made available by accessing the NMDOT website, and navigating within the Construction and Civil Rights Bureau's (CCRB) link.

Failure to comply with the requirements contained herein will result in the pay factor being calculated in accordance with the applicable Sections of 423, "Hot Mix Asphalt (HMA) (Major Paving) and 904, "Quality Level Analysis" and no test results will be replaced by referee results.

423.4 METHOD OF MEASUREMENT

If the Department measures *HMA* by the square yard, the Department will use the average width of the HMA in place and the length from station to station along the centerline of the Roadway when calculating quantities.

423.5 BASIS OF PAYMENT

Pay Item	Pay Unit
HMA Complete	Ton or Square Yard
HMA	Ton or Square Yard

The Department will pay for Accepted quantities at the Bid Item Unit Price, adjusted in accordance with Section 423.5.1, "Price Adjustments." Providing and transporting all cores, samples and storage containers shall be Incidental to the Pay Items above.

423.5.1 Price Adjustments

The Department will pay for Accepted quantities of *HMA* or HMA Complete at the Bid Item Unit Price, adjusted in accordance with Section 904, "Quality Level Analysis (QLA)." The HMA will be evaluated on a lot-by-lot basis at a price determined by multiplying the Bid Item Unit Price by the weighting factor. The Department will use Table 904.1:1, "Weighting Factors," to calculate each lot's composite pay factor. The pay factor for the entire Project will be calculated by applying weighted averages, based on tonnage contained within each lot, to each lot's composite pay factor. If the composite pay factor for a lot is greater than one (1.0), the pay factor will be set at one (1.0).

423.5. 2 Work Included in Payment

The Department will consider as included in the payment for the pay item(s) listed in this section and will not measure or pay separately for the following Work:

1. Asphalt binder, aggregate, blending sand, mineral filler, mineral admixture, and WMA additive or process as appropriate;
2. Mixing, hauling, placement, and compaction of HMA or WMA;
3. Quality Control in accordance with Section 902, "Quality Control;"
4. Providing and transporting all cores for correlation;
5. Providing Mix Design in accordance with Section 423.2.8, "Mix Design;" and
6. Providing storage container for samples and cores if referee testing is used.

SECTION 424: WARM MIX ASPHALT (WMA) (MAJOR PAVING)

424.1 DESCRIPTION

This Work consists of constructing one (1) or more pavement courses of Warm Mix Asphalt (WMA) on a prepared base milled surface.

WMA shall be produced in a mixing plant and stored, hauled, placed and compacted in accordance with the requirements of this Section and as shown in the Contract.

Section 423, “Hot Mix Asphalt – Superpave (Major Paving)” shall be complied with except as modified herein.

424.1.1 Definition

Warm Mix Asphalt (WMA) is a generic term used to describe the reduction in production paving and compaction temperatures achieved through the use of one (1) of the approved WMA Technologies.

Some modification to WMA plants may be necessary to accommodate the WMA Technologies as noted in Section 424.3, “Construction Requirements.”

424.2 MATERIALS

424.2.1 General

WMA may be produced by one (1) or a combination of several technologies which may include WMA plant foaming processes and Equipment, mineral additives or chemicals that allow the reduction of the production temperatures.

WMA is a mixture of asphalt binder, Warm Mix Additive (or technologies), aggregate, blending sand, mineral filler, and mineral admixture Material. The warm mix additive, or technology, shall be approved by the Department and included in the most current Approved Products List (APL). Unless otherwise prohibited in the Contract, the Department will allow Recycled Asphalt Pavement (RAP) in WMA mixes as long as the resulting mixture conforms to all Specification requirements.

A technical representative of Warm Mix Additive Supplier, including contact information shall be designated in writing via the mix design submittal process. The representative is expected to ensure that the Warm Mix Additive is handled properly. The representative does not have the authority to allow any deviation from the Department Specifications and Project requirements.

424.2.2 Aggregate

Refer to Section 423.2.2, “Aggregate.”

Note: HMA will be replaced with WMA.

424.2.3 Asphalt Binder

Refer to Section 423.2.3, “Asphalt Binder.”

424.2.3.1 Warm Mix Additive or Technology

Only Warm Mix Additives or Technologies approved by the Product Evaluation Program and listed on the NMDOT Approved Products List (APL) can be used on Department Projects.

To be placed on the APL, the WMA additive Supplier shall verify that the binder with the additive meets the PG grade of the specified binder. The potential additive Supplier shall demonstrate this to the Department by evaluating the Asphalt Binder containing the WMA additive at the expected additive dosage rates for compliance with the specified PG grade in accordance with AASHTO M320, Table 1 and Section 402.2.2.1.1, "Performance Graded Asphalt Binder."

The type and dosage rate of Warm Mix Additives shall comply with the recommendations of the Warm Mix Additive Supplier. Warm Mix Additive dosage rates shall not deviate from those recommended by the Warm Mix Additive Supplier. If a terminal blend Warm Mix Additive is used, the dosage rate shall be shown on the Materials Certificate of Compliance.

After the Warm Mix Additive is introduced, the PG grade of the binder shall comply with the PG grade as specified in the Contract.

For foamed asphalt systems, only foam systems that approved by the State Asphalt Engineer shall be used. Foamed asphalt systems, are not part of the NMDOT APL.

424.2.4 Mineral Admixtures

Refer to Section 423.2.4, "Mineral Admixture."

424.2.5 Blending Sand

Refer to Section 423.2.5, "Blending Sand."

424.2.6 Mineral Filler

Refer to Section 423.6, "Mineral Filler."

Note: HMA will be replaced with WMA.

424.2.7 Reclaimed Asphalt Pavement

Refer to Section 423.2.7, "Reclaimed Asphalt Pavement."

Note: HMA will be replaced with WMA.

424.2.8 Mix Design

Refer to Section 423.2.8, "Mix Design."

Note: HMA will be replaced with WMA.

In addition to the above reference, the Contactor shall provide documentation confirming the WMA additive or technology blended with the asphalt binder results in asphalt cement that meets the specified PG Grade Asphalt Binder.

The WMA Additive or Technology Supplier and the Asphalt Binder Supplier will recommend mixing, compaction, and maximum allowable temperatures to be used for the development of the mix design.

424.2.9 Job Mix Formula

Refer to Section 423.2.9, “Job Mix Formula.”

424.3 CONSTRUCTION REQUIREMENTS

424.3.1 General

Refer to Section 423.3.1, “General.”

Note: HMA will be replaced with WMA.

424.3.2 Mix Temperature Requirements

The Contractor shall not allow the temperature of the WMA to be less than 215 degrees F or greater than 275 degrees F behind the laydown machine. WMA delivered to the Project with mix temperatures outside the Acceptable range shall, at the sole discretion of the Project Manager, be removed and replaced at no cost to the Department.

424.3.3 Addition of Mineral Admixtures

Refer to Section 423.3.3, “Addition of Mineral Admixture.”

424.3.4 Equipment

Refer to Section 423.3.4, “Equipment.”

Note: HMA will be replaced with WMA.

The Contractor shall use Equipment and WMA technologies capable of producing an asphalt mixture that meets Specification requirements and is workable at the minimum placement and compaction temperatures desired, regardless of storage or haul distance considerations.

424.3.4.1 Mixing Plants

The Contractor shall modify the asphalt mixing plant as required by the manufacturer to introduce the WMA technology.

424.3.4.1.1 Plant Scales

Refer to Section 423.3.4.1.1, “Plant Scales.”

In addition to the above reference, the Contractor shall modify the asphalt mixing plant as required by the manufacture to introduce the WMA additive or technology.

424.3.5 Placement Operations

Refer to Section 423.3.5, “Placement Operations” except the following subsections as modified herein.

Note: HMA will be replaced with WMA.

424.3.5.1 Weather Limitations

The Contractor shall not place WMA on wet or frozen surfaces or if weather conditions prevent proper handling, finishing, and compacting. The Contractor shall place WMA when the Chill Factor is at least 35 °F and rising. If the air temperature is 55 °F or warmer, the Contractor shall not consider the Chill Factor.

424.3.6 Sampling and Testing

Refer to Section 423.3.6, "Sampling and Testing."

Note: HMA will be replaced with WMA.

In addition to the above referenced section the following shall be complied:

If the WMA additive Supplier indicates that the additive makes mix properties time defendant; the Plan must include how all of the required testing will be completed in the designated time frame. This Plan will include how the Contractor will comply with the required testing within the Supplier's specified time frames. It will also include how the Department will be supported, if necessary, to complete their tests within the time frame required if the testing cannot be performed at Department established facilities. This Plan must be reviewed and approved by the Project Manager and by the District Laboratory Supervisor prior to the placed of any WMA on the Project. If the Job Mix Formula changes, it shall be addressed in conformance with Section 423.2.9.1, "Job Mix Formula Adjustments."

424.3.7 Dispute Resolution

Refer to Section 423.3.7, "Dispute Resolution."

Note: HMA will be replaced with WMA.

424.4 METHOD OF MEASUREMENT

If the Department measures WMA by the square yard, the Department will use the average width of the WMA in place and the length from station to station along the centerline of the Roadway when calculating quantities.

424.5 BASIS OF PAYMENT

Pay Item	Pay Unit
WMA Complete	Ton or Square Yard
WMA	Ton or Square Yard

The Department will pay for Accepted quantities at the Bid Item Unit Price, adjusted in accordance with Section 424.5.1, "Price Adjustments." Providing and transporting all cores, samples and storage containers shall be Incidental to the Pay Items above.

424.5.1 Price Adjustments

Refer to Section 423.5.1, "Price Adjustments."

Note: HMA will be replaced with WMA.

424.5. 2 Work Included in Payment

Refer to Section 423.5.2, “Work Included in Payment.”

SECTION 509: PORTLAND CEMENT CONCRETE MIX DESIGNS

509.1 DESCRIPTION

This Work consists of developing, submitting and receiving approval to use Portland Cement Concrete (PCC) mix designs for use on Department Projects.

For the purposes of this Section, the following definitions are used:

1. Supplier: Any individual, partnership, company, firm, corporation, or joint venture that owns the Approved Concrete Mix Design, for concrete that is incorporated into a Department construction Project(s).
2. The terms “mix” and “mixture” are used interchangeably.

509.2 MATERIALS

All Materials shall be in accordance with AASHTO and ASTM methods or other test procedures designated by the Department. The State Materials Bureau is the final authority regarding the interpretation of test procedures.

The certifying laboratory or Private Testing Laboratory (PTL) performing the physical and chemical tests for the Supplier is required to participate in the Cement and Concrete Reference Laboratory (CCRL) proficiency sample and the pozzolan inspection programs.

509.2.1 Reserved

509.2.2 Cementitious Materials

Unless otherwise specified, the Supplier shall use; (1) a combination of Type II, III, or V Portland cement and supplemental cementitious Materials (SCM), (2) Blended cement, or (3) a combination of blended cement and SCM. Supplemental cementitious Materials used in blended cements shall not be used as a replacement of portland cement for mix design purposes.

509.2.2.1 Portland and Blended Cements

Portland cement shall comply with ASTM C150. Types II, III, and V portland cement shall have an alkali content less than 0.60% by mass of alkalis as Na_2O + 0.658 K_2O when determined under AASHTO T 105. Types III and V portland cements shall only be used if specified or authorized by the State Concrete Engineer.

Blended cements shall comply with Type IS (S) – portland blast-furnace slag cement, Type IP (MS) – portland-pozzolan cement, or Type IT – Ternary blended cement as specified in ASTM C595, except:

1. Portland cement used in blended cements shall comply with the requirements listed in 509.2.2.1;
2. Class C fly ash shall not be used in blended cements, unless otherwise approved by the State Concrete Engineer;
3. SCM used in blended cements shall meet the requirements of Section 509.2.2.2, “Supplementary Cementitious Materials;”
4. Maximum SCM content shall not exceed 50%; and
5. Blended cement shall be composed of Type II or V portland cement and SCM produced by one of the following methods:

5.1. Intergrinding of portland cement clinker and SCM;

5.2. Blending of portland cement and SCM; and

5.3. Combination of intergrinding and blending of portland cement and SCM.

509.2.2.2 Supplementary Cementitious Materials

Each SCM shall be in accordance with the following standards and as modified in Table 509.2.2.2:1, "Supplementary Cementitious Material Requirements:"

1. Portland cement used in blended cements shall comply with the requirements listed in Section 509.2.2.1, "Portland and Blended Cements;"
2. Class C and F fly ashes shall comply with the requirements of ASTM C618:
   2.1. Class C fly ash shall not be used in concrete exposed to sulfate environments or with "potentially reactive," or "reactive" aggregate;
3. Ultrafine fly ash (UFFA) shall comply with ASTM C618, Class F;
4. Natural or calcined natural pozzolans shall comply with ASTM C618, Class N;
5. Metakaolin shall comply with ASTM C618, Class N;
6. Ground granulated blast furnace slag (GGBFS) shall comply with ASTM C989, Grade 100 or 120; and
7. Silica fume shall comply with ASTM C1240.

Table 509.2.2.2:1
Supplementary Cementitious Material Requirements

SCM Type	Material Standard	Properties	Limits		
Coal Fly Ash, and Raw or Calcined Natural Pozzolans	ASTM C618	Class	N	F	C
		Sum of Al_2O_3, SiO_2, and Fe_2O_4, min	75%	85%	50%
		Loss on ignition, max	5.0%	3.0%	3.0%
		Magnesium Oxide (MgO), max	5.0%	5.0%	5.0%
		Sulfur Trioxide (SO_3), max	3.0%	3.0%	3.0%
		Available alkalis as Na_2O + 0.658 K_2O, max	1.50%	1.50%	1.50%
		Calcium Oxide (CaO), maxmax	As Approved	8.0%	50%

Table 509.2.2.2:1
Supplementary Cementitious Material Requirements

SCM Type	Material Standard	Properties	Limits
Ultra Fine Fly Ash in addition to the requirements for Class F fly ash	AASHTO M 321	Accelerated Pozzolonic Activity Index, • 7 day • 28 day	 85% 100%
		Particle size distribution • less than 2.25 μm • less than 8.50 μm	 50% 90%
		Fineness, retained on 45 μm wet sieve, max	5.0%
		Moisture content, max	1.0%
Metakaolin	ASTM C618	Silicon dioxide (SiO_2) + aluminum oxide (Al_2O_3), min	92%
		Calcium oxide (CaO), max	1.0%
		Sulfur trioxide (SO_3) max	1.0%
		Loss on ignition, max	1.2%
		Available alkalis as Na_2O + 0.658 K_2O, max)	1.5%
		Accelerated Pozzolonic Activity	

Table 509.2.2.2:1
Supplementary Cementitious Material Requirements

SCM Type	Material Standard	Properties	Limits
		Index, • 7 day • 28 day Fineness, retained on 45 μm wet sieve, max	 85% 95% 5.0%
Silica Fume	ASTM 1240	Reduction in mortar bar expansion when used with cement in the proposed mix design, min	80%

509.2.2.3 Cementitious Materials Source Approval and Acceptance

The Department will approve individual cementitious Materials based upon compliance with the respective ASTM or AASHTO Standard Specifications and the requirements listed in this Section. The following information shall be included with each cementitious Material approval request submittal:

1. Supplier name and address;
2. Manufacturer name and address;
3. Production facility physical address;
4. Material type;
5. Material source/origin;
6. Raw Material source(s);
7. Production procedures;
8. Description of storage facilities;
9. Quality Control program documentation including the following:
   - 9.1. Certifying Laboratory's accreditation and current participation in the ASTM Cement and Concrete Reference Laboratory Program (CCRL);
   - 9.2. Routine sampling and testing frequency; and
   - 9.3. QC program test reports (mill certs) for each lot tested from the previous six (6) months shall be provided upon request from the Department;
10. Cementitious Materials shall be tested and certified for conformance with the respective Material Specifications below:
    - 10.1. Portland cements: ASTM C150 – Standard Specification for Portland Cement; and

10.2. Blended cements: ASTM C595 – Standard Specification for Blended Hydraulic Cements;

10.2.1. Portland cements used in manufacturing blended cements: ASTM C150 – Standard Specification for Portland Cement; and

10.2.2. SCM used in manufacturing blended cements: ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; and

11. Supplementary Cementitious Materials shall be tested and certified monthly for conformance with the respective Material Specifications listed below:

11.1. Pozzolans: ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete;

11.2. Metakaolins: ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete;

11.3. GGBFS: ASTM C989 - Standard Specification for Slag Cement for Use in Concrete and Mortars; and

11.4. Silica fume: ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.

509.2.2.4 Withdrawal of Source Approval

The State Materials Bureau may withdraw cementitious Material source approval for any of the following reasons:

1. A change in Material source or production procedure from that on the original request for approval;
2. Failure to comply with Specification requirements;
3. The source becomes inactive for a period of three (3) months; or
4. The appropriate cementitious Material mill certificates are not received monthly.

509.2.2.5 Packaging

Cementitious Materials shall be packaged with the name brand, the source manufacturing facility, Material type, date of production and lot number. The Supplier shall provide the same information, as well as quantities, on the shipping documents for bulk cementitious Materials deliveries.

509.2.2.6 Storage

Different brands of SCM or cements from different production facilities shall be stored in separate, identifiable storage units provided at the production facilities. Each cementitious Material shall be stored separately.

509.2.3 Aggregates

509.2.3.1 Aggregates Testing

Coarse and fine aggregate shall be tested in accordance with the methods shown in Table 509.2.3.1:1, “Aggregates Test Methods.” Concrete mix design approval involving a designated source will remain in effect as long as annual test results for specific gravity, absorption, gradation, and sand equivalent (for fine aggregate only) and annual tests for other requirements (except ASR) demonstrate Material compliance.

Table 509.2.3.1:1
Aggregates Test Methods

Method	Aggregate test	Coarse Aggregates	Fine Aggregates
AASHTO T 2	Sampling	Note[A]	Note[A]
AASHTO T 112	Clay lumps, max	2.5%	3.0%
	Soft fragments, max	2.0%	2.0%
	Coal & lignite, max	0.25%	1.0%
AASHTO T 27	Sieve analysis	Note[B]	Note[C, D]
AASHTO T 11	Passing No. 200, max	2.0%[E]	3.0%[E]
AASHTO M 6	Fineness modulus	NA	2.3 to 3.1[F]
AASHTO T 85	Coarse aggregate absorption & specific gravity	Report	NA
AASHTO T 84	Absorption & Specific Gravity of Fine Aggregate	NA	Report
AASHTO T 104	Magnesium sulfate soundness, max	15%	12%
ASTM C131	L.A. Abrasion	40%	NA
ASTM D3744	Aggregate Index, min	25	NA
ASTM D4791 TTCP Modified	Flat and elongated pieces, max	15%[G]	NA
ASTM D5821	Fractured faces, min	Report	NA
AASHTO T 176	Sand equivalent, min	NA	75
ASTM C295	Petrographic analysis	Report	Report
AASHTO T303 or ASTM C1293	Alkali-Silica Reactivity	Report	Report

Notes:

1. Coarse and fine aggregates shall be sampled in accordance with AASTO T 2.
2. See Table 509.2.3.2.3:1 – Coarse Aggregate Gradation Requirements.
3. See Table 509.2.3.3.3:1 – Fine Aggregate Gradation Requirements.
4. The Department will not approve fine aggregate that has more than 45% passing any sieve and retained on the next finer sieve.
5. The Department may Accept coarse and fine aggregates with more than the maximum percent passing the No. 200 sieve if the combined gradation of the coarse and fine aggregate percent passing the No. 200 sieve does not exceed three percent (3.0%).
6. Ensure that Material larger than 3/8 inch contains no more than 15% flat or elongated particles with a 3:1 or greater dimensional ratio in accordance with TTCP. Add the percentage of flat pieces to the percentage of elongated pieces to determine specification compliance. Count pieces that are both flat and elongated only once.

509.2.3.2 Coarse Aggregate

Coarse aggregate shall consist of clean crushed stone, crushed gravel, or natural washed gravel free of trash, debris, organics, and other Deleterious Materials.

509.2.3.2.1 Coarse Aggregate Gradation Requirements

When using the combined gradation procedure in Section 509.2.7.5.1, "Combined Gradation;" coarse aggregate gradation requirements are not required with the exception of tolerance for Material passing the No. 200 sieve found in Table 509.2.3.2.1:1, "Coarse Aggregate Gradation Requirements." Coarse aggregate gradations shall be in accordance with Table 509.2.3.2.1:1, "Coarse Aggregate Gradation Requirements."

Table 509.2.3.2.1:1
Coarse Aggregate Gradation Requirements

	% of aggregate passing sieve			
Sieve size	**1.5 in**	**1.0 in**	**3/4 in[A]**	**1/2 in**
2.0 inch	100	—	—	—
1.5 inch	95–100	100	—	—
1.0 inch	—	95–100	100	—
3/4 inch	35–70	—	90–100	100
1/2 inch	—	25–60	—	90–100
3/8 inch	10–30	—	20–55	40–70
No. 4	0–5	0–10	0–10	0–15
No. 8	—	0–5	0–5	0–5
No. 200	0.0–2.0	0.0–2.0	0.0–2.0	0.0–2.0

A. Required for Class G gradation.

509.2.3.3 Fine Aggregate

Fine aggregate shall consist of clean and well-graded natural sand, manufactured sand, or combination of both, and free of trash, debris, organics, and other Deleterious Materials.

509.2.3.3.1 Fine Aggregate

When using the combined gradation procedure detailed in Section 509.2.7.5.1, "Combined Gradation;" fine aggregate gradation requirements are not required except for the amount of Material passing the No. 200 sieve which shall be within the tolerance listed within Table 509.2.3.3.1:1, "Fine Aggregate Gradation Requirements."

Fine aggregate shall meet the gradation requirements listed in Table 509.2.3.3.1:1, "Fine Aggregate Gradation Requirements." The gradation requirements represent the limits that the Department will use to determine source Acceptability.

The Supplier shall use a fineness modulus, calculated in accordance with AASHTO M 6, to determine the degree of uniformity between representative samples. If the combined gradation procedure has not been chosen, the Department may reject fine aggregate from designated sources with variation in fineness modulus greater than 0.20 above or below the fineness modulus shown on the approved concrete mix designs. Variations in excess of these tolerances may be cause for rejection.

Table 509.2.3.3.1:1
Fine Aggregate Gradation Requirements

Sieve size	% Passing
3/8 inch	100
No. 4	90–100
No. 8	70–95
No. 16	45–80
No. 30	25–60
No. 50	5–30
No. 100	0–8
No. 200	0.0–3.0

509.2.3.4 Aggregate Alkali-Silica Reactivity

The Supplier shall perform the initial proof-of-reactivity-potential test using standard GCC Type I-II low alkali cement from the GCC Cement plant located at Tijeras, New Mexico. The Department considers aggregates with mean mortar bar expansions of greater than 0.10% at 14 Days when tested in accordance with AASHTO T 303 or ASTM C1260 potentially reactive and those less than 0.10% as non-reactive. Expansions greater than 0.20% are considered "Reactive." If tested using ASTM C1293, the Department will consider aggregate non-reactive if the average expansion at the end of one (1) year is less than 0.04%. Once the State Materials Bureau approved a particular aggregate source is non-reactive, it will not require the source to reevaluate for five (5) years unless concerns arise from possible aggregate source changes.

509.2.3.4.1 ASR Mitigation Evaluation Criteria

If the results of the initial proof-of-potential-reactivity test show the aggregate to be "potentially reactive" or "reactive," the Contractor shall repeat the test procedure using the actual cement, and, if desired, any of the ASR inhibiting SCM and admixtures listed in Table 509.2.3.4.1:1, "Option 2 Mix Designs - ASR Mitigation Requirements." The Department will consider an admixture effective if the mean mortar bar expansion at 14 Days is less than or equal to 0.10%, when tested in accordance with AASHTO T 303 (modified to include SCM) or ASTM C1567. The Supplier shall retest aggregates classified as "potential reactive" or "reactive" for ASR mitigation each time the comprehensive mix evaluation is performed. The Contractor shall report the minimum amount of Class F fly ash, and the minimum amount of ASR inhibiting admixture required to provide a maximum expansion at 14 Days that is less than 0.10%. The SCM required for mitigation shall be reported as a percentage of the cement weight. For Option 2 mix designs, the Contractor shall use ASR inhibiting SCMs or admixtures in accordance with Table 509.2.3.4:1, "Option 2 Mix Designs - ASR Mitigation Requirements," unless it is determined that larger dosages are required to control the expansion.

Table 509.2.3.4:1
Option 2 Mix Designs - ASR Mitigation Requirements

SCM	Minimum SCM Content[A, B]
Class F	
Binary Blends	20%
Ternary Blends[C]	12%
Blended cement	20%
GGBFS	20%
Silica fume	10%
Lithium nitrate	0.55 gal/yd³ of solution for each pound of cement sodium equivalent

Table 509.2.3.4:1
Option 2 Mix Designs - ASR Mitigation Requirements

Notes:

1. By total cementitious content.
2. Or minimum amount required to mitigate ASR expansion, whichever is greater.
3. 20% combined SCM content or minimum amount required to mitigate ASR expansion, whichever is greater.

509.2.4 Admixtures

Admixtures types and brands are required to be on the Department's APL at the time of mix design submission. Air entraining, and chemical, and lithium nitrate admixtures shall not contain more than 0.1% of soluble and insoluble chlorides. Individual admixtures shall be compatible with each other when multiple admixtures are used in a concrete mixture. Admixtures shall be used in compliance with the manufacturer's written instructions.

509.2.4.1 Air Entraining Admixtures

Air-entraining admixtures shall be provided in accordance with ASTM C260.

509.2.4.2 Chemical Admixtures

Any of the following chemical admixtures types as defined by and meeting the requirements of ASTM C494 may be used to facilitate concrete mix design:

1. Type A – Water Reducing;
2. Type B – Retarding;
3. Type D – Water Reducing and Retarding;
4. Type F – Water Reducing, High Range; or
5. Type G – Water Reducing, High Range, and Retarding.

The following admixtures may be used if approved by the State Concrete Engineer:

1. Type C – Accelerating;
2. Type E – Water Reducing and Accelerating; or
3. Type S – Specific Performance.

Any of the following chemical admixtures types as defined by and meeting the requirements of ASTM C1017 may be used to facilitate concrete mix design:

1. Type I – Plasticizing; or
2. Type 2 – Plasticizing and Retarding.

509.2.4.3 Lithium Nitrate Chemical Admixture

Lithium nitrate shall be in an aqueous solution meeting the following:

1. Lithium nitrate as $LiNO_3$ shall be 30% by weight;
2. Sulfate as SO_4 shall be less than 0.1% (1,000 PPM); and
3. Alkalis as $Na_2O + 0.658\ K_2O$ shall be less than 0.1%.

509.2.4.44 Pigment Admixtures for Integrally Colored Concrete

Pigments shall conform to ASTM C979. Pigments shall be lightfast, alkali-resistant, weather resistant, and formulated to give long lasting color to concrete.

509.2.5 Water

Water shall conform to ASTM C1602. Water shall have a pH between 6.0 and 8.5; sulfate or chloride contents shall not exceed 1,000 ppm, and shall be free of oil, silt, clay, organic matter, or other Deleterious Material.

509.2.6 Fiber Reinforcement

If specified, steel fibers shall conform to ASTM A820, and synthetic fibers conform to ASTM C1116.

509.2.7 Portland Cement Concrete Mix Design

Concrete mixtures shall be designed in a PTL approved by the Department, by a Professional Engineer registered in the State of New Mexico with a minimum of three (3) year of experience in testing, proportioning and designing of concrete and is directly responsible for all test results used for design purposes. The laboratory mix design shall only be developed using the proposed Materials.

Only technicians who are currently certified by TTCP - Concrete or ACI Concrete Field Technician, Level I shall determine concrete fresh properties in accordance with the appropriate AASHTO procedures. Laboratories approved by the Department's State Materials Bureau shall determine hardened properties. Technicians performing tests on aggregates and aggregate gradations shall be certified by TTCP or ACI Concrete Laboratory Level I. Those technicians performing strength tests on hardened concrete must be certified as an ACI Level I Laboratory Technician or by TTCP for Compressive Strength Testing of Concrete.

509.2.7.1 Concrete Classifications

The concrete classes listed below shall be used when specified in the Contract:

1. Class A: Structural, cast-in-place sidewalks, curb/gutter, concrete wall barrier, Bridge Substructures;
2. Class AA: Structural, used for cast-in-place structural, Bridge Superstructure, approach slabs, abutments;
3. Class HPD: Structural, used for Bridge decks, concrete paving, concrete paving repair. Additional requirements: combined gradation protocol, shrinkage ASTM C157 less than 0.04% at 28 days;
4. Class F: Slip formed concrete wall barrier, curb/gutter; compressive strength measured at 14 days;
5. Class G: Below grade applications, caissons, drilled piers (part of Bridge Substructure);
6. Class HES (formerly rapid set): High early strength concrete used for rapid repair applications. Early compressive strengths will be determined on a per Project basis. Cement content will determined by lab trials. Allowable cements: Type II, III and rapid strength cements;
7. Class P (formerly class F-LS): Concrete paving. Mix design shall include compressive strengths in addition to flexural beams in order to develop a correlation curve. Other additional requirements: combined gradation protocol, shrinkage

ASTM C157 less than 0.04% at 28 days; and

8. Special: The Contract Requirements for the individual Project will address mix design and testing requirements.

509.2.7.2 Concrete Class Requirements

Option 1 or Option 2 may be used for mix design development of the Concrete Classes listed in Table 509.2.7.2:1, "Option 1: Concrete Requirements." Mix designs developed using Option 1 shall be approved by the State Concrete Engineer for estimated Project quantities less than those provided in the table below. The Department may consider requests to increase the maximum estimated quantity on a Project specific basis. Mix designs developed using Option 1 do not require ASTM C666 testing, and ASTM C457 hardened air void characteristics.

For Projects with anticipated concrete quantities of 150 CY or less of an individual concrete class, a written request may be submitted to the State Concrete Engineer to issue the a mix design under Section 509.2.7.6.12, "Mixture Design Submittals," bullet 13.3, "Incidental Concrete."

Table 509.2.7.2:1
Option 1: Concrete Requirements

Class	Strength[A], psi	W:CM Ratio, max	Minimum Cementitious Content, lbs/CY	Maximum Estimated Project, Quantity	Slump[B], Inches	Air Content[C], %
A	3,000	0.45	560	1,000 CY	3 - 5"	-
F	3,000[D]	0.45	575		0.5 - 2"	-
G	3,000	0.44	611		6 - 9"	< 3%[G]
HES	4,000[F]	0.40	NA	500 CY	Note H	-
P	3,000[D] and 650[E] flex	0.35	600	10,000 SY	0.5 - 2"	-
Special	The Contract Requirements for the individual Project will address special mix requirements.					

Notes:

1. Specified strength shall be achieved by 28 days unless otherwise noted.
2. As determined by AASHTO T 119.
3. Project risk zone requirements apply; see Section 509.2.7.4, "Freeze-Thaw Risk Zones."
4. Specified strength shall be achieved by 14 days.
5. Specified flexural strength shall be achieved by 28 days.
6. Specified strength shall be achieved in 24 hours, and 75% of the specified strength shall be achieved in five (5) hours, unless otherwise stated in the Contract.
7. Air entraining admixtures are not allowed.
8. Mix design specific for Project specific requirements.

For Option 1 mix design development, the minimum SCM in concrete shall comply with one of the following:

1. Any combination of cement and a minimum of one (1) SCM satisfying Equation 1:

Equation 1:

$$\frac{(25 \times UF) + (12 \times FA) + (6 \times SL)}{MC} \geq X$$

Where:

UF = silica fume, metakaolin, or UFFA, including the quantity in blended cement, lb/CY.

FA = Class N natural pozzolan, or Class F fly ash including quantity in blended cement, lb/CY.

SL = GGBFS, including the quantity in blended cement, lb/CY.

MC = minimum cementitious content, lb/CY.

X = 1.8 innocuous aggregate, 3.0 for reactive or potentially reactive aggregates.

Or

2. 25 % Class F fly ash by total weight of cementitious Material.

Option 2 mix designs are required for Project quantities in excess of the maximum quantities provided in Table 509.2.7.2:2, "Option 2: Concrete Requirements."

Table 509.2.7.2:2
Option 2: Concrete Requirements

Class	Compressive Strength[A], psi	Slump[B], Inches	Air Content[C], %
A	3,000	4.5" – 5.5"	-
AA	4,000	4.5" – 5.5"	-
F	3,000[D]	0.5 - 2"	-
HES	4,000[F]	-	-
HPD	4,000	4.5" – 5.5"	-
P	3,000[D] and 650[E] flex	0.5 - 2"	-
G	3,000	6-9"	< 3%[G]
Special	The Contract Requirements for the individual Project will address special mix requirements.		

Notes:

1. Min specified strength shall be achieved by 28 days unless otherwise noted.
2. As determined by AASHTO T 119.
3. Project risk zone requirements apply; see Section 509.2.7.4, "Freeze-Thaw Risk Zones."
4. Min specified strength shall be achieved by 14 days.
5. Min specified average flexural strength shall be achieved by 28 days when tested in accordance with AASHTO T 97.
6. Min specified strength shall be achieved in 24 hours, and 75% of the specified strength shall be achieved in five (5) hours, unless otherwise stated in the Contract.
7. Air entraining admixtures are not allowed.

For both Options 1 and 2, Class G concrete shall have the following characteristics:

1. Minimum cementitious content of at least 611 lb;
2. Maximum water/cementitious ratio no greater than 0.44;
3. Combined gradation;
4. Maximum sized aggregate no greater than 0.75 in;
5. Class G mix designs using aggregates with fractured faces shall include a viscosity modifying admixture.
6. Sand/aggregate ratio between 40% and 42% by total aggregate volume;
7. Maximum air content no greater than three percent (3.0%);
8. No air entrainment agent;
9. Slump range of seven (7.0) inches ± one (1.0) inch, except when placing under a drilling fluid;
10. Slump range of eight (8.0) inches ± one (1.0) inch for placement under a drilling fluid; and
11. Adjust admixtures for the job site conditions encountered so that the concrete remains workable and plastic for the two (2) h placement limit.

509.2.7.3 Details for Tables 509.2.7.2:1 & 2, "Concrete Classes for Laboratory Design of Concrete Mixtures"

Tables 509.2.7.2:1 & 2, "Concrete Classes for Laboratory Design of Concrete Mixtures" shall be used for designing concrete mixes. Section 510.3.1.4, "Plastic Properties" shall be used to evaluate concrete delivered to Department Projects.

The Contractor shall use the minimum air content shown below in the Laboratory mix:

1. High Risk Zones: 7.0%
2. Medium Risk Zones: 6.5%
3. Low Risk Zones: 6.0%

All new mix designs shall have a minimum over-design compressive strength of 1,200 psi greater than the specified compressive strength. For Class F and Class P the minimum over-design compressive strength shall be 800 psi greater than the specified design strength unless a lower value is calculated using the greater value from either Equation (1) or Equation (2). Class P over-design flexural strength shall be 15% greater than the specified flexural design strength. For Class P, the minimum average flexural strength for three (3) beams cast in the Laboratory shall be 650 psi at 28 Days, when tested in accordance with AASHTO T 97. Option 1 mix designs shall not be adjust based compressive strength statistical analysis.

For Option 2 mix designs, annually the Supplier shall determine the minimum allowable average compressive strength for approved mix designs with 15 or more compressive strength tests, or for similar mix designs mixing from the same facility with the similar air content and compressive strength, and 15 or more compressive strength tests using one (1) of the following equations. The equation that produces the largest value shall be used to determine the minimum allowable compressive strength.

$$f'_{cr} = f'_c + (1.34 \times k \times s) \quad (1)$$

$$f'_{cr} = f'_c + (2.33 \times k \times s) - 500 \quad (2)$$

Where,

f'_{cr} Minimum Laboratory compressive strength at the specified age.

f'_c Specified compressive strength.

k KK-factor from Table 509.2.7.3:1, "k-Factor for Increasing Standard Deviation," for standard deviation increase if the total number of tests is less than 30, but equal to or greater than 15.

s Standard deviation for the compressive strength tests submitted of the same specified strength.

Table 509.2.7.3:1
k-Factor for Increasing Standard Deviation

Total number of tests	k-Factor
15	1.16
20	1.08
25	1.03
≥30	1.00

The Department will allow linear interpolation for an intermediate number of tests. A mix that was developed from a history of 15 or more test results from the preceding 24 month period is considered an existing mix. A mix developed without historical test results is considered a new mix.

509.2.7.4 Freeze-Thaw Risk Zones

The concrete mixture shall be designed for use in the freeze-thaw zone in which the Project is located. One (1) freeze/thaw cycle is defined as a Day in which the lowest recorded temperature is equal to or less than 25 °F as recorded on the Western Regional Climate Center database. The web address is www.wrcc.dri.edu . The risk levels are defined as follows:

1. **Low-Risk**. The annual average number of freeze/thaw cycles is equal to or less than 30 cycles per year;
2. **Medium-Risk**. The annual average number of freeze/thaw cycles is greater than 30 but less than or equal to 130 cycles per year; and
3. **High-Risk**. The annual average number of freeze/thaw cycles is greater than 130 cycles per year.

Table 509.2.7.4:1, "Statewide Concrete Risk Zones," shall be used to determine the required risk zone.

Table 509.2.7.4:1
Statewide Concrete Risk Zones

District no.	County name	Station name	Concrete risk zone
1	Dona Ana	(County wide)	Low
1	Grant	(County wide)	Low
1	Hidalgo	(County wide)	Low
1	Luna	(County wide)	Low
1	Sierra	(County wide)	Low
1	Socorro	(County wide)	Medium
2	Chaves	(County wide)	Low

Table 509.2.7.4:1
Statewide Concrete Risk Zones

District no.	County name	Station name	Concrete risk zone
2	Curry	(County wide)	Medium
2	De Baca	(County wide)	Medium
2	Eddy	(County wide)	Low
2	Lea	(County wide)	Low
2	Lincoln	(County wide)[a]	Medium
2	Lincoln	Ruidoso	High
2	Otero	(County wide)	Medium
2	Roosevelt	(County wide)	Medium
3	Bernalillo	(County wide)[a]	Medium
3	Bernalillo	Sandia Crest	High
3	Sandoval	(County wide)	Medium
3	Valencia	(County wide)	Medium
4	Colfax	(County wide)	High
4	Guadalupe	(County wide)	Medium
4	Harding	(County wide)	Medium
4	Mora	(County wide)	High
4	Quay	(County wide)	Medium
4	San Miguel	(County wide)	Medium
4	Union	(County wide)	Medium
5	Los Alamos	(County wide)	Medium
5	Rio Arriba	(County wide)	High
5	San Juan	(County wide)	Medium
5	Santa Fe	(County wide)	Medium
5	Taos	(County wide)	High
5	Torrance	(County wide)	Medium
6	Catron	(County wide)	High
6	Cibola	(County wide)	High
6	McKinley	(County wide)[a]	High
6	Sandoval	(County wide)	High

[a]Except as otherwise listed

The minimum allowable air content for mix design submittal purposes is:

1. Six percent (6.0%) for low-risk zones;
2. 6.5% for medium-risk zones; and
3. Seven percent (7.0%) for high-risk zones.

The air content shall be confirmed by the pressure method and the volumetric method in accordance with Section 509.2.7.6, “Mix Design Submittal.”

509.2.7.5 PCC Mixture Development

509.2.7.5.1 Combined Gradation

The combined gradation procedure is required for Class F, Class P and Class HPD, and is optional for all other concrete mixes. The aggregates shall evaluated for concrete mixtures prepared for the combined gradation procedures in accordance with the following:

1. **Coarseness Factor.** Determine the Coarseness Factor in accordance with the following equation:

$$CF = \frac{Q}{Q+I} \times 100 \qquad (3)$$

Where,

CF Coarseness Factor.

Q Weight of the aggregate retained on or above the 3/8-inch sieve.

I Weight of the aggregate passing the 3/8 inch sieve, but retained on the No. 8 sieve

2. **Workability Factor.** The weight of the aggregate passing the No. 8 sieve divided by the weight of the combined gradation, represented as a percent.
3. **Mortar Factor.** The volume of the cement, SCMSCM, water, air, other pozzolans, and aggregate passing the No. 8 sieve divided by the volume of the entire concrete mixture, represented as a percent.
4. **Paste Factor.** The volume of the cement, fly ash, water, air, and other pozzolans divided by the volume of the entire concrete mixture, represented as a percent.

When using the combined gradation protocol, aggregates shall be proportioned using a 0.45 power curve to achieve a dense and uniform gradation. Coarse and fine aggregate gradation requirements do not apply. The suggested targets for the Coarseness and Workability Factors for concrete mixtures designed using combined gradation are provided in Table 509.2.7.5.1:1, “Recommended Workability Factor and Coarseness Factor Targets.”

Table 509.2.7.5.1:1
Recommended Workability Factor and Coarseness Factor Targets

Nominal Maximum Aggregate Size	Workability Factor	Coarseness Factor
3/4 inch	32 - 36	65 - 75
1/2 inch	40–42	10–20

509.2.7.5.2 Concrete Mix Design Requirements

The concrete mix design shall be proportioned and designed to meet the following requirements:

1. All concrete mix design submittals shall include compressive strengths for the following specified ages:
   1.1 3 days;
   1.2 7 days;
   1.3 14 days; and
   1.4 28 days;
2. For concrete classes developed using Option 2, when examined in accordance with

the ASTM C457 linear traverse method, hardened air void system characteristics with the exception of Class G and Class HES, shall meet the following criteria:

2.1 A minimum air content of five percent (5.0%);

2.2 A specific surface greater than 600 inches^{-1}; and

2.3 A spacing factor less than 0.008 inch;

3. Ensure that concrete complies with Section 509.2.3.4, "Alkali-Silica Reactivity," and Section 509.2.3.4.1, "ASR Mitigation Evaluation Criteria," as determined by the State Materials Bureau;
4. For all concrete classes, chloride ion permeability at 28 Days tested in accordance with ASTM C1202 shall meet the following:

   4.1 Less than or equal to 3,000 coulombs for Low-Risk Zones;

   4.2 Less than 2,500 coulombs for Medium-Risk Zones; or

   4.3 Less than 2,000 coulombs for High-Risk Zones;
5. For structural concrete classes developed using Option 2, the durability index shall be determined from at least one (1) prism tested at 28 Days for 300 cycles, in accordance with ASTM C666, Method A. The mix designs shall have a minimum durability index of:

   5.1 80 for Low-Risk Zones;

   5.2 85 for Medium-Risk Zones; and

   5.3 90 for High-Risk Zones;
6. Cure prisms tested for durability index and chloride ion permeability by bathing in lime saturated water at a temperature of 73.3 °F ± 3.0 °F for the first seven (7) Days followed by 21 Days in lime saturated water at a temperature of 100.0 °F ± 3.0 °F; and
7. The maximum shrinkage value for Class P and HPD concrete mixtures is 0.04% at 28 Days when tested with three (3) inch x four (4) inch x 16 inch prism or three (3) inch x three (3) inch x ten (10) inch prism and cured in a standard cure for the first seven (7) Days. Following the seven (7) Day initial cure, cure in a relative humidity of 50% and test in accordance with AASHTO T 160. The results shall be reported in the "comments" field of the mix design submittal form.

509.2.7.6 Mixture Design Submittals

For standard concrete mix designs, complete electronic copy of the NMDOT *Concrete Mix Design Submittal Form* shall be submitted to the Concrete Unit of the State Materials Bureau for review and approval. Special mix designs and mix designs with Project specific shall be submitted to the Project Manager for review and approval by the State Concrete Engineer.

The following information shall be included in the mix design submittal:

1. Mix design Option;
2. Supplier name;
3. Production facility physical address, telephone number and e-mail address;
4. Production facility NRMCA Certification # and expiration date;
5. PTL's name;
6. The New Mexico registration number of the professional Engineer who is responsible for the concrete mixture design Work;
7. A comprehensive Materials list and the properties of each component, including:

7.1. Aggregates:

7.1.1. Source names;

7.1.2. Specific source locations;

7.1.3. For new aggregate sources, a complete ASTM C295 “Petrographic Examination of Aggregates for Concrete” and an ASTM C294, *Constituents of Natural Mineral Aggregates* for both the coarse and fine aggregates after completing processing and manufacturing procedures and the aggregate is ready for use shall be submitted. Include the geologic origin of the Material; perform and certify the analysis using a petrographer previously approved by the Department;

7.1.4. AASHTO T 11 - Soundness loss;

7.1.5. AASHTO T 335 - Percent of Fractured Faces for the coarse aggregate;

7.1.6. Gradations, including AASHTO T 11;

7.1.7. AASHTO T 85 - Bulk saturated surface dry specific gravities;

7.1.8. AASHTO T 96 - Los Angeles wear abrasion;

7.1.9. AASHTO M 6 - Fineness modulus;

7.1.10. AASHTO T 84 - Aggregate absorption;

7.1.11. AASHTO T 152 - Aggregate correction factor;

7.1.12. AASHTO T 176 - Sand equivalent of fine aggregate;

7.1.13. AASHTO T 112 - Clay lumps content; and

7.1.14. AASHTO T 21 - Organic impurity content, including soft fragments, coal and lignite, flat or elongated pieces, and other Deleterious substances;

7.2. Cement:

7.2.1. Supplier name;

7.2.2. Specific source name; and

7.2.3. Specific cement type;

7.3. SCMSCM:

7.3.1. Supplier name;

7.3.2. Specific source name; and

7.3.3. Specific SCM type;

7.4. Blended Cement:

7.4.1. Cement supplier name;

7.4.2. Specific cement source name;

7.4.3. Cement type;

7.4.4. SCM supplier name if different than the cement supplier name;

7.4.5. Specific SCM source name;

7.4.6. Specific SCM type; and

7.4.7. Percent SCM;

8. Concrete mixture proportions; state clearly if submitting request under the combined gradation provisions;

9. Water/cementitious ratios;

10. Type and amount of admixtures; use admixtures on the Department’s *Approved Products List*;

11. Water source and location; include pH, available alkalis, and a full chemical

analysis, if the water source is not a certified NMED public potable water supply;

12. Plastic Concrete Properties:
    12.1. Air temperature;
    12.2. Concrete temperature;
    12.3. Slump; when using super-plasticizer, document the slump before and after addition of the super-plasticizer;
    12.4. Unit weight;
    12.5. Air content measured in accordance with AASHTO T 152 or AASHTO T 121; and
    12.6. When using super-plasticizer, document the measured air content before and after adding the super-plasticizer);
13. Hardened Concrete Properties:
    13.1. New Concrete Mixtures:
        13.1.1. Compressive strength tests (the average of three (3) cylinders tested at three (3) Days, seven (7) Days, 14 Days and 28 Days);
        13.1.2. Type of fracture of each cylinder;
        13.1.3. Flexural strength test results for Class P (average of three (3) beams)
        13.1.4. Durability index (for structural mixes only);
        13.1.5. Hardened air void analysis (for structural mixes only);
        13.1.6. Rapid Chloride Permeability (for structural mixes only); and
        13.1.7. Expansion data from AASHTO T 303 or ASTM C1260 or C1567;
    13.2. Existing Concrete Mixtures:
        13.2.1. Resubmit original mix design, updated aggregate properties, and compressive strength statistical data when available in accordance with Section 509.2.7.6, “Mixture Design Submittals;”
    13.3. Incidental Concrete Mix Designs (Only for specific Projects) are concrete mixes intended for Projects that anticipate less than 150 CY of each concrete class. Incidental Mix Designs shall be proportioned in accordance with the Section and shall be approved based on the following:
        13.3.1. Compressive strength data (field performance data if using the mix within the previous 24 months, or Laboratory mix performance data not using it in the field); and
        13.3.2. Air content, as measured by the pressure method or the volumetric method; when using superplasticizer, show the air content before and after adding superplasticizer.

509.2.7.7 Mixture Design Approval

The Department will require 14 Days to review the submittal packages after receipt by the State Materials Bureau of all required information.

The Department will approve Option 1 mix designs for a period of one (1) year from the date of issuance upon verification of compliance with all requirements. Option 1 designs are required to be fully renewed each year prior to use on NMDOT Projects, or may be resubmitted under Option 2 with the additional testing required for Option 2.

The Department will approve Option 2 mix designs for a period of one (1) year from the date of issuance upon verification of compliance with all requirements. A minimum of 30 Days

before the one (1) year approval expires, the Supplier may request that the mix design be reissued. The Supplier shall provide test reports showing that the mix design met specification requirements during the issue period. Option 2 mix designs may be re-approved for no more than four (4) additional years.

At the discretion of the State Concrete Engineer, a mixture can be adjusted without re-batching by using “cement efficiency” calculations to determine the amount of change to the cement and the total cementitious content that is necessary to achieve the desired level of performance. When this procedure is allowed, the ratio of SCM to cement ratio will remain unchanged, the water content will remain unchanged, and the aggregates will be adjusted without changing the overall gradation to accommodate the changes in volume from changes made to the cement. All changes made by this method shall be approved by the State Concrete Engineer before being implemented in the field.

The approved mix design’s constituent Materials shall not be changed without the State Concrete Engineer’s written approval. The approved mix design’s constituent Materials shall not be changed without the State Concrete Engineer’s written approval.

509.2.7.8 Suspension and Revocation of Mix Design Approval

Mix design approval may be suspended by the State Concrete Engineer at any time during the approval period for any of the following reasons:

1. Unauthorized changes to the constituent Materials or proportions;
2. Conditions of the Supplier’s Equipment or Quality Control adversely affects the strength or other properties of the concrete;
3. Drop in the statistical averages of the concrete below the minimums required for Acceptance in accordance with Section 510.3.5, “Acceptance;” and
4. Test cores indicate the mix is not performing as designed or is not meeting the specified design strength as determined in accordance with Section 510.3.5.4.1, “Testing Cores.”

If a mix design approval is suspended or revoked, it shall not be Accepted for use on any Department construction Project.

In the event that a mix design approval is suspended for reasons 1 or 2, all of the Supplier’s mix designs approvals may be suspended until such time that is demonstrated that the root cause for the suspension has been corrected.

The State Concrete Engineer will only consider a request to reinstate an approval after the Contractor has submitted and implemented a comprehensive “Corrective Action Plan” to address and correct the reason(s) for the suspension.

If the “Corrective Action Plan” fails to adequately address and correct the reason(s) for the suspension, the approval may be permanently revoked by the State Concrete Engineer. The mix design will then be required to be resubmitted in its entirety as a new mix design with updated comprehensive testing.

509.3 CONSTRUCTION REQUIREMENTS

Concrete or concrete items shall be constructed in accordance with the section of these Standard Specifications for which the concrete is used.

509.4 METHOD OF MEASUREMENT

The Department will measure concrete or concrete items in accordance with the section of these Standard Specifications for which the concrete is used.

509.5 BASIS OF PAYMENT

The Department will pay for concrete or concrete items in accordance with the section of these Standard Specifications for which the concrete is used.

SECTION 603

RIPRAP SURFACE TREATMENT

603.1 GENERAL

The construction of riprap surface treatment shall consist of furnishing and placing stone, with or without grout, with or without wire mesh, or sacked concrete riprap. The depth and type of riprap shall be as shown on the construction plans.

603.2 REFERENCES

603.2.1 ASTM
C 143

603.2.2 This publication:
SECTION 101
SECTION 109

603.3 MATERIAL

603.3.1 Riprap stone shall be as specified in Section 109 of these specifications.

603.3.2 Other materials necessary for completion of various types of Riprap Surface Treatments shall be as specified in the following subsections.

603.4 PREPARATION OF GROUND SURFACES

603.4.1 The bed for the riprap shall be shaped and trimmed to provide even surfaces. A footing trench shall be excavated along the toe of the slope as shown on the plans.

603.4.2 Specified filter cloth shall be placed on earth bed prior to placement of stone.

603.4.3 Earth surface shall be shaped and trimmed to conform to the construction plans prior to the placement and compaction of the gravel type of filter material.

603.5 PLACING RIPRAP STONE

603.5.1 When the required riprap is less than 20 inches in depth, stone shall be placed by hand unless otherwise authorized by the ENGINEER. Stone shall be placed to provide a minimum of voids. The larger stone shall be placed in the toe return, foundation course, and on the outer surface of the riprap. Stones shall be placed with their longitudinal axis normal to the face of the embankment and so arranged that each rock above the foundation course has at least a 3 point bearing on the underlying stones. Bearing on smaller stones used to chink voids will not be acceptable. Interstices between stones shall be chinked with small stones and spalls. The finished surface shall be even and tight and shall not vary from the planned surface by more than 3 inches per foot of depth. When the required riprap is 20 inches or more in depth, the stone may be placed by dumping and spread in layers by bull-dozers or other suitable equipment.

603.5.2 Riprap shall be placed to its full design thickness (depth) in one operation.

603.6 GROUTED RIPRAP

603.6.1 Riprap shall be placed as specified and grouted with Portland cement mortar. The grout shall consist of one part cement and 3 parts by volume of aggregate. The Portland cement shall be Type I or Type II as specified in Section 101 and the aggregate shall be 2 parts sand and 1 part gravel passing a 3/8 inch square mesh screen. The amount of water shall be such as to permit gravity flow into the interstices with limited spading and brooming. The consistency of the grout shall be as approved by the ENGINEER.

603.6.2 Except when hand mixing is permitted by the ENGINEER, grout shall be mixed in an approved machine mixer for not less than 1 1/2 minutes. Should hand mixing be permitted, the cement and aggregate shall be thoroughly mixed in a clean, tight mortar box until the mixture is of uniform color after which clean water shall be added in such quantity as to provide a grout of the specified consistency.

603.7 SACKED CONCRETE RIPRAP

603.7.1 The Portland cement, aggregates, and mixing shall be as specified in Section 101 and as herein specified. The aggregate may be pit-run material, at least 80 percent of which shall pass a 1 1/2 inch square mesh screen. Separating aggregates by primary sizes will not be required. Los Angeles abrasion tests and soundness tests will not be required.

603.7.2 The mixed concrete shall contain 376 pounds (4 sacks) of Portland cement per cubic yard.

603.7.3 The amount of water shall be such as to produce a mixture with a slump of 3 to 5 inches when tested in accordance with ASTM C 143.

603.7.4 Sacks shall be made of at least 10 ounce burlap and shall be approximately 19 1/2 inches by 36 inches measured inside the seams when the sack is laid flat.

603.7.5 Slopes on which the sacked concrete riprap is to be placed shall be finished within 0.2 foot of the designated grades. The first course shall be a double row of stretchers laid in a neatly trimmed trench. The second course shall be a single row of headers. The third and remaining courses shall be stretchers or headers as shown on the plans and shall be placed so that joints between courses are staggered. Dirt and debris shall be removed from the tops of sacks before the next course is laid thereon. Headers shall be placed with the folds upward. Not more than 4 vertical courses shall be placed in any tier until the initial set has taken place in the first course of any such tier.

603.7.6 When, in the opinion of the ENGINEER, there will not be proper bearing or bond due to delays in placing succeeding layers or the hampering of work by storm, mud, or for any cause, a small trench shall be excavated back of the row of sacks already in place and this trench filled with fresh concrete before more sacks are placed. Payment for the concrete in the trenches shall be at the price per cubic yard for sacked concrete riprap. Payment for excavating the trenches shall be considered as included in the payment for the concrete in the trench.

603.7.7 Sacked concrete riprap shall be cured by sprinkling with a fine spray of water every 2 hours during daylight for not less than 3 days.

603.8 WIRE ENCLOSED RIPRAP

603.8.1 Wire enclosed riprap shall consist of a layer of rock of the required thickness enclosed on all sides in wire fabric in conformity with the details shown on the plans. The wire fabric shall be drawn tightly against the rock on all sides and tied with galvanized wire of the required gauge. The ties shall be spaced approximately 2 feet on centers and shall be anchored to the bottom layer of wire fabric, extended through the rock layer, and tied securely to the top layer of wire fabric. When indicated on the plans, wire enclosed riprap shall be anchored to the slopes by steel stakes driven through the riprap into the embankment. Stakes shall be spaced as shown on the plans. Wire fabric used for riprap shall conform to the mesh, gauge, and weight shown on the plans. Tie wire shall be galvanized and of the gauge shown on the plans. Wire fabric shall be furnished in such lengths and widths as to reduce the number of splices to a minimum.

603.8.2 Steel stakes shall be cut to the required length from steel railroad rails, galvanized steel pipe, or steel angles of the dimension and weight shown on the construction plans.

603.9 FILTER CLOTH

603.9.1 MATERIAL: The filter cloth shall be a non-woven polyester geotextile, such as: Mirafi No. 140N drainage Fabric, Mirafi Inc., Charolette, North Carolina, or approved equal.

603.9.2 INSTALLATION: The surface to receive the cloth shall be prepared to a relatively smooth condition free of obstructions, depressions, and debris. The cloth shall not be laid in a stretched condition but shall be laid loosely with a long dimension perpendicular to the channel centerline. The cloth shall be placed so the upstream edge overlaps the downstream dege a minimum of 12 inches, with securing pins inserted through both layers at no greater than two-foot intervals. Cloth damaged or displaced before or during installation or placement of the overlaying riprap shall be replaced or repaired to the satisfaction of the ENGINEER at the CONTRACTOR'S expense.

603.10 GRAVEL TYPE OF FILTER MATERIAL

603.10.1 MATERIAL: Filter material shall be comprised of sand, gravel, and cobble in mixes as specified on the plans. Alternate materials such as milled Portland cement concrete, concrete wash, or reclaimed material may be substituted with the ENGINEER'S approval.

603.10.2 INSTALLATION: Filter material shall be used as a subbase for riprap as shown on the plans. The minimum depth of filter material shall be one foot unless the plans provide an alternate detail for filter blanket construction.

603.11 MEASUREMENT AND PAYMENT

603.11.1 Riprap, such as: plain stone, grouted, wire enclosed, or sacked concrete, shall be measured by the cubic yards placed to the lines and grades shown on the construction plans. Payment for riprap will be made at the unit price per cubic yard for the type of riprap as specified in the Bid Proposal and shall include materials, labor, and equipment necessary to complete the work.

603.11.2 Filter cloth shall be measured by the square foot and overlaps shall be measured as a

single layer of cloth. Payment shall be made at the unit price per square foot as per Bid Proposal, and shall include shipping, handling, storage, seams, special fabrication, securing pins, and/or installation.

603.11.3 Gravel type filter material shall be measured by the cubic yard of material in place, in accordance with the construction plans. Payment will be made at the unit price per cubic yard as per Bid Proposal and shall include all materials, labor, and equipment necessary for the installation of the material.

SECTION 607: FENCE

607.1 DESCRIPTION

This Work consists of constructing fence and gates.

607.2 MATERIALS

607.2.1 Certification

The Contractor shall submit independent testing Laboratory certification to the Project Manager that indicates the fencing Materials meet these Specifications. The Department may inspect the manufacturing methods at manufacturing plants and may obtain Material samples for testing and may base Acceptance on the quality of manufacturing lots.

607.2.2 Barbed Wire and Woven Wire Fence

607.2.2.1 Wire

The Contractor shall provide wire and wire components with at least a Class 1 zinc coating in accordance with ASTM A 121 or ASTM A 116, unless otherwise specified in the Contract. Instead of Class 1 coating, the Contractor may coat the wire with aluminum alloy covering at least 0.3 oz per square foot of wire surface.

607.2.2.1.1 Barbed Wire

The Contractor shall provide barbed wire and barbs in accordance with ASTM A 121. The Contractor shall provide composite barbed wire strands that consist of two (2) coated wires with diameters of 0.099 inch. The Contractor shall provide round barbs that have a coated diameter of 0.08 inch, with either two (2)-point barbs spaced four (4) inches apart or four (4)-point barbs spaced five (5) inches apart. The Contractor shall provide stays for barbed wire fences in accordance with ASTM A 116, with a coated diameter of at least 0.142 inch and with lengths and spacing in accordance with the Contract.

607.2.2.1.2 Woven Wire

The Contractor shall provide woven wire in accordance with ASTM A 116, Design Number 832-6-11, unless otherwise specified in the Contract.

607.2.2.1.3 Post Fasteners

The Contractor shall provide coated staples with a diameter of at least 0.148 inch and a length of at least 1 1/2 inch; use for fastening fence wire to wood posts.

607.2.2.1.4 Brace Wire

The Contractor shall provide coated brace wire with a diameter of at least 0.148 inch; use for constructing braces and intermediate braces with wood posts.

607.2.2.1.5 Tie Wire

The Contractor shall provide coated tie wire for fastening barbed or woven wire to steel posts with a diameter of at least 0.099 inch. The Contractor may use wire fasteners or metal clamps with thicknesses of 0.12 inch or greater instead of tie wires, if approved by the Project Manager.

607.2.2.2 Posts

The Contractor shall provide metal or wood corner, brace, intermediate brace gate, and line posts of the specified type, size, and length in accordance with the Contract. The Contractor shall permanently cap all vertical metal pipes on fence and gate supports. The Contractor shall ensure that the top coating and color of the pipe is maintained.

607.2.2.2.1 Metal Posts

The Contractor shall provide metal posts and braces of rail, billet, or commercial-grade steel in accordance with ASTM A 702 or ASTM F 1083 for galvanized, standard weight pipe. The Contractor shall provide C-section posts in accordance with ASTM A 1011.

The Contractor shall galvanize steel posts in accordance with AASHTO M 181 for Grade 1 steel and provide a top coating specified for Grade 2 steel, or an equivalent or better coating, from the Department's *Approved Products List.* The Contractor shall coat edges and damaged areas of posts in accordance with ASTM A 780. The Contractor shall use posts of the same coating and color.

The Contractor shall provide posts that weigh no less than 95% of the specified weight; and are of the specified length + two (2) inch, - one (1) inch.

The Contractor shall provide line posts with a minimum weight of 1.33 lb per foot, not including anchor plates. The Contractor may provide I-beam, T-beam, U-beam, Y-bar, or C-section line posts. The Contractor shall provide line posts with corrugations, lugs, ribs, or notches spaced one (1) inch on centers to attach fence wire. The Department will not Accept posts with punched tabs used for crimping around the wire.

The Contractor shall provide anchor plates with an area of at least 18 $inch^2$ and that weigh at least 0.67 lb. The Contractor shall clamp, weld, or rivet anchor plates to the post section to prevent displacement when driving the posts.

607.2.2.2.2 Wood Posts

The Contractor shall provide wood posts cut from live southern yellow pine, lodge pole pine, or ponderosa pine trees. The Contractor shall provide straight posts that are free of decay and other defects, bark-free, trimmed smooth of knots and projections, and with both ends sawed off perpendicular to the centerline.

The Contractor shall provide an average nominal diameter at the top of each post of at least six (6) inches. The Contractor shall ensure the circumference of corner, brace, intermediate brace, and gate posts is at least 19 inches, measured six (6) inches below the top of the post.

The Contractor may provide line posts with a slight crook in one (1) direction, but the post may not vary more than 1 1/2 inch from a straight line connecting both ends of the post. The Contractor shall ensure the average nominal diameter of the top of each line post is at least three (3) inches. The Contractor shall ensure the circumference of line posts is at least nine (9) inches, measured six (6) inches below the top of the post.

The Contractor shall provide coast region douglas fir or New Mexico red spruce or fir braces for wood posts.

607.2.2.2.2.1 Preservative Treatment of Wood Posts

The Contractor shall provide wood posts pressure treated with pentachlorophenol in accordance with Section 550.2.2, “Preservatives and Treatment Methods,” treated according to AASHTO M-133, all in accordance with AWPA Standard U1 and Commodity Standard B: Posts and AWPA Standards P8 and P9.

607.2.2.3 Gates

The Contractor shall provide two (2)-inch 16-gauge tubular gates meeting the requirements of ASTM A513 with a wall thickness of .065 inches and a tolerance of plus (+0.003) or minus (-0.011) unless otherwise specified in the Contract.

Gates shall be coated in accordance with Section 607.2.2.2.1, “Metal Posts,” or coat in accordance with Section 545, “Protective Coating for Miscellaneous Structural Steel.” The Contractor shall use “Interstate Green” as the finished color coating, except for galvanized gates and unless otherwise shown in the Contract.

607.2.2.4 Fittings

The Contractor shall provide fittings, hardware, and appurtenances for fences and gates that are of commercial-quality steel, malleable iron, or wrought iron, and galvanized in accordance with ASTM A 153.

607.2.3 Chain Link Fence

607.2.3.1 Posts

The Contractor shall provide posts that are tubular steel, H-column, or C-section (for line posts). The Contractor shall provide either Grade 1 or Grade 2 steel posts in accordance with AASHTO M 181. The Contractor shall provide Grade 1 tubular posts, braces, and top rails in accordance with ASTM F 1083 for galvanized, standard weight pipe. The Contractor shall provide Grade 2 steel posts in accordance with ASTM A 1011 or ASTM A 653.

The Contractor shall provide C-section line posts in accordance with ASTM A 1011. The Contractor shall provide H-column posts in accordance with ASTM A 36.

The Contractor shall provide pipe with minimum wall thickness as specified in the Contract. The Contractor shall ensure that the product of the yield strength and section modulus of the pipe is in accordance with ASTM F 1083.

The Contractor shall provide posts that securely hold tension wires in position without vertical movement.

607.2.3.2 Fittings

The Contractor shall provide fittings in accordance with Section 607.2.2.4, “Fittings.”

The Contractor shall provide stainless steel straps and seals in accordance with ASTM A 176.

The Contractor shall provide coated tension wires that are galvanized coil spring steel wire of commercial quality with a diameter of 0.148 inch. The Contractor shall provide galvanized ferrules for tension take-up in accordance with ASTM A 1011.

The Contractor shall provide pull cable and tension truss rods with diameters of at least

3/8 inch, with drop forged turnbuckles or other approved tension devices.

The Contractor shall provide pull cable and tension wires with a minimum zinc coating of 0.8 oz per square foot of uncoated individual wire surface, tested in accordance with ASTM A 90.

The Project Manager will determine the uniformity of the coating by visual inspection. The Project Manager may reject coating with excessive roughness, blisters, discoloration spots, bruises, and flaking. The Department may make other inspections and tests at the manufacture's plant, before shipment.

607.2.3.3 Tie Wires and Fasteners

The Contractor shall provide galvanized, coated tie wires for fastening chain link fabric to posts and rails with a diameter of at least 0.148 inch. The Contractor may provide galvanized steel or non-corrosive metal bands or fasteners instead of tie wires, as recommended by the manufacturer.

607.2.3.4 Compression Braces

The Contractor shall provide compression braces that meet the same requirements as top rails in accordance with Section 607.2.3.1, "Posts."

607.2.3.5 Chain Link Fabric

The Contractor shall provide chain link fabric in accordance with AASHTO M 181, with a Class C coating or better. The Contractor shall provide chain link fabric full height. The Contractor shall provide galvanized, coated wire with a diameter of 0.148 inch. The Contractor shall provide two (2) inch mesh fabric. The Contractor shall measure the mesh size as the distance between the wires forming parallel sides of the mesh.

607.2.3.6 Gates

The Contractor shall provide double drive, single drive, or single walk gates. The Contractor shall provide galvanized steel pipe gate frames in accordance with ASTM F 1083 and ASTM A 123.

607.2.3.7 Vinyl-Coated Chain Link Fence

The Contractor shall provide vinyl-coated chain link fences in accordance with Section 607.2.3, "Chain Link Fence," except as modified in this subsection.

If providing PVC coated chain link fabric, the Contractor shall use vinyl-coated fabric, posts, and hardware in accordance with AASHTO M 181 for Class A PVC coating. The Contractor shall continuously bond the vinyl coating (do not spray or dip) over the galvanized steel wire by the extrusion bonding process under pressure.

The Contractor shall ensure the vinyl coating resists damage from prolonged exposure to dilute solutions of common mineral acids, sea water, and dilute solutions of salts and alkali.

The Contractor shall galvanize using the electrolytic process before coating with PVC.

The Contractor shall provide wire that was vinyl-coated before weaving and is free and flexible at the joints.

607.2.4 Post and Cable Access Fence

607.2.4.1 Cable

The Contractor shall provide wire cable in accordance with AASHTO M 30. The Contractor shall provide cable of Type I, Class A, 0.75 in diameter rope, unless otherwise specified in the Contract.

607.2.4.2 Hardware and Fittings

The Contractor shall provide galvanized or cadmium plated parts, hardware, and fittings. The Contractor shall galvanize in accordance with AASHTO M 232. The Contractor shall provide cadmium plating in accordance with ASTM B 766, for Class 12, Type III. The Contractor shall provide bolts in accordance with ASTM A 307 and nuts in accordance with ASTM A 563.

The Contractor shall provide externally threaded fittings such as end tie rods, anchor rods, and splicing rods that transmit direct tensile stress, having a minimum tensile strength of 75,000 psi.

The Contractor shall provide internally threaded fittings such as turnbuckles, cable sockets, and nuts capable of withstanding a proof load that is 85% of the proof load requirements for nuts, as specified in accordance with ASTM A 563, Table 3.

The Contractor shall provide cable splices and connections that withstand a proof load equal to the tensile strength required of the attached wire rope cable.

The Contractor shall provide steel rectangular plate washers and cable clamps with a minimum tensile strength of 60,000 psi. The Contractor shall provide plain washers of ferrous metal in accordance with ANSI B 18.22.1, Type A.

607.2.4.3 Wood Posts

The Contractor shall provide wood posts from one (1) of the following species:

1. Northern White Cedar;
2. White Pine;
3. Jack Pine;
4. Red (Norway) Pine;
5. Southern Yellow Pine; or
6. Ponderosa Pine.

The Contractor shall provide posts from live trees that are stacked and properly seasoned. The Contractor shall peel the entire length of each post, closely trim knots, saw both ends square, and shave the entire length of the post to the white.

The Contractor shall provide posts with a top diameter after shaving of four (4) inches; -1/2 inch, +1 1/4 inch.

The Contractor shall ensure posts are free of sap rot, woodpecker holes, plugged holes, ant-eaten areas, and hollow knots extending to center of the post. The Contractor shall not allow butt rot to exceed five percent (5%) of the butt area. The Contractor shall provide posts with sound tops, however, the Department will allow one (1) pipe rot not exceeding a diameter of 3/8 inch on a cedar post. The Contractor shall provide posts that do not have excessive

checking. The Contractor shall ensure that the posts do not have short kinks or more than one (1) one-way sweep exceeding two (2) inches, however, the post may have a winding twist.

The Department will not allow posts exhibiting both the maximum crook and maximum butt rot, and will not allow more than ten percent (10%) of the posts specified in the Contract to contain the maximum crook or butt rot.

The Department may reject posts with other defects that give the post an unsightly appearance or impair its durability or strength. The Contractor shall complete debarking, trimming, and sizing operations before treatment.

607.2.4.4 Preservative Treatment of Posts for Post and Cable Barrier

The Contractor shall provide pressure treated wood posts with pentachlorophenol in accordance with Section 550.2.2, “Preservatives and Treatment Methods,” treated according to AASHTO M-133, in all accordance with AWPA Standard U1 and Commodity Standard B: Posts and AWPA Standards P8 and P9.

607.2.5 Snow Fence

The Contractor shall provide snow fence of 1/2 inch × 1 1/2 inch wooden pickets spaced 3 1/2 inch on center and woven between five (5) cables. Each cable will consist of at least two (2) strands of galvanized steel wire with diameters of 0.099 in or larger.

The Contractor shall provide wooden pickets that are at least 48 inches long and treated or painted in accordance with the manufacturer’s recommendations.

The Contractor shall provide wire, braces, attachments, and fittings in accordance with ASTM A 116 and applicable requirements of Section 607.2.2, “Barbed Wire and Woven Wire Fence.”

607.2.6 Concrete

The Contractor shall provide Class A concrete bearing blocks and anchors in accordance with Section 510, “Portland Cement Concrete.” The Contractor may provide a prepackaged, pre-blended cementitious Material to which the Contractor only adds water at the site.

607.3 CONSTRUCTION REQUIREMENTS

607.3.1 General

The Contractor shall clear the fence lines of trees, bush, stumps, logs, weeds, existing fences, and other obstructions that may interfere with fence construction, unless the Project Manager requires certain trees to remain in place. The Contractor shall dispose of removed Material in accordance with Section 601, “Removal of Structures and Obstructions.”

If the Contractor is to embed posts, braces, or anchors in concrete, the Contractor shall install temporary guys or bracing to hold the posts in position until the concrete sets. Unless otherwise specified, the Contractor shall not install Materials on posts and do not strain posts, braces, or anchors set in concrete until seven (7) Days after concrete placement, or until the concrete has reached a compressive strength of 2,500 psi, whichever occurs first. The Contractor shall crown the concrete at the top of the foundation to shed water.

The Contractor shall only cut the tops of posts as approved by the Project Manager. The

Contractor shall apply protective coating to cut posts in accordance with Section 607.3.8, “Repair of Damaged Coating on Pull Cables and Tension Wires.”

The Contractor shall firmly attach wire and fencing to the posts and braces. The Contractor shall tightly stretch wire and install it at the required elevations. The Contractor shall place fence wire on the field side of the posts, except on the inside of curves.

At each location where an electric transmission, distribution, or secondary line crosses new fence, the Contractor shall provide and install a ground connection in accordance with the NEC®.

The Contractor shall build new fences adjacent to existing fence before removing existing fences. When removing and rebuilding fences, the Contractor shall maintain the security of livestock and protect adjacent properties and the traveling public. The Contractor shall remove the existing fence or unused Materials and neatly roll it up in single strand rolls. The Contractor shall remove the fence posts without damaging them and place the posts with the rolls of wire within the Right of Way for property owners to salvage, unless otherwise directed by the Project Manager. If the property owners do not pick the fence up within the allotted time, the Contractor shall dispose of the fence as directed by the Project Manager.

607.3.2 Barbed Wire and Woven Wire Fence

The Contractor shall set posts plumb and in accordance with the Plans. The Contractor may drive metal line posts. The Contractor shall excavate for footings and anchors in accordance with the Plans or as directed by the Project Manager. The Contractor shall place post hole backfill in thin layers and compact each layer.

The Contractor shall attach Right of Way fences to Roadway Structures, in accordance with the Plans.

607.3.2.1 Fence Tensioning

The Contractor shall stretch fence wire with a mechanical stretcher or other similar device. The Contractor shall not allow the length between pull posts to exceed 990 ft for barbed wire, and 660 ft for woven wire.

607.3.2.2 Braces and Corner Posts

The Contractor shall place intermediate braces at intervals of 990 ft or less and at every fence grade-change, such as edges of arroyos, bottoms and tops of hills, and as directed by the Project Manager. The Contractor shall maintain the required distance between the bottom wire and the ground. The Contractor shall space intermediate braces evenly between corner and gateposts or cattle guards. The Contractor shall place a corner post and brace at the intersection of cross fences and the Right of Way fence. The Contractor shall stretch the wires and firmly attach them to the corner posts.

607.3.3 Chain Link Fence

The Contractor shall install braces, tension rods, cables, hardware, and appurtenances in accordance with the manufacturer’s recommendations and the Contract.

The Contractor shall not attach chain link fabric to posts until the concrete footings have reached a compressive strength of 2,500 psi, or until three (3) Days after concrete placement, whichever occurs first.

After permanently positioning posts, setting anchorages firmly, and drawing tension wires and pull cables tight with turnbuckles or other approved tension devices, the Contractor shall secure the tension wires to the posts with tension bands and tie wires. The Contractor shall secure the chain link fabric at one end and stretch away from the secured end. The Contractor shall stretch the fabric with a mechanical stretcher or other device approved by the Project Manager.

607.3.3.1 Chain Link Fence Post Placement

The Contractor shall set posts plumb in concrete footings. The Contractor shall space chain link fence posts at intervals of ten (10) feet or less. The Contractor shall measure the intervals from center to center of posts. Pull posts are line posts braced to adjacent line posts. The Contractor shall position pull posts at intervals of 500 ft or less. The Contractor shall provide end posts with an outside diameter of at least 2.875 inch. The Contractor shall brace end posts in the same way as corner posts.

607.3.3.2 Chain Link Security Fence

The Contractor shall use chain link security fence in accordance with Section 607.3.3, “Chain Link Fence.” The Contractor shall supply security appurtenances on gates for access.

607.3.4 Post and Cable Access Fence

607.3.4.1 Post Placement

The Department will allow a depth of post embedment that is greater than specified in the Contract if the finished top of the post meets the required elevation. The Contractor shall compact the bottom of the holes to provide a stable foundation. The Contractor shall set the posts plumb with the front faces in a neat uniform line and with full contact on the foundation surface. The Contractor shall backfill holes with granular Material and compact in layers so the posts maintain the specified position and alignment.

Instead of setting posts in previously dug holes and backfilling, the Contractor may drive the posts, except if the Contract specifies bearing blocks. The Contractor shall only drive if there is adequate lateral stability and as long as the Shoulders and adjacent slopes are not damaged from the driving operations.

The Contractor shall remove posts that do not meet the requirements or are damaged below cutoff during driving, and replace with sound posts. If upward vertical adjustment of posts is necessary, the Contractor shall remove and reinstall them.

The Contractor may cut off the tops of posts to the elevation specified in the Contract. The Contractor shall round the tops of round posts to an approximate domed hemispherical shape centered on the axis of the post. After cutting off treated posts, the Contractor shall apply two (2) coats of pentachlorophenol preservative to the cut surfaces.

607.3.4.2 Setting of Anchors, Cable, and Fittings for Post and Cable Access Fence

If a bolt projects more than one (1) inch from the nut, the Contractor shall cut off 1/2 inch and burr. The Contractor shall paint the ends of cut-off bolts with aluminum paint. The Contractor shall bore holes for cable supports after the posts are set. The Contractor shall place end and intermediate anchorages and bearing blocks in accordance with the Contract.

The Contractor shall excavate trenches for anchor blocks to their neat lines. The Contractor shall perform excavation for anchor rod installation without excessively disturbing

the earth between the block and the anchored posts. The Contractor shall excavate holes for bearing blocks to their neat lines, then place and level the block with anchor rods in place on undisturbed soil. The Contractor shall place backfill Material and compact in layers. The Contractor shall not apply final tension to the anchor assembly until after completing the backfilling.

After completing the anchor assemblies, the Contractor shall properly adjust and securely fasten the cables, draw the cables tight, then loosen them to meet Contract requirements for the applicable temperature range.

The Contractor shall use three (3) inch wide reflective sheeting in accordance with Section 701.2.2.1, “Retroreflective Sheeting,” Silver White No. 2. The Contractor shall mount the sheeting on flexible aluminum alloy. The Contractor shall fix the sheeting to each end post and at maximum intervals of 100 ft on intermediate posts, with a minimum of three (3) strips per installation. The Contractor shall completely wrap the reflective strips around each post before installing the post plate washers.

607.3.5 Snow Fence

The Contractor shall construct snow fence in accordance with the manufacturer’s recommendations and the Contract.

607.3.6 Pedestrian/Bicycle Railing

The Contractor shall construct pedestrian and bicycle railing in accordance with the Contract or as directed by the Project Manager.

607.3.7 Removing and Rebuilding Fence

The Contractor shall remove and rebuild existing fences in accordance with the Contract or as directed by the Project Manager. The Contractor shall construct new fences in the same or better condition than the original fence.

The Contractor shall salvage Materials from removed fences and incorporate into the rebuilt fences. If the Project Manager determines that some Materials are not reusable, the Contractor shall replace those Materials as necessary and in accordance with Section 109.5, “Payment for Changes, Differing Site Conditions, and Extra Work.”

The Contractor shall firmly reset posts to the staked alignment. The Contractor shall use the same spacing of the posts and the same number of wires strung and stapled to the posts as the original fence. The Contractor shall use new staples to fasten the wires to the posts.

607.3.8 Repair of Damaged Coating on Pull Cables and Tension Wires

The Contractor may repair pull cables and tension wires that exhibit minor damage to the zinc coating by wire-brushing the damaged area and removing loose, cracked, or weld-burned zinc coating. The Contractor shall paint the cleaned area with two (2) coats of zinc oxide-zinc dust paint in accordance with Federal Specification TT-P-641 or Military Specification MIL-P-21035 or with an equivalent coating approved by the Project Manager. The Contractor shall make repairs and provide repair Materials at no additional cost to the Department.

607.3.9 Gates

The Contractor shall fabricate and construct gates, and stile and post wire traps in accordance with the Contract.

607.3.9.1 Remove and Reset Gate

The Contractor shall remove and reset existing gates in accordance with the Contract or as directed by the Project Manager.

607.4 METHOD OF MEASUREMENT

The Department will measure fences and watergap gates along the top from outside to outside of end posts for each continuous run of fence or watergap gate.

607.5 BASIS OF PAYMENT

Pay Item	Pay Unit
Barbed Wire Fence ___ft	Linear Foot
Game Fence ___ft	Linear Foot
Woven Wire Fence ___ft	Linear Foot
Chain Link Fence ___ft	Linear Foot
Chain Link Security Fence ___ft	Linear Foot
Vinyl-Coated Chain Link Fence ___ft	Linear Foot
Snow Fence ___ft	Linear Foot
Pedestrian/Bicycle Railing ___ft	Linear Foot
Pedestrian Screening Fence Type ____ft	Linear Foot
Post and Cable Access Fence ___ft	Linear Foot
Remove and Rebuild (type) Fence	Linear Foot
Standard Gate ___ft	Each
Barbed Wire Gate, ___ft	Each
Chain Link Gate, ___ft Span	*Each*
Chain Link Gate, ___ft Span by ___ft Rise	*Each*
Pipe Gate ___ft	Each
Water Gap Gate	Linear Foot
Turnstile Gate ___ft	Each
Remove and Reset Gate	Each
Stile and Post Wire Trap	Each
Braces/Corner Posts	Each

607.5.1 Work Included in Payment

The following Work and items will be considered as included in the payment for the main item(s) and will not be measured or paid for separately:

1. Clearing and grubbing,
2. Grading,
3. Excavation,
4. Backfill,
5. Disposal of surplus Material,
6. Concrete, fasteners,

7. Galvanizing,
8. Coating repairs; and
9. All additional bracing required for grade changes.

SECTION 623: DROP INLETS

623.1 DESCRIPTION

This Work consists of providing and installing drop inlets and junction boxes, and adjusting existing drop inlets.

623.2 MATERIALS

The Contractor shall provide Class A concrete in accordance with Section 510, "Portland Cement Concrete." The Contractor shall provide reinforcing steel in accordance with Section 540, "Steel Reinforcement." The Contractor shall provide Structural Steel in accordance with Section 541, "Steel Structures."

The Contractor shall provide coatings for Structural Steel in accordance with Section 545, "Protective Coating of Miscellaneous Structural Steel."

The Contractor shall provide preformed expansion joint filler in accordance with AASHTO M 213.

The Contractor shall provide precast units in accordance with Section 517, "Precast Concrete Structures."

623.3 CONSTRUCTION REQUIREMENTS

The Contractor shall construct drop inlets in accordance with Section 511, "Concrete Structures;" Section 540, "Steel Reinforcement;" and Section 541, "Steel Structures."

The Contractor shall precast the drop inlets and junction boxes or cast in place.

The Contractor shall raise the existing drop inlets by removing and reconstructing the top six (6) inches of the existing Structure. The Contractor shall reuse the existing grate, but provide a new frame.

623.3.1 Foundation Requirements

The Contractor shall compact the foundations of drop inlets and junction boxes to at least 95% of maximum density as determined by AASHTO T 180 (Modified Proctor), Method D (TTCP Modified), in accordance with Section 207, "Subgrade Preparation."

The Contractor shall replace unstable Material with structurally adequate Material before constructing new foundations.

623.3.2 Backfilling

The Contractor shall backfill in accordance with Section 206, "Excavation and Backfill for Culverts and Minor Structures."

623.3.3 Coating of Structural Steel

The Contractor shall coat Structural Steel for drop inlets in accordance with Section 545, "Protective Coating of Miscellaneous Structural Steel."

623.4 METHOD OF MEASUREMENT

The Department will measure reinforcing steel, concrete, and Structural Steel for drop inlet extensions in accordance with Section 540, “Steel Reinforcement,” Section 511, “Concrete Structures,” and Section 541, “Steel Structures,” respectively.

623.5 BASIS OF PAYMENT

Pay Item	Pay Unit
Median Drop Inlet, Type I, ___ to ___ ft	Each
Median Drop Inlet, Type ___	Each
Modified Median Drop Inlet, Type___	Each
Curb Drop Inlet Type___, ___ to ___ ft	Each
Curb Drop Inlet Type ___, over ___ ft	Each
Drop Inlet Type___, ___ to ___ ft	Each
Drop Inlet Type___, over ___ ft	Each
Transverse Drop Inlet Type ___, ___ to ___ ft	Each
Transverse Drop Inlet Type ___, over ___ ft	Each
Junction Box	Each

623.5.1 Work Included in Payment

The following Work and items will be considered as included in the payment for the main items and will not be measured or paid for separately:

1. Subgrade preparation;
2. Compaction;
3. Replacement of unsuitable foundation Material;
4. Excavation and backfilling for drop inlets;
5. Coating of Structural Steel;
6. Reinforcing steel, concrete, and Structural Steel (Except on Extensions);
7. Removal of the top six (6) inches on extensions;
8. Gravel for drain pocket and hardware cloth for the weep holes; and
9. De-watering.

SECTION 624: WIRE MESH FOR SLOPE STABILIZATION

624.1 DESCRIPTION

This Work consists of Roadway slope stabilization to restrain and channel rockfall.

624.2 MATERIALS

624.2.1 Anchor Cable

The Contractor shall provide anchor cable with a diameter of at least 1/2 inch. It shall be zinc-coated steel wire strand, common grade, Type 1 coating, in accordance with ASTM A 475.

624.2.2 Resin-Grouted Steel Bolt Systems

The Contractor shall provide a resin-grouted steel bolt system with the best standard products of a manufacturer regularly engaged in the production of this type of installation and of the manufacturer's latest approved design.

The Contractor shall use resin-grouted steel bolts and hooked anchors with a minimum diameter of 3/4 inch. The Contractor shall use the headed type with flash forging. The Contractor shall use steel bolts with the following tensile properties:

1. Minimum yield strength: 43,000 psi; and
2. Minimum ultimate strength: 70,000 psi.

The Contractor shall use steel bolts and hooked anchors manufactured from any of the grades of deformed bars specified in ASTM A 615. The Contractor shall use steel bolts and hooked anchors specifically designed for resin grouting with lugs, vertical ribs, and deformations to provide thorough mixing of the resin and to center the steel bolts in the drilled holes.

624.2.2.1 Resin Cartridges

The Contractor shall provide the type of resin cartridges, as per the manufacturer's recommendations, designed for a 0.9 inch diameter cartridge in a one (1) inch diameter hole with a 3/4 inch bolt or anchor.

624.2.3 Earth Anchor Systems

The Contractor shall use earth anchor systems with the best standard products of a manufacturer regularly engaged in the production of this type of installation and of the manufacturer's latest approved design. The Contractor shall use earth anchor systems designed for the conditions encountered and as approved by the Project Manager.

624.2.4 Bearing Base Plates

The Contractor shall use bearing base plates that are six (6) inches square or six (6) inches diameter round plates in accordance with ASTM F 432.

624.2.5 Certification

The Contractor shall submit to the Project Manager for approval any manufacturer's certificates, literature, and shop drawings at least two (2) weeks before beginning the Work.

Shop drawings will, at a minimum, include spacing, bolt/anchor length, working load, and minimum required torque.

624.2.6 Slope Stabilization Wire and Wire Mesh

The Contractor shall provide tie wire and wire mesh in accordance with Section 602, “Slope and Erosion Protection Structures.”

624.2.6.1 Polyvinyl Chloride Coated Wire Mesh

In addition to Section 602, “Slope and Erosion Protection Structures,” the Contractor shall use PVC-coated wire mesh and connections in accordance with the following:

1. Extrude the PVC coating onto the wire core before weaving the coated wire;
2. Overall minimum diameter (galvanized wire core plus PVC coating) is 0.1338 inch;
3. Edging wire will be a galvanized wire core, with a diameter of at least 0.1338 inch (approximate U.S. gauge 10), coated with PVC, and having a minimum overall diameter of 0.1638 inch; and
4. Lacing wire will be a galvanized wire core, with a diameter of at least 0.0866 inch (approximate U.S. gauge 13.5), coated with PVC, and having a minimum overall diameter of 0.1166 inch.

624.2.6.2 PVC Coating

The Contractor shall provide protective PVC coating that resists the damaging effects of natural weather exposure or immersion in salt water and that does not show any Material difference in its initial compound properties in accordance with Table 624.2.6.2:1, “PVC Coating Physical Property Requirements.”

Table 624.2.6.2:1
PVC Coating Physical Property Requirements

Property	Required value	Test method
Initial Property Requirements	—	—
Specific Gravity, kg/Dm^3	1.30–1.35	ASTM D 792
Durometer Hardness	50–60	ASTM D 2240
Shore D	—	ISO 868
Volatile Loss, Maximum	—	ASTM D 1203
@ 105 °C for 24 h	Two percent (2%)	ISO 176
@ 105 °C for 240 h	Six percent (6%)	ASTM D 2287
Tensile Strength, kg/cm^2, Minimum	210	ASTM D 412
Elongation, %	200–280	ASTM D 412
Modulus of Elasticity, kg/cm^2, Minimum	—	—
100% of Elongation	190	ASTM D 412
Resistance to Abrasion, gm, Maximum	0.19	ASTM D 1242 – 95a
Brittleness Temperature, °C, Maximum	–30	BS 2782-104A
Cold bend temperature	+15	BS 2782-150B

Table 624.2.6.2:1
PVC Coating Physical Property Requirements

Cold flex temperature	—	—
Creeping Corrosion, mm, Maximum[a]	25	—

[a]Penetration of corrosion of the wire core from a square cut end when the specimen has been immersed for 2,000 h in a 50% solution of hydrochloric acid 12 Be.

624.3 CONSTRUCTION REQUIREMENTS

The Contractor shall prepare top and bottom of slopes by trenching.

The Contractor shall scale slope faces in accordance with Section 626, “Scaling of Rock Slopes,” before installing steel bolts/anchors and draping and anchoring the wire mesh.

624.3.1 Anchor Hole Preparation

The Contractor shall drill bore holes for steel bolts/anchors approximately perpendicular to the rock face, except in areas approved by the Project Manager, incline the boreholes to a maximum of 30° off the perpendicular in order to intercept and seat the steel bolts/anchors in solid rock.

Upon completion of drilling, the Contractor shall blow the drilled holes clean with compressed air with an operating air pressure of at least 50 psi introduced at the back of the hole.

The Contractor shall use the manufacturer’s recommended hole diameter for the steel bolts/anchors.

The Contractor shall ensure that the clearance between the steel bolt/anchor and borehole wall is from 1/8 inch to 3/16 inch.

624.3.2 Anchor Installation

The Contractor shall carefully follow the manufacturer’s recommended installation procedures for steel bolts/anchors.

During construction, the Contractor may reduce the center-to-center spacing in order to maximize anchorage by selective bolting/anchoring in sound rock or to eliminate large voids between the wire mesh and the slope face.

The Contractor shall use steel bolts/hooked anchors that are at least six (6) feet long. The Contractor shall ensure that the steel bolts extend at least one (1) foot into sound rock.

As construction progresses, the rock conditions encountered may require the lengths of the steel bolts/hooked anchors to be greater than the minimum length, so the Project Manager may direct varied lengths. If using varied lengths, the Department will allow the Contractor to use steel couplings or other methods recommended by the manufacturer.

624.3.2.1 Tensioning and Testing of Steel Bolts and Earth Anchors

The Contractor shall tension steel bolts and earth anchors in accordance with the manufacturer's recommendations. The Contractor shall use a minimum torque of 200 lbf•ft, unless otherwise specified.

After installation, test a randomly selected set of ten percent (10%) of the bolts or anchors to confirm the specified working load. If more than one third of these fail, the Contractor shall test all bolts/anchors.

After replacing the failed bolts and anchors, the Contractor shall test another randomly selected set of ten percent (10%) of bolts and anchors, not including those previously tested and Accepted. The Contractor shall repeat the procedure until obtaining the satisfactory results.

The Contractor shall replace unacceptable bolts and anchors at no additional cost to the Department.

624.3.3 Installation of Wire Mesh

If the Contract specifies, the Contractor shall use PVC-coated wire mesh.

The Contractor shall lap the wire mesh at least six (6) inches and securely bind the perimeter edges of wire mesh so that the joints formed by tying the selvedges have a minimum strength equal to that of the body of the mesh.

The Contractor shall space ties, connectors, locking clips, or hog rings used for fastening edges four (4) inches apart or less. The Contractor may lace perimeter edges with binding wire by tightly looping it through every mesh opening.

The Contractor shall extend wire mesh down the face of the slope and anchor it to the face of the slope by resin-grouted steel bolts or anchors, as required.

The Contractor shall hold wire mesh in place by the bearing base plates to stretch it to the maximum and contour it to the existing surface.

The Contractor shall anchor the wire mesh at the bottom to contain loose debris and allow periodic maintenance and debris removal.

624.3.3.1 Alternate Anchoring Method

If specified in the Contract, the Contractor shall anchor wire mesh using anchor cable and hooked resin-grouted steel or earth anchors.

624.3.4 Site Maintenance

The Contractor shall maintain the Project area and keep it clear of falling rock and debris during construction and at Project completion. The Contractor shall dispose of waste and debris at locations approved by the Project Manager.

624.4 METHOD OF MEASUREMENT—Reserved

624.5 BASIS OF PAYMENT

Pay Item	Pay Unit
Slope Protection Wire Mesh	Square Yard
Slope Protection Wire Mesh PVC-Coated	Square Yard
Resin-Grouted Steel Bolts	Linear Foot
Resin-Grouted Steel Anchors	Linear Foot

Earth Anchors	Linear Foot
Anchor Cable	Linear Foot

624.5.1 Work Included in Payment

The following Work and items will be considered as included in the payment for the main items and will not be measured or paid for separately:

1. Trenching at the top and bottom of the slope;
2. Hauling and disposal of rocks and debris; and
3. Ties, lacing wire, clips, hog rings, plates, and other appurtenances.

SECTION 668
UTILITY ALLOWANCE

1. Where possible, all conflict with existing utilities shall be avoided by minor adjustments to the alignment of proposed facilities as directed by the Owner's Project Manager. Where conflicts are determined to be unavoidable by the Owner's Project Manager, the utility shall be relocated.

2. The Contractor shall notify the utility owner at Notice to Proceed Number 1. The Contractor shall be responsible for coordinating this work and paying invoiced cost to the utility owner. The Contractor may be required by the utility owner to pay for such relocation work prior to the actual relocation work being performed. Cost of coordination with utility owners will be incidental to the cost of relocating the utility.

3. The utility allowance price for each utility shall be measured on a per each basis. The Contractor shall submit a utility relocation estimate from the utility owner plus contractors' coordination fee to the Project Manager for review and approval prior to the actual direction from SSCAFCA to relocate the utility. The fee per each will be based upon receipt of invoices submitted from the utility company after work is performed plus a contractor's fee for coordination. All invoices and other necessary documentation must be submitted prior to any payment being made on a particular utility allowance item.

4. Payment will be made as a lump sum per each utility relocation required and as directed by SSCAFCA, completed, installed and operational, to be billed against overall project utility allowance. This price shall include the cost of all labor, material, equipment, utility charges, excluding coordination with utility owners, and all incidentals necessary to complete this item in accordance with all requirements of the utility company. The utility relocation allowance price may be paid as a percentage of utility relocation allowance completed. The percentage shall be computed by dividing the total of utility company invoices by the total price included in this bid for utility relocation allowance.

5. Contractor will be required to coordinate with all utility companies including telecommunication. Coordination with the Utility companies is included in the cost of the project and no additional compensation shall be made. Coordination with utility companies shall begin at Notice to Proceed Number 1. Any unknown or unidentified utility conflicts shall be paid per items 2-4 above.

Pay Item	Pay Unit
Utility Allowance	Allowance (AL)

SECTION 701

TRENCHING, EXCAVATION AND BACKFILL

701.1 GENERAL

Trench excavation and backfill for underground utilities, sanitary sewer, storm sewer, water lines, and appurtenances shall conform to these specifications or as specified in the Supplemental Technical Specifications or as authorized, in writing, by the ENGINEER.

701.2 REFERENCES

701.2.1 ASTM:

D-422 D-698
D-1557 D-2321
D-2487 D-2922
D-3017 D-4318

701.2.2 This Publication:

Section 207
Section 301
Section 302
Section 336
Section 337
Section 340

701.3 TERMINOLOGY

701.3.1 For the purpose of these specifications in this Section, the descriptive terms "flexible," "plastic" and "non-rigid" are similarly interchangeable as utilized in these specifications and appurtenant reference material.

701.3.2 Rigid pipe: shall be reinforced concrete, concrete cylinder, and vitrified clay pipes.

701.3.3 Flexible pipe shall be polyvinyl chloride, polyethylene, ductile iron, and corrugated metal pipes.

701.3.4 Standard Detail Drawings show the trench cross-sections which identify the meaning and limits of terminology used in these specifications for the terms "foundation, bedding, haunching, initial backfill, final backfill, embedment, pipe zone, cover, springline, and pipe width."

701.3.5 The Unified Soil Classification System in ASTM D2487 Shall be utilized for the purpose of material classifications. See Table 701.3.A for a listing of referenced soil classes.

701.4 NOTIFICATION OF FORTHCOMING WORK

701.4.1 To assure that the construction work progresses in a timely manner and that good public relations are maintained with the property owners, the following actions are considered essential:

701.4.1.1 Prior to the start of construction the CONTRACTOR shall assist the ENGINEER in notifying the adjacent property owners as to when construction will start, the estimated completion date, anticipated access blockages.

TABLE 701.3.A
EMBEDMENT SOILS CLASSIFICATIONS

SOILS CLASS	SOIL TYPE	DESCRIPTION
CLASS I SOILS*		Manufactured angular, granular material, ¼ to 1-1/2 inches (6 to 40 mm) size, including materials having regional significance such as crushed stone or rock, broken coral, crushed slag, cinders, or crushed shells, complying to the requirements of Class II soils.
CLASS II SOILS**	GW	Well-graded gravels and gravel-sand mixtures, little or no fines. 50% or more of coarse fraction retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
CLASS II SOILS**	GP	Poorly graded gravels and gravel-sand mixtures, little or no fines. 50% or more of coarse fraction retained on No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
CLASS II SOILS**	SW	Well-graded sands and gravelly sands, little or no fines. More than 50% of coarse fraction passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
CLASS II SOILS**	SP	Poorly graded sands and gravelly sands, little or no fines. More than 50% of coarse fraction passes No. 4 sieve. More than 95% retained on No. 200 sieve. Clean.
CLASS III SOILS***	GM	Silty gravels, gravel-sand-silt mixtures. 50% or more of coarse fraction retained on No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS III SOILS***	GC	Clayey gravels, gravel-sand-clay mixtures. 50% or more of coarse fraction retained on No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS III SOILS***	SM	Silty sands, sand-silt mixtures. More than 50% of coarse fraction passes No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS III SOILS***	SC	Clayey sands, sand-clay mixtures. More than 50% of coarse fraction passes No. 4 sieve. More than 50% retained on No. 200 sieve.
CLASS IV SOILS	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
CLASS IV SOILS	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays, Liquid limit 50% or less. 50% or more passes No. 200 sieve.
CLASS IV SOILS	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
CLASS IV SOILS	CH	Inorganic clays of high plasticity, fat clays. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
CLASS V SOILS	OL	Organic silts and organic silty clays or low plasticity. Liquid limit 50% or less. 50% or more passes No. 200 sieve.
CLASS V SOILS	OH	Organic clays of medium to high plasticity. Liquid limit greater than 50%. 50% or more passes No. 200 sieve.
CLASS V SOILS	PT	Peat, muck and other highly organic soils.

* Soils are as defined in ASTM D2487, except for Class I Soil which is defined in ASTM D2321
** In accordance with ASTM D2487, less than 5% passes No. 200 sieve.
*** In accordance with ASTM D2487, soils with 5% to 12% passing No. 200 sieve fall in a borderline classification that is more characteristic of Class II than of Class III.

701.4.1.2 Prior to the start of trenching operations, including pavement cutting and removal, the CONTRACTOR should coordinate with the ENGINEER any problem areas and involving traffic control, access to private properties, stockpiling of excavated materials, and other utility conflicts.

701.4.1.3 The CONTRACTOR shall provide the ENGINEER with the name and telephone number of at least two contact persons during non-working hours.

701.5 TRENCH SAFETY

The CONTRACTOR shall be responsible for maintaining all trenches in a safe condition; thereby protecting the workers and the general public. Trench slopes and other protection shall be in accordance with applicable regulations such as the Department of Labor's Occupational Safety and Health Administration Standards 29CFR Part 1926, subpart P *or* any applicable amendments.

701.6 BRACING EXCAVATIONS

701.6.1 Excavation for pipe shall normally be by open unsupported trenches unless local conditions warrant trench bracing.

701.6.2 Excavations shall be braced and sheeted. to provide complete safety to persons working therein and bracing shall comply with applicable Federal (OSHA), State and local laws and ordinances. Support systems for trenches in excess of 20 feet deep and adjacent to existing improvement or subject to vibrations or ground water shall be in accordance with OSHA regulations. The CONTRACTOR shall be fully responsible for sufficiency and adequacy of bracing excavations with respect to work under construction and adjacent utility lines and private property.

701.6.3 If the soil conditions within the trench area require support, the CONTRACTOR may elect to use tight sheeting, skeleton sheeting, stay bracing, trench jacks, or movable trench shield to support the trench during pipe laying operations, such as: bedding preparation, pipe laying, backfilling of haunches and initial zone.

701.6.4 No sheeting shall be permitted to remain in the trench except when, in the opinion of the ENGINEER, field conditions or type of sheeting or methods of construction used by the CONTRACTOR, warrant the supports must remain. The ENGINEER may opt to have the lower portion (within the pipe zone) of the sheeting to remain. If the CONTRACTOR plans on removing the sheeting, he shall submit method to the ENGINEER for approval to treat the void created by the removal of the sheeting within the pipe zone and below.

701.6.5 When a movable trench shield is used, the trailing half of the shield should be notched to the height of the top of the pipe. This will allow the haunch area of the pipe to be compacted properly to the wall of the trench. If the trench shield is not notched, a subtrench shall be excavated for pipe installation such that the bottom of the trench shield does not enter the pipe zone.

701.7 DEWATERING

701.7.1 Trenching and pipe laying operations may encounter standing water or ground water which would preclude the proper placing of bedding, backfilling, and laying pipe. The water shall be removed by pumps and associated equipment, such as well points, to lower the water level. Dewatering shall continue for a minimum 24 hours after placement of any concrete.

701.7.2 Dewatering operations shall remove the water to achieve a stable foundation for pipe embedment and backfilling. The ENGINEER shall determine if adequate foundation has been attained. The ground water shall be lowered to a minimum depth of 6 inches below pipe grades. Should over excavation be necessary due to unsuitable foundation conditions, the ground water shall be additionally lowered as necessary.

701.7.3 The CONTRACTOR shall submit a plan for approval by the ENGINEER as to how and where the waste water will be disposed. Waste water will not be discharged into traffic and pedestrian lanes or onto private properties.

701.7.4 The CONTRACTOR shall obtain permit from the New Mexico State Engineer prior to commencing dewatering operations.

701.7.5 The CONTRACTOR shall also responsible for any adverse effect his dewatering operation has to private property, including providing temporary water to residences and/or business necessitated by the effect on private wells.

701.7.6 The CONTRACTOR shall arrange dewatering operation in a neat and orderly manner such that access to adjacent, properties is maintained, the discharge system does not leak and that any power generation complies with applicable noise
limit regulations .

701.8 REMOVAL OF EXISTING PAVEMENT SIDEWALK, AND DRIVEWAY

701.8.1 Existing concrete pavement, sidewalk, or driveway removed in connection with construction shall be replaced , neatly sawed edges. Cuts shall be neat and to true straight lines with no shatter outside the removal area. If a saw cut would fall within 30 inches of a construction joint, cold joint, expansion joint, or edge, the concrete shall removed and replaced to the joint or edge. Concrete sidewalk and/or driveway may removed so that a minimum of 30-inch square is replaced. If the saw cut would fall within 12 inches of a score mark, the score mark.

701.8.2 Existing bituminous pavement removed in connection with construction shall be cut with a saw, pavement break cutting wheel, or other suitable tool approved by the ENGINEER. Care shall taken to assure that the edge of removed pavement does not vary from a straight line more than 2 inches from r mean.

701.8.3 Saw cutting shall be 1-1/2 inches in depth or 1/4 the thickness of the pavement, sidewalk, or driveway, whichever is greater. All saw cuts or other scoring shall be made perpendicular to the surface of the material to be cut.

701.8.4 Any unnecessarily irregular breakage or cracking caused by the CONTRACTOR shall be removed and replaced by the CONTRACTOR without added expense to the OWNER.

701.8.5 The CONTRACTOR shall be responsible for the disposal of removed materials.

701.8.6 Saw cutting is required on all concrete or asphalt paving on State maintained streets or roads.

701.8.7 Paving cuts for manholes and valve boxes and other utility appurtenances shall be square and at dimensions specified the Standard Detail Drawings or on the construction plans.

701.9 MAXIMUM LENGTH OF OPEN TRENCH

In developed areas, no more than 300 feet of trench shall be opened in advance of pipe laying operations. This distance may be reduced due to traffic control considerations. Backfilling shall begin as soon as pipe is laid and inspected and shall keep pace with the pipe laying. In advance of trenching operations in undeveloped areas, the CONTRACTOR shall submit in writing or on plans for the ENGINEER'S approval, the maximum length of trench that will be open at anyone time. Except by permission of the ENGINEER, the maximum length of open trench in anyone location where concrete structures are cast in -p1ace will be that which is necessary to permit uninterrupted progress. Construction shall be pursued as follows: excavation, formwork, and setting of reinforcing steel, placing of floor slab, walls, and cover slab or arch shall follow each other without anyone of these operations preceding the next nearest operation by more than 200 feet. Failure by the CONTRACTOR to comply with the limitations specified herein or as may be specifically authorized by the ENGINEER may result in a written order from the ENGINEER to halt progress of the work until such time as compliance with this paragraph has been achieved and the work can be proceeded in an orderly sequence of operations.

701.10 WIDTH OF TRENCHES

Trench widths will vary according to the type of pipe used, size of pipe, depth of trench, and soil conditions, The minimum width requirements, indicated below, are for proper laying, aligning and jointing of pipe as well as trench grading, bedding preparation, and backfilling.

701.10.1 TRENCH WIDTH FOR RIGID PIPE MATERIALS: Trench widths from bottom of pipe to a point 12 inches above the top of the pipe shall be kept to the practical minimum required for properly laying, aligning, grading, jointing, and backfilling of the pipe, but no less width than pipe outside diameter plus 16 inches. For stable soils which will stand a vertical cut, the maximum trench width at a point 12 inches above the top of pipe or at a point 5 feet above the bottom of the trench, whichever is less, shall be as follows:

701.10.1.1 The pipe outside diameter plus 2 feet for pipes 27 inches in diameter and smaller.

701.10.1.2 1.6 times the nominal diameter for pipes 30 inches in diameter or larger.

701.10.1.3 When soil will not stand vertical. the trench sides shall be sloped to provide not less than the outside diameter plus 16 inches at the pipe invert.

701.10.2 TRENCH WIDTH FOR NON-RIGID PIPES: The minimum clear width of the trench measured at the springline of the pipe should be 1 foot greater than the outside diameter of the pipe. The maximum clear width of the trench at a point 1 foot above the top of the pipe is equal to the pipe outside diameter plus 2 feet. If the maximum recommended trench width must be exceeded *or* if the pipe is installed in a compacted embankment, then pipe embedment should be compacted to a point of at least 2-1/2 pipe diameters from the side of the pipe or to the trench walls.

701.11 ROCK EXCAVATION

701.11.1 Rock is defined as material which cannot be excavated without drilling and blasting. All stone or boulders less than 8 cubic feet in volume will be classified as earth; all larger boulders shall be classified as rock. If blasting is necessary to excavate such materials as shale, hardpan, soft sandstone, cemented gravel, or loose rock which normally can be classified as earth excavation, then this excavation shall be classified as rock excavation. Whenever a ledge of solid rock encountered with earth below it or where alternate layers of solid rock and earth occur, the earth shall be included in the allowance for rock when the thickness of the layer of earth is less than 12 inches, thus requiring it to be removed by blasting along with the ledges of rock. Blasting will be considered necessary when the soil and rock cannot be excavated at a rate of 50 cubic yards per hour by a competent operator with a back-hoe that has a minimum bucket curling force of 25,000 pounds (John Deere 690 or equivalent).

701.11.2 Whenever rock is encountered in the trench or elsewhere in any excavation required to be made, it shall be excavated to the line and grade as shown on the plans and within the limits described therein, unless otherwise authorized, in writing, by the ENGINEER.

701.11.3 For trenches, rock shall be excavated to a depth of 6 inches minimum below the outside bottom of the conduit except at points of rock and earth transitions at which points the rock shall be excavated to a minimum of 12 inches below the outside bottom of the conduit as shown on the detail sheets for trench cuts and backfill of rock. Any depression in the bottom of the trench caused by overshoot and/or excavating and being 6 inches or greater in depth from a theoretical bottom of trench grade shall be filled to the theoretical bottom of the trench with select soils. The trench shall be backfilled with select backfill material to a point 1 foot above the top of the conduit. The remainder of the trench shall be backfilled as specified herein. The complete trench backfill from the bottom through to the top of the subgrade shall meet the compaction and/or moisture requirements as specified herein.

701.11.4 BLASTING: Suitable weighted covering or mats shall be provided to confine all materials lifted by the blasting within the limits of the trench and to prevent injury of persons or damage to property. Blasting shall be under the supervision of a person qualified and experienced in the use and handling of explosives. All blasting operations shall be done in accordance with applicable local, state, and federal laws, ordinances, and codes regulating the transportation, storage, and use of explosives. Forty-eight hours prior to blasting operations, the CONTRACTOR shall notify the local law enforcement agency.

701.12 FOUNDATION

701.12.1 All pipe shall be bedded on a stable foundation in a trench which is completely free of water. The ENGINEER shall determine the adequacy of the foundation. Class V soils shall not be used as a foundation. If Class V soils are encountered at the bottom of the trench it shall be removed to the depth authorized by the ENGINEER and replaced with Class I, II or III soils.

701.12.2 Where an unstable foundation condition is encountered, it must be stabilized before laying pipe or alternative foundation methods utilized. The CONTRACTOR will be paid for foundation stabilization when required by the ENGINEER. Failure to notify the ENGINEER of an obvious unstable foundation condition prior to proceeding with placement of the pipe shall result in complete removal of the affected pipe, foundation stabilization, and replacement of the pipe at the CONTRACTOR'S expense.

701.12.3 Should the trench be inadvertently over-excavated below the foundation, the area of over-excavation shall be filled with select material in 6 inch lifts and compacted to a density of not less than 95 percent of maximum density, as determined by ASTM D 1557.

701.12.4 Unless specifically approved in writing by the ENGINEER, the CONTRACTOR shall not proceed with pipe embedment in a trench where water is present or the foundation is saturated. Adequate dewatering, as specified in Section 701.7, shall be utilized.

701.13 PIPE EMBEDMENT

701.13.1 GENERAL:

701.13.1.1 The class of bedding used for each pipe shall be as shown on the plans or as specified in the Supplemental Technical Specifications.

701.13.1.2 The CONTRACTOR may request a change in the class of bedding required on a pipe, if authorized by the ENGINEER, all increase in the cost of labor and materials required to include upgrading of the pipe class will be at the CONTRACTOR'S expense with no additional cost to the OWNER.

701.13.2 RIGID PIPE EMBEDMENT:

701.13.2.1 The trenches shall be excavated in conformance with the trench width requirements in Section 701.10 and 701.5.

701.13.2.2 Embedment material shall be Class I, II, III, or IV soils, or lean fill as specified in Section 207.

701.13.2.3 All soil in the embedment zone shall be placed in lifts not exceeding 8 inches in uncompacted depth, except that material along the side of the pipe shall not be placed above the spring1ine until the haunch area of the pipe is adequately filled and sliced such that no voids remain.

701.13.2.4 All soil shall be compacted to a density not less than 90 percent of maximum density, as determined by ASTM D 1557. The CONTRACTOR shall take care to assure that the pipe is not damaged or misaligned during compaction of the embedment.

701.13.3 FLEXIBLE PIPE EMBEDMENT:

701.13.3.1 Proper placement of soils in the embedment zone is extremely important in achieving a satisfactory installation of flexible pipe. The CONTRACTOR shall be aware that the soil classes have differing requirements relative to embedment. There are also differing requirements for embedment in dry and wet conditions (wet conditions meaning that the embedment zone will be subject to ground water).

701.13.3.2 Embedment material shall be Class I, II, or III soils, or lean fill as specified in Section 207.

701.13.3.3 Embedment soil shall be placed in lifts not exceeding 8 inches loose depth. The haunch shall be properly compacted by hand tampers utilizing due caution such that the pipe is not damaged or misaligned. Mechanical tampers shall not be utilized directly over the pipe in the embedment zone.

701.13.3.4 The CONTRACTOR may utilize acceptable on site soils in the embedment area which are in conformance with these specifications. The CONTRACTOR has the option of importing a different soil, however, additional compensation will only be allowed if the on site soils are Class IV or V.

701.13.3.5 Class I soil shall comply with the requirements of Section 302, AGGREGATE BASE COURSE.

701.13.3.6 Class II and III soils shall be compacted to a density of not less than 95 percent of maximum density in the embedment area, as determined by ASTM D 1557. The moisture content shall not exceed 5 percent above optimum.

701.14 FINAL BACKFILL

701.14.1 Final backfill shall consist of homogeneous soil except that boulders, frozen clumps, rubble, and Class V soils are excluded.

701.14.2 Final backfill shall be compacted to a density of not less than 90 percent of maximum density, as determined by ASTM D 1557 unless otherwise specified in the Contract Documents.

701.14.3 The upper portion of the final backfill may require specific soils and compaction in order to provide a suitable foundation for pavements, curb and gutter, sidewalk, or other type of structure.

701.15 COMPACTION METHODS

701.15.1 The CONTRACTOR shall be responsible for the compaction method utilized during foundation preparation, embedment placement, and final backfill except as otherwise specified herein or in the Supplemental Technical Specifications.

701.15.2 The use of mechanical vibratory compactors directly over the pipe is prohibited in the embedment area. Extreme care shall be taken when utilizing mechanical compactors in the haunch and initial backfill area in order to avoid damage to or misalignment of the pipe. The ENGINEER shall examine any damaged pipe and has the authority to

direct that it be replaced with new pipe at no additional cost to the OWNER.

701.15.3 Flooding or jetting shall be allowed if the subsurface soils are compatible to its usage, as authorized by the ENGINEER. It shall not be used for compaction of flexible pipe, when the soil has a plastic limit of 7 or greater, and in areas of collapsible soils. The CONTRACTOR shall take any necessary precautions to minimize to negligible flotation of the pipe.

701.15.4 The CONTRACTOR shall, at the direction of the ENGINEER, excavate the compacted fill as necessary for the purpose of determining the adequacy of the compaction.

701.16 PAVEMENT

701.16.1 Either new street construction or pavement replacements shall satisfy the following design and construction requirements:

701.16.1.1 Unless permanent pavement is specified to be placed immediately, a temporary dust-free patch shall be placed wherever excavation is made through existing pavements, sidewalks, or driveways. The patch shall be placed, rolled, and maintained by the CONTRACTOR to provide a smooth surface for traffic until a permanent pavement is constructed within the time frame specified by the ENGINEER.

701.16.1.2 The subgrade preparation of the area to be paved shall be in accordance with Section 301 of these specifications. The asphalt pavement placed shall be in accordance with Section 336 and the concrete pavement shall be in accordance with Section 337. The placement of the other roadway items shall be in accordance with Section 340.

701.16.1.3 Material thickness for all pavement replacements within residential or arterial streets shall conform to the plans or the Standard Detail Drawings or match the existing pavement as authorized by the ENGINEER.

701.16.1.4 Pavement cuts of 8 ft. or more in width and 100 ft. or more in length shall be paved with a laydown machine.

701.16.1.5 When authorized by the ENGINEER, asphalt concrete base course may be used to replace surface course thickness requirements on streets that are scheduled for overlay.

701.16.1.6 The edges of all trenches at the base course level shall be neatly trimmed before beginning any paving replacement. All edges of the existing pavement adjacent to the trench cut shall be inspected. Undermined, broken, cracked, or unevenly cut portions shall be removed and the pavement edges retrimmed prior to pavement replacement. All vertical edges of the existing asphalt pavement adjacent to the trench cut and all surface areas for a width of at least 4 inches and no greater than 8 inches, shall be thoroughly cleaned and a tack coat applied prior to placing any hot mix asphalt. The finished surface of the pavement replacement shall be graded to conform to the existing contour both in cross section and profile.

701.16.1.7 Concrete pavement to replace cuts made in concrete paved streets, arterials, etc., shall conform to the Standard Detail Drawings for concrete pavement or in accordance with New Mexico Department of Transportation requirements where applicable.

701.16.1.8 When more than one-half of the surface area of a manhole, lamphole or valve box is found to extend into the area to receive a permanent asphaltic hot-mix surfacing and/or base pavement replacement, the existing pavement surrounding the manhole, lamphole, or valve box shall be removed to within those limits which will permit a permanent pavement replacement to be made in accordance with the approved plans.

701.16.1.9 Asphaltic hot mix shall not be placed upon the concrete collar, nor shall traffic be permitted upon the collar for at least 24 hours, or longer, if so directed by the ENGINEER. A tack coat of asphaltic emulsion may be applied after the concrete has taken its final set. During this time adequate barricading of the area shall be maintained by the CONTRACTOR.

701.16.1.10 If in the course of a pavement removal, a manhole, lamphole, and/or valve box is encountered and has a concrete collar about it and the collar is performing adequately, no special construction need be made in the permanent pavement replacement.

701.16.1.11 The CONTRACTOR shall make any small grade or alignment adjustment of the manhole, lamphole, and/or valve box encountered that is necessary to provide a smooth riding surface between the existing pavement and the patch and/or within the patch itself.

701.16.1.12 TESTING

701.16.1.12.1 A sample of each type of soil encountered shall be classified in accordance with

the requirements of ASTM D2487, and the moisture density relationship determined in accordance either ASTM D698 or D1557, whichever is applicable.

701.16.1.12.2 A compaction test shall be taken for each 2 feet depth per 200 feet trench length or less, as directed by the ENGINEER. Compaction tests shall be taken in accordance with ASTM D2922 and D3017. Areas represented by non-complying tests shall be reworked and re-tested for compliance.

701.17 MEASUREMENT AND PAYMENT

701.17.1 TRENCHING, BACKFILLING, AND COMPACTION:

701.17.1.1 Trenching, backfilling, and compaction shall be combined into one unit and shall be measured and paid for as follows:

701.17.1.2 Measurement shall be made along the center1ine of the pipe.

701.17.1.3 The unit of measurement shall be by the linear foot *per* pipe diameter per specified increment of depth.

701.17.1.4 The following depth increments will apply:

701.17.1.4.1 For water line installations the costs for trenching, backfilling and compaction shall be included in the unit price per linear foot of pipe per pipe diameter for maximum depth, such as: 4 to 14 inch diameter at 6 feet, 16 to 24 inch diameter pipe at 7 feet and all pipe larger than 24 inch at 8 feet. Separate payment will be specified in the Bid Proposal when required depths exceed the above depths.

701.17.1.4.2 For sewer installations the increments shall be 8 feet or less, 8 feet to 12 feet, 12 feet to 16 feet, 16 feet to 20 feet and thereafter at 4 foot intervals.

701.17.1.4.3 All depths shall be measured to the nearest foot.

701.17.1.5 All depths shall be measured from the invert of the pipe to the top of existing ground elevation. The existing ground elevation shall be the elevation of the surface that exists along the centerline of the pipe at the time of construction staking for said trenching.

701.17.1.5.1 Whenever a special pipe embedment detail is specified, on the plans, the trench depth shall be measured from the bottom of the embedment to the top of existing ground elevation. However, no additional trench depth shall be measured as a result of inadvertent over-excavation nor to accommodate trench dewatering.

701.17.1.6 Payment will be made at the unit price per linear foot per diameter of pipe per depth increment as specified in the Bid Proposal, and will include trenching, backfilling, and compaction for all trench zones. No additional payment will be made for compacted materials to bring trench backfill up to required depth.

701.17.2 OVER-EXCAVATION: Required over-excavation for foundation stabilization shall be measured by the cubic yard of material removed and replaced with compacted suitable material. Payment will be made at the unit price per cubic yard of compacted replacement material and shall include excavation, backfill material, and compaction.

701.17.3 ROCK EXCAVATION: Rock excavation will be measured by the cubic yard within the specified limits of the trench configuration. Blasting will be included in the rock excavation. Payment will be made at the unit price per cubic yard.

701.17.4 UNSUITABLE MATERIALS: Removal and disposal of unsuitable materials from the construction site shall be measured by the cubic yard of excavated material. Payment will be made at the unit price per cubic yard of excavated material.

701.17.5 PAVEMENT. SIDEWALK, AND DRIVEWAYS: Removal and disposal of existing pavement, sidewalks, and driveways will be measured by the square yard or square foot whichever is apropos. Payment will be made at the unit price per square yard or square foot as specified in the Bid Proposal.

701.17.6 SELECT MATERIALS: Where selected material is required in the backfilling operations, the quantity of material will be measured by the cubic yard of compacted material in place in the trench. Payment will be made at the unit price per cubic yard of select material as indicated above.

701.17.6.1 Whenever a special pipe embedment detail is specified, measurement and payment shall be as identified in the Bid Proposal.

701.17.7 DEWATERING: Dewatering operations for trench work shall be measured by the linear foot along the center-line of that portion of the trench which requires dewatering. Payment will be made at the unit price per linear foot of dewatered trench.

701.17.8 PAVEMENT:

701.17.8.1 Permanent or temporary pavement surfacing shall be measured and paid for in accordance with the paving section elements as defined under Section 300 for the specific item of work.

701.17.8.2 Permanent resurfacing or permanent surface patching will be measured on the basis of the square yard for new surfacing as provided in the applicable section of these specifications. For payment purposes, the normal maximum pavement cut width shall be as defined in the Table No. 701.17.8.2

TABLE No. 701.17.8.2

NORMAL MAXIMUM PAVEMENT CUT WIOTHS ALLOWED FOR PAYMENT PURPOSES

Soil Stability	Trench Depth (TD)	Pipe Size	Max. Pavement Cut Width
Stable. Soil stands in a vert. cut	Less than or equal to 5 feet	ND less than or equal to 27"	00 + 2 feet
"	Greater than 5'	ND less than or equal to 54"	TD + 2 feet
"	"	ND greater than 54"	1.6 X ND + TD + 3'
Unstable. Soil does not stand in vert. cut	Any	Any	2 X TD + OD

NOTES: 1. TD is trench depth; ND is nominal pipe diameter; and OD is outside pipe diameter.

2. Individual locations or conditions may warrant greater cut widths than those specified above. The ENGINEER shall authorize in writing the increase in the above pavement cut widths.

SECTION 801

INSTALLATION OF WATER TRANSMISSION, COLLECTOR AND DISTRIBUTION LINES

801.1 GENERAL

The water facilities and materials, specified herein, are associated with water transmission, collector and distribution lines.

801.2 REFERENCES

801.2.1 American Water Works Association (Latest Edition) (AWWA):

C110 American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in., for Water and Other Liquids
C203 Coal-Tar Protective Coatings and Linings for Steel Water Pipelines -Enamel and Tape-Hot-Applied
C206 Field Welding of Steel Water Pipe
C207 Steel Pipe Flanges for Waterworks Service-Sizes 4 in. through 144 in.
C502 Dry Barrel Fire Hydrants
C504 Rubber-Seated Butterfly Valves
C509 Resilient-Seated Gate Valves for Water and Sewerage Systems
C600 Installation of Ductile-Iron Water Mains and Their Appurtenances
C651 Disinfecting Water Mains
C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in., for Water Distribution
C905 Polyvinyl Chloride (PVC) Water Transmission Pipe Nominal Diameter 14 in. through 36 in.
C909 Molecular Oriented Polyvinyl Chloride (PVCO), Pressure Pipe 4" - 12" for water distribution.
M9 Concrete Pressure Pipe
M23 PVC Pipe-Design and Installation

801.2.2 This Publication:

SECTION 18 UTILITIES
SECTION 121 PLASTIC PIPE
SECTION 127 STEEL WATER PIPE
SECTION 128 CONCRETE CYLINDER PIPE
SECTION 129 DUCTILE IRON PIPE
SECTION 130 GRAY IRON AND DUCTILE IRON FITTINGS
SECTION 340 PORTLAND CEMENT CONCRETE CURBS, GUTTERS, WALKS,DRIVEWAYS, ALLEY INTERSECTIONS, SLOPE PAVING, AND MEDIAN PAVING
SECTION 343 REMOVAL AND DISPOSAL OF EXISTING PAVEMENT, CURBS, GUTTERS, SIDEWALKS & DRIVEPADS
SECTION 701 TRENCHING, EXCAVATION AND BACKFILL
SECTION 1502 SUBMITTALS

801.3 MATERIALS:

801.3.1 GENERAL:

801.3.1.1 The CONTRACTOR shall submit certification from the manufacturer of the pipe as specified in Section 1502 as to the pipe material and that the pipe meets or exceeds the required testing. Only pipe manufactured in the United States of America will be acceptable.

801.3.1.2 Main line pipe and fittings shall be as specified in the Reference Section in this publication as listed above or as specified in the Supplemental Technical Specifications and/or as authorized by the ENGINEER.

801.3.2 PIPE:

801.3.2.2 Limitations of pipe materials versus pipe sizes will be as follows, unless otherwise specified on the plans or Supplemental Technical Specifications:

Pipe Type	Sizes
Ductile Iron	3" thru 64"
Concrete Cylinder(AWWA C303)	16" and larger
Plastic (PVC)	4" thru 20"
Welded Steel Pipe (AWWA 200)	16” and larger

801.3.2.3 The type of pipe used shall be approved by the ENGINEER. Steel pipe will be used only where specified on the drawings. All pipe shall be of domestic manufacture and origin. Unless otherwise approved by the ENGINEER, all pipe installed shall be identical from valve to valve.

801.3.3 GATE VALVES:

801.3.3.1 Gate valves shall only be used for pipe sizes of 12 inches and smaller, unless otherwise noted on the plans or in the Supplemental Technical Specifications.

801.3.3.2 Resilient seat gate valve shall be used and shall conform to AWWA C 509. The gate valve shall be a non-rising stem type with inside screw and "O" ring seals. The valve shall have a standard hub which opens counter-clockwise. Type valve ends shall be mechanical joints, unless otherwise specified on the plans. "O" ring retainer shall be secured with nuts and bolts.

801.3.3.3 The resilient seat shall be mechanically retained or bonded on the valve gate (wedge disc).

801.3.3.4 All brass or bronze parts used on gate valves shall comply with AWWA C 509.

801.3.3.5 The outside of the valve body shall be painted with coal tar enamel or corrosion-resistant coating. The inside shall be protected with corrosion resistant coating, approved for potable water.

801 .3.3.6 The valve stem shall comply with AWWA C 509. The material for the valve stem shall be brass or bronze, and shall have a minimum yield strength of 20,000 psi and minimum tensile strength of 60,000 psi.

801.3.3.7 Gate valves shall have a 2 inch square operating hub nut. Gate valves in vaults with valve covers at ground level shall have a handwheel with the 2" nut welded to the center.

801.3.3.8 Maximum input torque to open and/or close the valve shall be 200 foot pounds for a 4-inch valve and 300 foot pounds for 6-inch under a working pressure of 200 psi.

801.3.3.9 No Project will be accepted by the OWNER until all valves are operational and accessible.

801.3.3.10 Before the Work will be accepted, the CONTRACTOR shall provide the ENGINEER with a completed “Water Valve Data Card”, as shown on Pages 801-5 and 801-6. The ENGINEER shall forward the card to OWNER.

801.3.4 RUBBER SEATED BUTTERFLY VALVES:

801.3.4.1 Butterfly valves will be used for sizes of 14 inches and larger, and shall comply to AWWA C 504.

801.3.4.2 Only short body, Class 150B valves are acceptable. Wafer type valves are not acceptable. Valve ends may be either mechanical joint or flanged.

801.3.4.3 The rubber seat shall be field replaceable on valve sizes 24 inches and larger. The rubber seat may be mechanically retained or bonded on the disc or valve body.

801.3.4.4 Butterfly valves shall have a 3 inch square operating hub nut. Butterfly valves in vaults with valve covers at ground level shall have a handwheel with the 3" nut welded to the center.

801.3.4.5 The valve shaft and disc shall be installed horizontally. The valve disc shall pivot and rotate on the horizontal axis.

801.3.4.6 The maximum input torque to open and/or close the valve shall not exceed 150 foot pounds under a minimum working pressure of 150 psi, and the butterfly operator shall be compatible with this pressure. Maximum operating torques shall be in accordance with AWWA C 504, Table 1, Class 150B. The manufacturer of the valve shall be responsible for the operator.

801.3.4.7 No project will be accepted by the OWNER until all valves are operational and accessible.

801.3.4.8 Before the Work will be accepted, the CONTRACTOR shall provide the ENGINEER with a completed “Water Valve Data Card,” as shown on pages 801-5 and 801-6. The ENGINEER shall forward the card to the OWNER.

801.3.5 VALVE BOXES: Valve boxes shall consist of Polyvinyl Chloride (PVC) C-900, or High Density Polyethylene Pipe, (HDPE), with corrugated exterior and smooth interior pipe cut to accommodate the required depth. No joints shall be allowed. Pipe diameter shall be 10 inches for valves in paved areas to accommodate the cover and lid specified here-in. The pipe shall be centered and placed true to vertical around the axis of the operating nut. Valve covers and lids for re-use water shall be different than those used for potable water, and shall be as shown on re-use project construction plans.

801.3.6 COMBINATION AIR AND VACUUM VALVES: Air and vacuum valves shall be the type and size shown on the plans.

801.3.7 FIRE HYDRANTS:

801.3.7.1 Fire hydrants and their extensions shall be in accordance with AWWA C 502, traffic type. Fire hydrants shall have one 5 1/4 inch diameter valve opening; 6 inch mechanical joint inlet connection; two 2 ½ inch hose nozzle connections; and one 4 ½ inch steamer nozzle with National Standard Fire Hose Coupling Screw Threads. Fire hydrants shall have a bronze or cast iron, pentagon, operating nut, be designed for 150 psi. working pressure service, and have a normal bury of 4 to 4 ½ feet unless field conditions require a deeper bury, in which case extensions will be used so as to bring the bottom of the break-off flange 2 to 8 inches above the top of finish grade.

801.3.7.2 The pipe fittings and fire hydrants starting at the street main and ending at the fire hydrant itself shall be lying in a line perpendicular to the street's centerline or radially on a curvilinear installation. Fire hydrants shall have no more than ½ inch variation from a vertical line between the breakway flange and the top of the fire hydrant.

801.3.7.4 Hydrants shall be dry barrel, post-type with compression main valve closing with pressure. They shall have a field lubrication capability. Hydrants shall have a bronze seat ring threaded into a bronze drain ring or bronze or cast iron bushing.

801.3.7.5 Exterior of hydrant, below the ground line, shall be coated with asphalt varnish, and the exterior painted from the top to a point one foot below the ground level flange, consisting of one coat rust inhibitive primer and one coat "chrome yellow" enamel. The bonnet shall then be painted with a reflectorized paint using a color as close to “chrome-yellow” as possible.

801.3.7.6 The bottom plate of the main valve shall be epoxy coated. The shoe of the fire hydrant shall have a 6-inch mechanical joint connection and the inside shall be epoxy coated to prevent corrosion. The nozzle shall be threaded in place and retained by stainless steel locks. Hydrant body shall be threaded to receive the threaded nozzle. Nozzle shall be secured by a stainless steel locking device.

801.3.7.7 Fire hydrant shall contain two drain outlets. The drain outlets shall be constructed of bronze. Hydrant shall be provided with a pentagon operating nut to open counter clockwise and shall have an anti-friction washer between the hold-down nut and the operating nut.

801.3.7.8 To prevent loss of brass operating nuts due to theft or vandalism, the following shall be included in or on the fire hydrant:

801.3.7.8.1 Attach OWNER approved anti-theft device to the hydrant; or

801.3.7.8.2 The bonnet must be removed in order to remove the operating nut; or

801.3.7.8.3 Use a cast iron operating nut.

801.3.7.9 Fire hydrants shall be installed at locations as shown on construction plans and in accordance with Standard Detail Drawings.

801.3.7.10 Fire hydrants shall be properly restrained in accordance with Section 130. If mechanical restraint is used, each joint on the hydrant leg shall also be restrained.

801.3.8 PRESSURE REDUCING VALVE (PRV): Pressure reducing valve shall be a globe pattern, flanged end, pressure Class 125. Submittals for approval shall be made to the ENGINEER and approval must be received before installation. The following items are required in the PRV:

801.3.8.1 Materials:

801.3.8.1.1 Main valve-cast iron with brass trim.

801.3.8.2 Pilot Control System:

801.3.8.2.1 Adjustment from 15 psi to 75 psi.

801.3.8.2.2 Shut-off cock on all pilot control system lines.

801.3.8.2.3 Inlet flow strainer.

801.3.8.2.4 Closing speed control.

801.3.8.2.5 Opening speed control.

801.3.8.2.6 Flow stabilizer.

801.3.8.2.7 Tubing shall be copper.

801.3.8.3 Installation shall be as per the construction plans. ENGINEER shall determine final settings on PRV.

801.3.8.4 Before the Work will be accepted, the CONTRACTOR shall provide the ENGINEER with a "Water Valve Data Card”. The ENGINEER will forward the card to the OWNER.

801.3.9 TAPPING SLEEVES: (For other than Concrete Cylinder Pipe) For either taps greater than 2/3 line size, or size on size taps 12 inches or less, only approved, long body, fully gasketed tapping sleeves shall be allowed. During installation of the tapping sleeve, the pipe shall be fully supported to support the weight of the tapping sleeve and tapping machine.

801.3.9.1 Tapping sleeves of heavy welded steel bodies shall meet the following requirements:

801.3.9.1.1 Epoxy coated.

801.3.9.1.2 Bolts and nuts to be stainless steel.

801.3.9.1.3 Gaskets to be Buna-N rubber.

801.3.9.1.4 Flange to be flat face steel and comply with AWWA C-207.

801.3.9.1.5 Class D-ANSI 150 lbs. drilling.

801.3.9.1.6 Designed to sustain an operating pressure of 150 psi.

801.3.9.1.7 May be used on all water mains, 4" and larger.

801.3.9.2 Tapping sleeves of cast iron bodies shall

meet the following requirements:

801.3.9.2.1 Mechanical joint type with a working pressure of 200 psi .

801.3.9.2.2 Outlet flange to be Class 125, ANSI B16.1.

801.3.9.2.3 Sleeves to include side and end gaskets of Buna-N rubber.

801.3.9.2.4 Eight high strength steel bolts and nuts to secure the halves of the sleeve to the pipe.

801.3.9.2.5 May be used on all water mains, 4" and larger.

801.3.9.3 Tapping sleeves of short sleeve cast iron shall meet the following requirements:

801.3.9.3.1 Working pressure of 150 psi.

801.3.9.3.2 Outlet flange to be Class 125, ANSI B16.1.

801.3.9.3.3 Outlet half to have an enclosed gasket in a groove for a pressure seal.

801.3.9.3.4 Four high strength steel bolts to secure halves of tapping sleeve to the pipe.

801.3.9.3.5 May be used on all water mains, 4" and larger.

801.4 WATER VALVE DATA CARD: Water Valve Data Card, as shown on pages 801-5 and 801-6 shall be prepared for all types of valves (Gate Valves, Butterfly Valves, Pressure Reducing Valves, Air Release Valves, etc.) according to the following instructions.

801.4.1 A Water Valve Data Card will be prepared for each valve installed.

801.4.2 The Valve Number will be assigned by the OWNER at a later date.

801.4.3 Valve Size is the nominal diameter of the valve, i.e., 6-inch, 14-inch or 48-inch. In the case of compound valves give size of main valve and bypass valve, i.e., 24-inch and 4-inch, or 36-inch and 6-inch.

801.4.4 Valve Type is the general description of the valve, such as: Resilient-Seal Gate Valve, Butterfly Valve, Globe Valve, Check Valve, etc.

801.4.5 Make and Model refers to the manufacturer, make and model number to identify the valve for replacement parts. This information should be available from the shop drawings.

801.4.6 Number of Turns and Direction to Open is the number of revolutions of the operating nut to make the valve travel from fully closed to fully open, and the direction is either clockwise or counterclockwise, i.e., 54 turns counterclockwise. All standard valves shall open counterclockwise. Operation, turn count, and direction to open will be verified by the ENGINEER prior to installation.

801.4.7 Under Project Name is the assigned work order number.

801.4.8 Date Warranty Expires is the expiration date, under the contract, for requiring warranty repairs.

801.4.9 Street Location: Give both Block number and street name. For valves in intersections give both streets, i.e., 5200 San Mateo Blvd. NE and 3000 Candelaria NE.

801.4.10 The section on coordinate location shall be completed with information furnished by the ENGINEER.

801.4.11 All applicable items on the "Water Valve Data
Card" should be filled in. However, accuracy is more unknown and cannot be determined, leave the space blank.

CARD NO. 801.4
WATER VALVE DATA CARD
(Front Side)

MAP NO.	VALVE NO.	SIZE / TURNS	TYPE ☐ -B.F.V. ☐ -B.V. ☐ -R.S.G.V.	MAKE	MODEL	PROJECT	EMD ☐ -YES ☐ -NO

CHECKED														
DATE														
CREW														

"CHECKED" CODE:

O - OK L - LOST E - EXTENSION NEEDED C - NEEDS CLEANING

B - BROKEN M - LID MISSING R - RAISE TO GRADE

WARRANTY EXPIRES DEPTH TO OPER. LOCATION

CONTRACTOR EXTENSION LENGTH SKETCH EXACT LOCATION BELOW

NOTES: 1. Available at Water Systems Division.
2. Size 4 inches x 8 inches.

CARD NO. 801.4
WATER VALVE DATA CARD
(Reverse Side)

801.4.12 Depth to "Operator" is vertical distance from the top of actual valve operating nut to top of valve box cover.

801.5 FIRE HYDRANT DATA CARD

Fire Hydrant Data Card, as shown on page 801-8 shall be prepared for all installations of fire hydrants, according to the following instructions.

801.5.1 Fire hydrant number will be assigned by the OWNER at a later date.

801.5.2 Fire hydrant type refers to the manufacturer's make and model.

801.5.3 Location. Indicate both block number and street name. At intersections indicate both street names.

801.5.4 Date installed. Indicate actual date the hydrant was installed.

801.5.5 Depth. Indicate the actual depth in feet of the lower barrel of the fire hydrant. This depth is measured from the shoe to the break-away flanges of the hydrant.

801.5.6 On the reverse side of the card indicate the location of fire hydrant on the sketch.

801.6 WATER LINE CONNECTIONS

801.6.1 GENERAL : All new water line tie-ins to the existing water system shall be directly inspected and approved by the ENGINEER. This includes non-pressurized or pressurized connections that will result in extension of the existing system.

801.7 LOCATIONS OF WATER MAINS AND SEWER LINES

801.7.1 Unless otherwise authorized by the ENGINEER, parallel water and sewer lines shall be installed at least 10 feet apart horizontally, and the water line shall be at a higher elevation than the sewer. Separate trenches will be required in all cases (this shall be effective even though one line has been installed prior to the other), and the water line shall be at least 18 inches above the sewer; when water and sewer lines cross each other, the water line shall be at least 18 inches above the sewer; otherwise the sewer shall be of pressure class pipe extending between manholes, or concrete encased for 10 feet on each side of the water line as shown in the Standard Detail Drawings. The crossings shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints.

801.7.2 Water mains shall not be constructed under walkways, sidewalks, curbs and gutters, drivepads, or similar concrete structures by tunneling underneath them. Trenchless technologies may be allowed with prior approval by the OWNER. The CONTRACTOR will cut these structures by using a concrete saw or, at his option, he may remove and replace the section of the concrete structure to the nearest full expansion joint or edge.

801.8 TRENCHING AND BACKFILLING

801.8.1 All trenching and backfilling shall be in full accordance with Section 701. The minimum cover over distribution lines shall be 3 feet, and 4 feet of cover over transmission and collector lines.

801.9 GENERAL INSTALLATION ITEMS

801.9.1 Trenching, bedding, and backfilling shall comply with the requirements set forth in Section 701.

801.9.2 Pipe and accessories shall be new and unused and shall be handled in such a manner as to insure delivery to the trench in sound, undamaged condition. Particular care shall be taken not to injure the pipe coating. No other pipe or material of any kind shall be placed inside of a pipe or fitting after the coating has been applied.

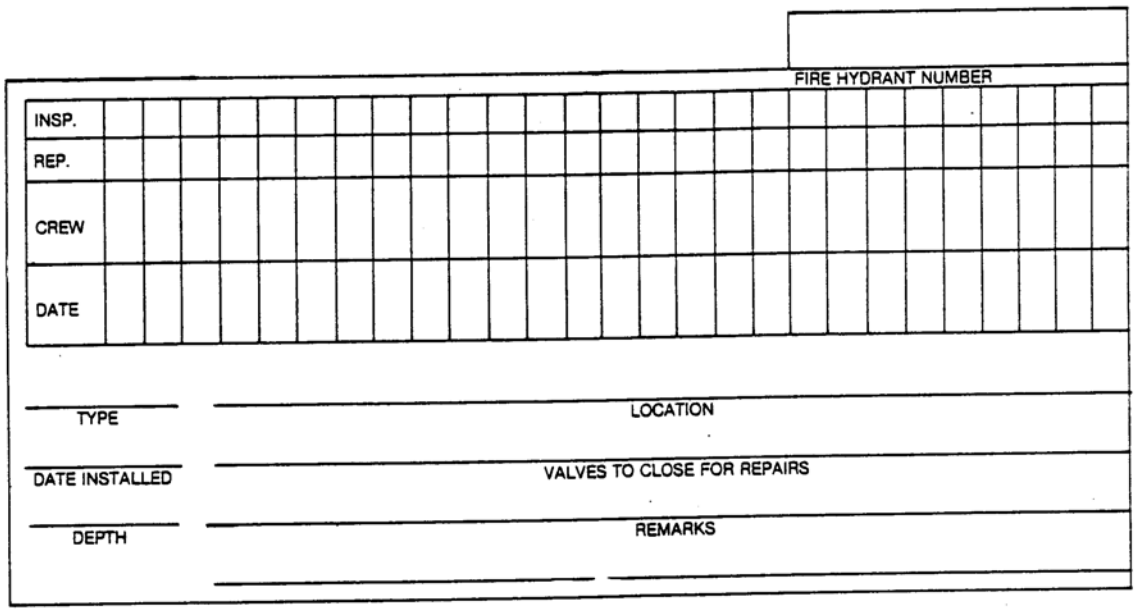
801.9.3 The interior of the pipe shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during operations by plugging or other approved methods. When work is not in progress, open ends of pipes and fittings shall be securely closed so that no other substances will enter the pipes or fittings. Any section of the pipe found to be defective before or after laying shall be replaced with sound pipe without additional expense to the OWNER.

801.9.4 All nuts and bolts utilized in underground pipe connections shall be stainless steel, high strength cast iron or high grade, high strength steel. The full length of each section of pipe shall rest solidly upon the bed, with recesses excavated to accommodate bells and joints. Any pipe that has the grade or joint disturbed after laying shall be taken up and relaid. Pipes shall not be laid in water or when trench or weather conditions are unsuitable for the work except by as authorized by the ENGINEER. All unconnected ends of pipes shall have a valve, plug, or cap installed on it.

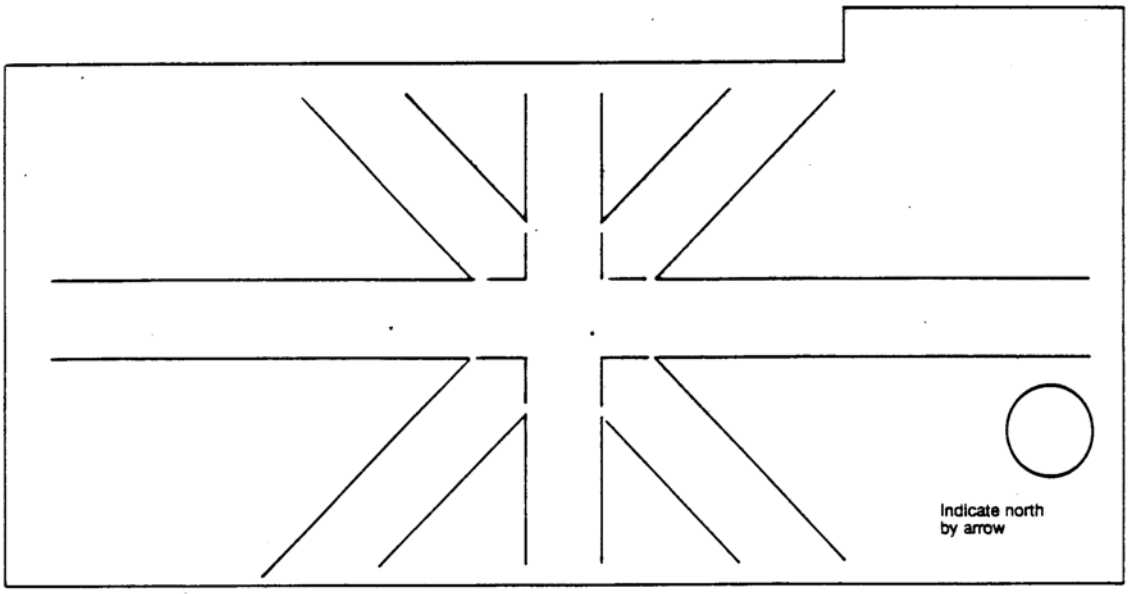
801.9.5 Pipe shall be laid to line and/or grade shown on the plans or as staked in the field. Changes in horizontal or vertical alignment of the pipe at a joint shall not exceed the manufacturer’s recommended deflection for the type and size pipe being laid. When the change required is more than the recommended deflection, a fitting or several short joints of pipe shall be used. PVC pipe may not be deflected at the joints.

CARD NO. 801.5

FIRE HYDRANT DATA CARD



FRONT SIDE



REVERSE SIDE

801.9.6 When new pipe is to be connected to an existing pipe or when crossing an existing pipe line, the CONTRACTOR shall excavate the existing lines well in advance of the laying of the new pipe line to enable the ENGINEER to verify their elevation and placement and to make any changes in grade and/or alignment of the new pipe line that may be required.

801.9.7 On all push-on-joints (bell and spigot, fluid-tite, and ring-tite) the rubber gasket shall be removed, cleaned, the groove cleaned, the gasket replaced, and the bell or plain end cleaned before jointing. The gasket and the bell or plain end of the pipe to be jointed shall both be lubricated with a suitable soft vegetable soap compound to facilitate jointing. Care shall be taken to insure that neither the bell or collar, or the pipe being jointed is damaged as it is being pushed home.

801.9.8 Flanged and mechanical joints shall be made with machine bolts and nuts of the proper size only. All components of these types of joints shall be cleaned before jointing. Only one (1) gasket will be permitted in a flange joint. In a mechanical joint the plain end pipe shall be fully seated before the gasket and gland is slipped up to the bell. Nuts on both types of joints shall be tightened by alternating nuts 180 degrees apart. The CONTRACTOR shall be responsible for assuring that proper torque is achieved and shall have a torque wrench available for verification by the ENGINEER.

801.9.9 When laying PVC pipe, a metalized detectable warning tape shall be installed a minimum of 1 foot above the top of pipe and 3 to 6 feet below the final surface. The tape shall be detectable with a standard metal pipe locator. The color of tape shall be safety precaution blue and will be inscribed at 10-foot intervals with the words, “CAUTION BURIED WATER LINE BELOW.” Tape shall be 2 inches wide. The tape shall be constructed of material that is impervious to alkalis, acids, chemical reagents, and solvents found in the soils.

801.9.10 When laying pipe, Electronic Marker Disks (EMDs) shall be installed in accordance with Section 170.

801.10 SPECIFIC PIPE LAYING REQUIREMENTS

801.10.1 Ductile iron pipe shall be installed in accordance with AWWA C 600 and as herein specified.

801.10.2 Steel pipe shall be installed in accordance with AWWA C 206 for welded joint and as herein specified. All field welded joints shall have one coat of coal-tar enamel of 3/32 inch thickness.

801.10.3 Plastic pressure pipe shall be installed in accordance with AWWA M 23 and C 900 and/or manufacturer’s printed recommendations, whichever is applicable. Where a conflict arises with this Specification, this Specification shall control. Trenching, embedment and backfill shall be specified in Section 701. A reference mark (a distinct circumferential line) is placed on the pipes spigot by the manufacturer to indicate the correct depth of the spigot penetration into the pipes gasket joint. If the pipe is seated too deep or too shallow, the pipe may buckle or separate due to thermal expansion/contraction, therefore particular attention must be exercised when jointing pipe. The reference mark must be showing and not farther than ½" from the leading edge of the bell. The CONTRACTOR shall verify that the manufacturer’s reference mark is correct per manufacturer’s literature.

801.10.4 All welded steel and concrete cylinder pipe shall have two small bond wires of low resistance, or other approved method, welded across the joint to make the joint electrically continuous. Where rigid joints are specified they shall be provided as specified herein. The outside joint recess shall be completely filled with a rich low shrinkage cement grout. The concrete surface in contact with the joint mortar shall be moistened with water just prior to pouring the joint recess. The mortar shall be poured into the joint recess against a waterproof paper or cloth diaper laid around and lapping the outside field joint. The diaper shall completely and snugly enclose the joint recess, being held in place by metal box strapping or wire. The mortar shall be poured into an opening slightly to one side on the top of the pipe and rodded by a flexible wire rod into place until it appears on the opposite side completely. After the joint recess has been filled with mortar, adjoining pipe sections shall not be disturbed. After the joint has been made, the concrete lining surfaces of the joint shall be moistened and the interior recess tightly jointed and troweled flush and smooth with the inside pipe surface. Grout for painting the interior joints shall be of a stiff consistency and shall have low shrinkage characteristics. In sizes of pipe smaller than 24", the mortar shall be buttered all around the shoulder inside the bell before the spigot is entered. A backing-up tool, such as an inflated rubber ball wrapped with burlap, shall be pulled through the joint to compact the mortar, completely fill the inside annular space and wipe off the excess mortar. Each joint will be inspected by the ENGINEER for proper and complete closure prior to final acceptance. Flanges shall be protected by “cocoon” type protection coating of coal-tar and felt in accordance with AWWA C 203. When moving individual pipe sections, the pipe shall be lifted using two web or belt type slings which support the pipe between the third and outside quarter points.

801.10.5 All fittings and valves shall be installed as per the type of joint as stated herein and/or as shown on the plans.

801.10.6 All couplings, clamps, sleeves, etc shall be installed as per the manufacturer's printed recommendations and as approved by the ENGINEER. The CONTRACTOR shall properly restrain all appurtenances as necessary.

801.10.7 All waterlines installed as part of a re-use system or other non-potable use shall be purple in color or shall be encased in purple PVC wrap.

801.11 CUTTING: The cutting of any type of pipe shall be done as per the manufacturer's printed recommendations, as approved by the ENGINEER. Care shall be taken in cutting any pipe that has an internal and/or external lining or coating.

801.12 BLOCKING AND RESTRAINED JOINTS

801.12.1 All restrained joints shall be by mechanical means unless directed or approved otherwise by the ENGINEER.

801.12.2 All tees, bends shall be restrained by mechanical means. Valves in runs need not be restrained, except that butterfly valves shall be flanged. Where rigid joints are called for on concrete cylinder pipe, the joints shall be flanged or field welded bell and spigot joints in accordance with the manufacturer's recommendation.

801.12.3 All caps and plugs on dead end lines will be mechanically restrained when feasible. Blocking may also be required when adequate restrain length is not available.

801.12.4 Where restrained joints on ductile iron pipe, or PVC pipe are called for on the plan, the mechanical restraining system employed shall conform to the recommendations of the pipe manufacturer. The restrained joint will be subject to the hydrostatic test specified herein.

801.13 RESTRAINING JOINTS FOR WELDED STEEL AND CONCRETE CYLINDER PIPE

801.13.1 Restrained joints in welded steel and concrete cylinder pipe for thrust restraint shall be produced by continuous welding the pipe joints and as shown on the plans.

801.13.2 Unless otherwise stated in the supplemental specifications the working pressure (operating plus transient) shall be 150 psi. The value for weight of overburden and the coefficient of friction shall be stated in the supplemental specifications.

801.14 TAPS INTO EXISTING CONCRETE CYLINDER PIPE

801.14.1 OBJECTIVE: The intent of this Subsection is to establish procedural and design criteria for making taps into existing concrete cylinder pipe for water distribution line extensions, and will be applicable to 4-inch and larger size water taps.

801.14.2 NEW WATER LINES: No non-factory taps will be allowed on newly-installed concrete cylinder pipes.

801.14.3 EXISTING WATER LINES:

801.14.3.1 Taps to existing concrete cylinder pipe must be approved in writing by the OWNER. The requester shall provide the following information:

801.14.3.1.1 Justification for the tap,

801.14.3.1.2 Project name and number, if applicable,

801.14.3.1.3 Date tap required,

801.14.3.1.4 Name of the CONTRACTOR who will be making the tap.

801.14.3.2 The CONTRACTOR shall coordinate the work with the OWNER before commencing work. The OWNER shall inspect and approve the entire installation of the tap.

801.14.4 INSTALLATION OF FIELD TAP:

801.14.4.1 Installation of field taps on concrete cylinder pipe shall be no smaller than 4 in. and no larger than 2/3 diameter of pipe to be tapped. No "weld neck" or weld on outlets will be used.

801.14.4.2 For field taps larger than 2/3 of pipe diameter, a tee will be inserted into the line.

801.14.4.3 For field taps greater than 4 in. and less than 2/3 diameter of pipe to be tapped an approved tapping saddle will be used. Tapping saddles shall be approved by the ENGINEER

801.15 SALVAGED MATERIALS
All salvaged materials (pipe, fittings, valves and other water line appurtenances) shall be stockpiled on-site in a neat manner by the CONTRACTOR. The ENGINEER and a representative of OWNER will inspect the stockpiled materials for salvage fitness and direct the following disposition:

801.15.1 If the material is considered salvageable, the CONTRACTOR will be directed to deliver the material to the OWNER. The CONTRACTOR will be responsible for the loading, transportation and off-loading of the salvageable materials. When the

materials are delivered, the CONTRACTOR shall obtain a signed receipt from the OWNER. Before final acceptance of the project, all signed receipts will be submitted to the ENGINEER for accounting purposes.

801.15.2 Materials that do not have salvageable value will be disposed of by the CONTRACTOR at no additional cost to the OWNER.

801.16 HYDROSTATIC TESTS:

801.16.1 The CONTRACTOR shall be required to perform hydrostatic tests in all water mains, laterals, dead ends, and service lines in accordance with AWWA C 600. The test shall be conducted in the presence of the ENGINEER or his authorized representative. The testing of the lines shall be done without being connected to existing lines unless approved by the ENGINEER. The CONTRACTOR shall provide all temporary plugs required. If connections to the existing lines are allowed by the ENGINEER, it is with the understanding that the CONTRACTOR assumes any and all responsibility in case of damage or failure of the existing system. Water used for disinfecting may be used for hydrostatic testing. Leakage through connections to the existing system, leaks in the existing lines, or leaking existing valves under the test pressure will invalidate the test. The lines shall be tested at 150 pounds, or 1.5 times the normal working pressure of the line, whichever is greater, for not less than two hours. All taps, gauges and necessary equipment shall be provided by the CONTRACTOR as approved by the ENGINEER, however, the ENGINEER may utilize gauges provided by himself if he so elects. Each section of the new line, between valves shall be tested to demonstrate that each valve will hold the test pressure. No installed pipe will be accepted if the leakage is greater than that determined by hydrostatic test sheet calculations in which L is the allowable leakage, in gallons per hour; S is the length of pipeline tested; D is the nominal diameter of the pipe in inches; and P is the test pressure in pounds per square inch gauge. During the test the test pressure should not lose more than 10 psig without being pumped back up to test pressure. The totals of the gallons of water required to hold the test pressure during the two hours and the amount of water required to return the line to the test pressure at the end of the test period is the total leakage. If the total leakage is less than the allowable, the line can be accepted. All visible leaks will be repaired regardless of the amount of leakage.

801.16.2 CONTRACTOR shall submit a testing plan to the ENGINEER for approval. In cases where a new main is being connected to an existing main without the installation of a new valve, the end of the new main shall be temporarily caped and blocked and a hydro-static test performed. Hydro-static tests should not be made such that an existing valve or existing main is included in the test section. Test Sheet on page 801-12 is the standard form which must be completed at the time of the test, signed by the ENGINEER and delivered to the OWNER prior to acceptance of the Project

801.17 DISINFECTING, FLUSHING, AND BACTERIA TESTING OF WATER LINES: New water lines shall be installed in such a manner as to not require cleaning by flushing. This shall require capping of stockpiled line, capping of lines at night and any other time work is not in progress, visual inspection of interior of lines, and cleaning as necessary, prior to placing in the trench. Every effort shall be made to prevent the entry of dirt and debris into pipelines under construction.

801.17.1 Mains shall be disinfected in accordance with AWWA C 651 or as required below with chlorine liquid solution, which is added by an approved method at one end of the lines as water is drawn through the lines and service connections. The chlorine solution shall remain in the line for at least 24 hours. The lines shall then be flushed until the chlorine residual is equal to the normal residual in the existing system or at 0.5 parts per million for unchlorinated water. Dry chlorine will not be used for disinfection of water lines. The flushed water will be disposed of by the CONTRACTOR appropriately.

801.17.2. Prior to the line being placed into service, bacteria samples shall be taken by the OWNER. Should results of the bacteriological analysis be unsatisfactory, the disinfection procedure shall be repeated.

801.17.3 The CONTRACTOR will be granted two free volumes of water for testing, disinfecting and flushing the new installation. All water used for testing, disinfecting and flushing shall be metered. If additional water is needed for these purposes, the water will be paid for by the CONTRACTOR at the current water rates. An approved backflow preventor system shall be used when withdrawing water from any waterlines and hydrants. Direct connection to the water system shall not be used for providing water for disinfecting, testing or flushing.

801.17.4 OWNER or the ENGINEER will collect the water sample to test the water in the existing lines at the point of delivery for assurance of clean and potable water. The water in the existing lines will be used for testing and flushing.

801.18 INTERFERENCE WITH SERVICE AND SCHEDULE OR WORK

801.18.1 The CONTRACTOR shall obtain the permission of the ENGINEER before making any

connections with existing mains. The required operation of existing valves will be performed by the OWNER as per Section 18.

801.18.2 Work shall be started after authorization of the

TEST SHEET 801.16.2

Test No.:_____ HYDROSTATIC TEST

PROJECT NAME:_____
DATE:_____

PROJECT NUMBER:_____
CONTRACTOR:_____

LOCATION:_____

_____
__

PIPE MATERIAL: _____ DIP _____ PVC _____ CCP _____Fabricated Steel

Test: Length (S) = _____ ft.
Size (D) = _____ inches
Pressure (P) = _____ psi - gauge (average test pressure during the hydrostatic test)
Leakage Allowed (L_{ALL}) - _____ gal / hr (L_{ALL} = SD P / 133,200 per AWWA C600-99)

Basis: Only resilient seated gate valves and/or rubber seated butterfly valves are used. No metal seated valves are allowed.

Total Leakage Allowed for 2 hour Test Period: L_{ALL} * 2 hours = _____ gallons

Actual Amount of Water ADDED to maintain 150 psi ± 5 psi for 2 hours = _____ gallons

If actual amount of water added is LESS THAN total leakage allowed, test PASSED
If actual amount of water added is GREATER THAN total leakage allowed, test FAILED

_____ Test Passed _____ Test Failed

_____ _____ _____ _____
Contractor Date Inspector Date

_____ _____
Project Manager Date

COMMENTS:
_____

_____

_____
_
_____

Note: See Section 801.16 for the Specification for test procedure.
A0224B/D2376B
ENGINEER and shall be completed in a prompt efficient manner in coordination and cooperation with other utilities concerned.

801.18.3 The CONTRACTOR will be required to arrange his construction program with a view of maintaining continuous service to water users, from existing facilities, to the fullest extent possible. He shall, at all times, withhold construction work, where any conflict in the service requirements occur.

801.19 NOTIFICATION OF COMPLETION

The CONTRACTOR shall notify the ENGINEER, in writing, when the CONTRACTOR has completed construction of a water line. This notification should be submitted immediately upon completion; the water line will not be placed in service by the OWNER before the sewer service and the street are in place and until the OWNER has received and accepted all adequate documentation submittals. OWNER shall consider, on a case by case basis, exceptions for fire protection purposes.

801.20 VALVE CAN REHABILITATION

801.20.1 The rehabilitation of existing valve cans as shown on the plans or as authorized by the ENGINEER shall include the following:

801.20.1.1 Removing the existing valve can and ring and cover and installing the new type can and cover.

801.20.1.2 Install a new concrete collar in paved and unpaved areas. Size and direction of the line should be noted on the collar.

801.20.1.3 The existing ring and cover shall be considered salvaged materials.

801.20.1.4 Removal and replacement of the pavement.

801.20.1.5 Excavation, backfill, and compaction.

801.20.1.6 All materials, labor, and equipment necessary to do the work.

801.20.2 The work under this item shall be constructed per the Standard Detail Drawings.

801.21 DOCUMENTATION SUBMITTALS

801.21.1 At the time of the final inspection the following documentation will be submitted to the ENGINEER and OWNER:

801.21.1.1 Hydrostatic test data of the new water line system.

801.21.1.2 Microbiological test reports which were taken at representative locations along the system.

801.21.1.3 Fire hydrant and valve cards. All valves at that time shall be in the open position, unless otherwise authorized by the ENGINEER and OWNER.

801.21.1.4 A marked-up set of construction drawings reflecting as-built conditions. This does not supplant the requirements for record or as-built drawings.

801.22 MEASUREMENT AND PAYMENT

801.22.1 PIPE: Payment for all sizes and types of pipe shall be made on the basis of measurement per linear foot, including the length of fittings, valves, etc. The contract unit price of pipe shall include all jointing and coupling materials necessary for its installation and connections to other sections of pipe, except for fittings, valves or other appurtenances. The cost of hydrostatic testing, flushing and disinfecting of new water lines shall be included in the contract unit price for the item in place. Pipe locator tape for pipe shall be included in the contract unit price of the pipe.

801.22.2 DEPTH OF TRENCH:

801.22.2.1 The contract unit price for pipe and appurtenances in all cases shall include the trenching, installation, and compacted backfilling for trench cuts as specified in Section 701.

801.22.2.2 Payment for additional depth, below the specified limits shall be made on the contract unit price per vertical foot per linear foot, and shall include trenching, installation of pipe and appurtenances, and compacted backfilling in the deeper trench.

801.22.3 REMOVAL AND RELAY, RETURN, OR DISPOSAL OF PIPE:

801.22.3.1 The contract unit price for removal and relaying pipe shall include all labor and new gasket material necessary to remove and reinstall pipe in another location.

801.22.3.2 The payment for removing and the delivery 2-1/4 inch to 14 inch pipe to the Water Utility Division in the City Yard as salvage materials shall be made on the unit price per linear foot. Only cast iron or ductile iron pipe that is undamaged will be considered for salvage.

801.22.3.3 Where there is no salvage value of the

pipe, the pipe shall be removed and disposed of by the CONTRACTOR. The payment for removal shall be made on a unit price per linear foot; there will be no additional cost to the OWNER for disposal.

801.22.3.4 The payments for removal and relaying, removal and return, or removal and disposal shall include trenching and compacted backfilling.

801.22.4 CAST IRON AND DUCTILE IRON FITTINGS:

801.22.4.1 All cast iron and ductile iron fittings shall be measured and paid for at the contract unit price per pound based on weights of an all mechanical joint ends fitting for the type and size of fitting used as specified in AWWA C 110, regardless of the type of ends on the fitting installed. The contract unit price per pound of fittings shall include all gaskets, glands, bolts and nuts required, no separate payment will be made for these items.

801.22.4.2 When the CONTRACTOR installs a OWNER-furnished fitting and replaces that fitting in the OWNER's inventory, the CONTRACTOR shall be paid the full contract unit price of that fitting as outlined above. If the CONTRACTOR does not replace the fitting in the OWNER's inventory the payment to the CONTRACTOR will be at the contract unit price of the fitting less the cost of the fitting itself.

801.22.4.3 Fitting insertion: The insertion of a fitting into an existing pipe line shall be measured and paid for at the contract unit price per pound based on weights of an all mechanical joint end fitting and if required an all mechanical joint connecting piece (coupling) of the type fitting and size used, as specified in AWWA C 110, regardless of the type of ends on the fitting and coupling installed. This payment shall include all compensation for the excavation, cutting and removal of the existing pipe, installation of the fitting and coupling, if required, the recutting of the existing pipe or new pipe installed between the fitting and coupling, and backfill and compaction complete in place. In addition to the payment for the fitting insertion, the CONTRACTOR shall be paid for one each non-pressurized (wet) connection and if pavement, curb and gutter, sidewalk, drivepad, etc., are removed, these items will be paid for as part of the appropriate item.

801.22.5 REMOVAL AND RELAY, RETURN OR DISPOSAL OF PIPE APPURTENANCES:

801.22.5.1 The contract unit price for removal and relaying the appurtenances shall include all labor and new gasket material necessary to remove and reinstall the item in another location.

801.22.5.2 The payment for removing and returning 2 1/4 inch to 36 inch appurtenance to the OWNER as salvaged material shall be made on the contact unit price per each or unit price per pound. Only undamaged material will be considered for salvage.

801.22.5.3 Where there is no salvage value of the appurtenance, the item shall be removed and disposed of by the CONTRACTOR. The payment for removal shall be made on the contract unit price per each or contract unit price per pound; there will be no additional cost to the OWNER for disposal.

801.22.5.4 The payment for removal and relaying, removal and return, or removal and disposal shall include trenching and compacted backfilling.

801.22.5.5 Only cast iron or ductile iron appurtenances will be removed and relaid or removed and returned for salvage.

801.22.5.6 Fire hydrant relocation payment shall be the contract unit price per each for removal and reinstallation and shall include excavation, blocking, aggregate and compacted backfilling, as shown in the Standard Detail Drawings.

801.22.6 CONCRETE CYLINDER OR WELDED STEEL PIPE FITTINGS:

Concrete cylinder or welded steel pipe fittings, such as flanged outlets, bends, reducers, etc., shall be considered as incidental to the contract unit price for installation of the pipe, as shown on the construction plans.

801.22.7 COUPLINGS: The measurement for steel or cast iron couplings shall include payment for all gaskets, bolts, and incidental materials as may be needed for its complete installation. Payment shall be made on the contract unit price per each size of coupling required.

801.22.8 STEEL FITTINGS: Steel fittings shall only be used when authorized by the ENGINEER and when needed to connect to an existing steel water line. Measurement and payment for steel fittings, when authorized, shall be made at the contract unit per pound based on weights of an all mechanical joint ends fitting of the type fitting and size used, as specified in AWWA C 110. This payment shall include all fabrication and welding required on the fitting.

801.22.9 VALVE AND VALVE CANS:

801.22.9.1 Valves shall be measured and paid for at the contract unit price per each size of valve. The contract unit price for valves 24-inch and larger shall include the bypass valve, fittings and piping, complete

in place.

801.22.9.2 Valve boxes shall be measured and paid for at the contract unit price per each per type of valve boxes, which payment shall include the concrete pad with stem extension when required, complete in place.

801.22.10 FIRE HYDRANTS: Fire hydrants shall be measured and paid for at the contract unit price per each per depth of bury, which payment shall include excavation, gravel drain pocket, mechanical restraining system or blocking, backfilling, and compaction complete in place.

801.22.11 VALVE BOX ADJUSTMENTS:

801.22.11.1 Valve box adjustment using the adjustment collar and insert shall be measured and paid for per each complete in place including the concrete pad.

801.22.11.2 When the adjustment height required on a valve box exceeds the height of the adjustment collar or the valve box has been previously adjusted, the valve box will have to be rehabilitated. Measurement and payment shall be made as specified under Valve Box Rehabilitation.

801.22.12 WATER LINE CONNECTIONS:

801.22.12.1 Nonpressurized Connections: Nonpressurized connections shall be measured and paid for at the contract unit price per each for any size or type of pipe, complete in place, which shall include any extra excavation required, shut-off coordination, the removal of any caps or plugs or the cutting of the existing pipe any number of times required to make the connection, drainage plan (if required), pumping or handling of the water, backfilling and compaction. Fittings shall be measured and paid for per pound as specified herein, including all types of couplings.

801.22.12.2 Pressurized Connection: Pressurized connections shall be measured and paid for at the contract unit price per each per location shown on the plans, complete in place, which shall include excavation, the cleaning or removal of existing pipe coatings and coverings, air testing, the tapping, any grouting required, backfilling and compaction. The installation of the tapping sleeve and gate valve is to be paid under separate item or as indicated on the plans.

801.22.12.3 Connection to Steel Water Lines: All connections to existing steel water lines shall be made by using a transition coupling. The measurement and payment for this type of connection shall be made per pound of fitting for a Mechanical-Joint Connecting Piece of the size used based on the weights specified in AWWA C 110.

801.22.13 THRUST RESTRAINTS:

801.22.13.1 CONCRETE BLOCKING: When concrete blocking is used as a substitute for a mechanically restrained joint as authorized by the ENGINEER, the blocking shall be measured and paid for at the contract unit price per cubic yard placed to the neat lines shown on the plans or per the Standard Detail Drawings.

801.22.13.2 RESTRAINING JOINTS FOR WELDED STEEL OR CONCRETE CYLINDER PIPE: Measurement and payment for this item shall be at the contract unit price per linear inch of circumferential weld, complete in place, including protective coating of the weld.

801.22.13.3 MECHANICALLY RESTRAINED JOINTS: Mechanically restrained joint assemblies shall be measured and paid for at the contract unit price per each assembly per size of the pipe per each type (pipe to pipe, pipe to mechanical joint, pipe to fitting, etc.) complete in place.

801.22.13.4 VALVE ANCHORAGE: No separate measurement nor payment shall be made for valve anchorage as per Standard Detail Drawing. The cost of this work shall be included with the cost of the valve.

801.22.14 PRESSURE REDUCING VALVE (PRV): Measurement and payment for furnishing and installing a PRV shall be made at the contract unit price per each per size, complete in place as shown on the plans or in the Standard Detail Drawings. The payment shall include all labor, equipment and material required for the excavation, the PRV, all by-pass piping, fittings and valves both inside and outside the structure, the structure, backfilling and compaction.

801.22.15 AIR RELEASE VALVE (ARV): Measurement and payment for furnishing and installing an ARV shall be made at the contract unit price per each per size of ARV, complete in place as shown on the plans or in the Standard Detail Drawings. The payment shall include all labor, equipment and materials required for the excavation, ARV, piping, fittings, gate valve, can or structure, backfilling, and compaction.

801.22.16 VALVE BOX REHABILITATION: Valve box rehabilitation shall be measured and paid for at the contract unit price per each, complete in place which shall include the removal of the existing valve box, excavation, the new valve box installed, backfilling, compaction and the installation of the concrete collar.

801.22.17 CONCRETE STRUCTURES: The removal and replacement of concrete structures such as sidewalks, drive pads, and curb and gutters etc., required for the installation of water lines shall be measured and paid for as specified in Section 340 and

343.

801.22.18 BEDDING MATERIAL: No separate measurement nor payment shall be made for bedding material required when shown on the plans or when required due to the type of pipe supplied by the CONTRACTOR. The cost of the bedding material shall be included in the unit price of the pipe. If bedding material is not required by the conditions above but is required due to the conditions encountered during construction then the bedding material shall be measured and paid for as specified in Section 701.

801.22.19 SURPLUS MATERIALS: No separate measure nor payment will be made for the removal and disposal of surplus material generated by the pipe, bedding material or the use of lean fill.

SECTION 802

INSTALLATION OF WATER SERVICE LINES

802.1 GENERAL: This section pertains to the water service line which extends from the distribution line to the water meter.

802.2 REFERENCES

802.2.1 American Society for Testing and Materials (Latest Editions) (ASTM)

A-48 Specification for Gray Iron Castings
B-62 Specification for Composition Bronze or Ounce Metal Castings
B-88 Specification for Seamless Copper Water Tube
D-2000 Classification System for Rubber Products in Automotive Applications

802.2.2 American Water Works Association (Latest Editions) (AWWA)

C-800 Underground Service Line Valves and Fittings

802.3 MATERIALS

802.3.1 SERVICE LINE FITTINGS: All service line fittings shall be in full compliance with the latest revision of AWWA Standard C 800, except as modified herein. Service line fittings will be of brass which has a composition of 85 percent copper, 5 percent tin, 5 percent lead, and 5 percent zinc. Fittings will be of the type required for the type of service line being installed. All stops shall be of the round, full opening type with no restriction in the opening less than the nominal size. Fittings incorporating a threaded plastic gripper and "O" ring seal may be utilized in lieu of the flared configuration. All service pipe and fittings shall be designed to sustain and operating pressure of 150 psi.

802.3.2 COPPER SERVICE PIPE: The 3/4" to 2" copper service pipe shall conform to ASTM B 88 and shall be Type K, unless otherwise specified. Copper tubing shall be bent with approved tube benders without any kinks or sharp bends. Cutting of tubing will be performed with cutters designed for that purpose.

802.3.3 TAPPING SADDLES:

802.3.3.1 Service saddle bodies shall be of cast iron, ductile iron or bronze; straps, nuts, bolts, and washers shall be of stainless steel or bronze; gaskets shall be vulcanized elastomeric rubber or synthetic rubber compound.

802.3.3.2 The saddles shall be tapped for the type of thread being used on the corporation stop.

802.3.3.3 Tapping saddles for PVC C900 pipe shall have bronze straps and shall be installed as per the manufacturer's printed recommendations.

802.3.4 METERS: Meters are furnished and installed by OWNER for new service line installations. For replacement and relocation work the meters will be furnished by the OWNER and installed by the CONTRACTOR.

802.3.5 METER

802.3.5.1 METER BOXES FOR 3/4"-1" Meters:

802.3.5.1.1 Meter boxes with two meters shall be centered on adjacent property lines.

802.3.5.1.2 The meter box is to be part of an underground enclosure for water meters and will have a cast iron cover plate or lid.

802.3.5.1.3 Meter box will be cast in one piece to form a hollow rectangle and new material or recycled materials shall be used in its manufacture.

802.3.5.1.4 The box material shall have the following minimum mechanical properties at variable ambient temperatures of -20°F to 120°F: compressive strength = 10,000 psi, tensile strength = 1,500 psi and flexural strength = 7,500 psi.

802.3.5.1.5 During testing of the materials at the above ambient temperatures no visual cracking, crazing, checking, blistering, surface pitting or deformation will be noted.

802.3.5.1.6 The finished meter box shall have the following physical properties:

802.3.5.1.6.1 Maximum wall deflection shall not exceed 1/8" at any one point when subjected to earth pressures or forces created during backfilling.

802.3.5.1.6.2 Material used for making the box shall be non-biodegradable when buried and/or exposed to water. Life expectancy of the box shall be at least 20 years.

802.3.5.1.6.3 Overall weight of the box component shall not exceed 80 pounds.

802.3.5.1.6.4 Inside dimensions of the box shall be: width = 16 ½ inches, length = 22 ½ inches, and depth = 24 inches. See Standard Detail Drawings for further

dimensions and configurations. This meter box is for one and two meter installations.

802.3.5.1.6.5 Inside and outside surfaces of walls shall be reasonable smooth and free of burrs.

802.3.5.1.6.6 All materials used for box construction shall be approved for use in domestic water supply system.

802.3.5.2 METER COVER AND LID:

802.3.5.2.1 Lightweight and heavyweight meter box covers and lids shall be of Gray Iron casting materials. The light weight type is for use in sidewalk and unpaved areas not subject to traffic loads. The heavyweight type is for use in driveways and along streets having mountable curbs. The size, dimensions and details of the castings are as shown in the Standard Detail Drawings.

802.3.5.2.2 The casting shall conform to ASTM A 48, Class 30. The castings shall be true to pattern in form and dimensions and be free from pouring faults, sponginess, cracks, blowholes or other defects. Castings shall be filleted boldly at angles and arises shall be sharp and true. Edges shall be rounded or chamfered. The castings shall be thoroughly cleaned and the parting lines, grates, and risers ground flush. The lid shall seat firmly in the cover without rocking. The lid top surface shall be flush with the top surface of the cover. The lid shall be easily removed from the cover.

802.3.5.2.3 The cover and lid shall have, integrated in the casting top, a corrugated design to provide a nonslip surface. The lid shall have, integrated in the top of the casting, the words “WATER METER.” The cover and lid shall be asphalt painted with coal tar paint. The paint thickness shall not exceed 30 mils.

802.3.5.3 METER BOX FOR 1 ½" AND 2" METERS:

802.3.5.3.1 The meter box is to be part of an underground enclosure for water meters.

802.3.5.3.2 The material used for manufacturing the box, cover and lid shall be new or recycled materials and shall have the following minimum mechanical properties at ambient temperatures from -20°F to 120°F: compressive strength = 11,000 psi, tensile strength = 1,700 psi and flexural strength = 7,500 psi.

802.3.5.3.3 During testing of the materials at the above ambient temperatures no visual cracking, crazing, checking, blistering, surface pitting or deformation will be noted.

802.3.5.3.4 The finished meter box shall have the following physical properties:

802.3.5.3.4.1 Box, cover and lid shall be rated for a load capacity of 1,000 lbs over a 4" x 4" area.

802.3.5.3.4.2 The overall weight of the box, cover and lid and extension shall not exceed 80 lbs.

802.3.5.3.4.3 Maximum wall deflection shall not exceed 1/8" at any one point when subjected to earth pressures or forces created during backfilling.

802.3.5.3.4.4 The material used for making the box shall be non-biodegradable when buried underground and exposed to water.

802.3.5.3.4.5 The minimum dimensions of the box, cover and lid shall conform to the Standard Detail Drawings.

802.3.5.3.4.6 The walls inside and outside of the box shall be reasonably smooth and free of burrs.

802.3.5.3.4.7 Cover of the meter box must have a non-skid surface and have “WATER METER” inscribed on the top. The cover shall be secured to the box by bolts.

802.3.5.3.4.8 All materials used for constructing the box, cover and lid shall be approved for use in domestic water supply systems.

802.3.5.4 LOCATIONS OF METER BOXES: Meter Boxes shall be located within the right-of-way as shown on Standard Detail Drawings.

802.3.6 CORPORATION STOP: Corporation stop shall be AWWA thread inlet by compression-type outlet or Pack Joint to fit 3/4", 1", 1 ½" and 2" copper tubing. The socket-housing or the rotating ball shall be PTFE coated to avoid metal to metal contact, ensure adequate seal and provide smooth turning operation. Outlet shall have a nominal size Standard AWWA C-800 copper service thread to fit existing OWNER drilling and tapping machine equipment. All casting shall be ASTM B-62 and outlet seals shall be Buna-N

802.3.7 TAILPIECE: The service will be placed in the meter box with a copper tubing tailpiece for 3/4" to 2", protruding from the standard concrete pad into the owner’s property with a Pack Joint capped fitting to which the plumber can connect.

802.3.8 COPPERSETTERS: Coppersetters shall have pipe connections for Type K Copper Tubing. The coppersetter shall be an assembly of brass and copper tubing with a bottom bar, shall have a bronze ball valve on the inlet side of the meter, and shall be furnished with coupling gaskets. Coppersetters shall have

temporary threaded plugs in the meter connections and shall be furnished free of excess grease. A stabilizer bar of 12 inches by ½ inch galvanized pipe shall be inserted in the yoke assembly as shown on the Standard Detail Drawings. A coppersetter with dual check valve shall be installed as per the Cross Connection Control section.

802.3.9 CROSS CONNECTION CONTROL: Aproved dual check valves shall be installed on all services as indicated on the plans. For water customers having private wells located that connect to the municipal water system shall: agree to completely sever the private well from the premises existing plumbing system and install an approved dual check valve at the water meter. The owner of the premises shall also sign a covenant that runs with the land that the private well shall not be re-connected to the premises previous plumbing.

802.4 SERVICE LINE INSTALLATIONS

802.4.1 NEW 3/4" TO 2" SERVICE LINES:

802.4.1.1 New Service lines are complete new services in accordance with Standard detail Drawings and shall include the following:

802.4.1.1.1 Furnish and install tapping saddle, corporation stop, tubing, coppersetter, meter box, cover and lid and tailpiece, complete in place, including excavation and backfill and flushing.

802.4.1.2 Meters will not be installed as part of this work. However, construction of the meter box and placement of the yoke shall be such that at a later date the meter may be installed properly and easily.

802.4.1.3 The CONTRACTOR shall be responsible for proper vertical and horizontal location of the box over the meter yoke.

802.4.2 REPLACEMENT 3/4"-2" SERVICE LINES:

802.4.2.1 Replacement service lines are essentially new services installed in conjunction with the replacement of the water main. Unless otherwise specified in the Contract Documents, all existing services shall be replaced with new material between the water main and the meter yoke.

802.4.2.2 Replacement service line work does not include any relocation or rehabilitation of the meter. The work shall consist of the following:

802.4.2.2.1 Furnish and install tapping saddle, corporation stop, coppersetter and tubing, complete in place, including flushing.
802.4.2.2.2 Re-connection to the meter.

802.4.2.2.3 All necessary excavation and backfill and concrete removal and replacement.

802.4.3 3/4" thru 2" METER RELOCATION:

802.4.3.1 A meter relocation is the relocation of an existing meter to a position closer to or further away from the centerline of the street. The meter relocation item is to be used when the service line is not replaced.

802.4.3.2 A new meter box and cover shall be furnished and installed.

802.4.3.3 A coppersetter shall be used in the reinstallation of the meter, for services sized 3/4" thru 2", and shall be of a height to properly position the meter, vertically, within the box, as shown in the Standard Detail Drawings.

802.4.3.4 When moving the meter toward the property line, new tubing shall be installed, from the inlet connection point of the meter to be relocated, to the coppersetter, and a tailpiece shall be installed on the outlet side of the coppersetter to the property line. When the existing meter is moved toward the street, the gap in the service line shall be filled with new tubing, including connectors.

802.4.3.5 When determined by the OWNER, the existing meter shall be replaced by the CONTRACTOR with a meter furnished by the OWNER. 1" meters will be substituted for 1-1/4" meters.

802.4.3.6 The work and materials shall include the coppersetter, connector pieces, excavation, tubing, backfill, removal of old meter and meter box, installation of new meter, meter box, and concrete pad, necessary disconnections, and connections of the house and meter box service lines, complete restoration of the affected site (including landscaping) and adjustment of the meter to the level shown in the Standard Detail Drawings.

802.6 3/4" thru 2" METER REHABILITATION AND REPLACEMENT

802.6.1 3/4" THRU 2" METER REHABILITATION:

802.6.1.1 Meter rehabilitation is applicable where the meter box deficiency exists. Deficiencies include obsolete, broken above or below grade, improperly sized, or existing location does not allow access to the meter, curb stop or connector pieces (does not meet new installation standards). When any of these conditions exists, the meter box and meter installation shall be rehabilitated, as authorized by the ENGINEER.

802.6.1.2 The work and materials shall include:

802.6.1.2.1 Furnish and install a new coppersetter, meter box, cover and lid and concrete pad.

802.6.1.2.2 Furnish and install any reconnection pieces necessary for a complete service restoration.

802.6.1.2.3 Flushing out of the service line.

802.6.1.2.4 Site restoration (including any necessary landscaping) and cleanup.

802.6.2 3/4" thru 2" METER REPLACEMENT: Meters to be replaced under “Service Line Replacement” and “Meter Relocation” work shall be performed in accordance with the following procedure:

802.6.2.1 All existing meters involved with “Service Line Replacement” and “Meter Relocation” work shall be replaced by the CONTRACTOR with a meter provided by the OWNER as determined by the OWNER.

802.6.2.2 The replacement meter shall be requested, in writing by the CONTRACTOR from the OWNER with documentation of address and size meter for each meter to be replaced, project name and number, and CONTRACTOR’s name.

802.6.2.3 The request shall be received at least seven days prior to issuance of meters.

802.6.2.4 The CONTRACTOR will be issued a directive with each meter issued. The CONTRACTOR shall return the directive along with the replaced meter, within five days of replacement of the meter to the OWNER.

802.6.2.5 The work order must be turned in with the specific meter for which the meter replacement was issued. The replaced meter shall have a tag affixed to the meter, by the CONTRACTOR, showing the CONTRACTOR’s name, and project name and address from which the meter was removed.

802.6.2.6 The CONTRACTOR shall handle all meters so as not to damage them and shall be responsible for the meters from the time of receipt to turn in. Stolen or lost meters shall be replaced at the CONTRACTOR’s expense.

802.7 METER PIT FOR SERVICES 3" AND LARGER: Meter pit construction details and the installation of the pipe, valves and meter details will be shown on the construction plans.

802.8 MEASUREMENT AND PAYMENT

802.8.1 METERED SERVICE LINE INSTALLATIONS: For 3/4 inch thru 2 inches, new service lines, service line replacements and transfers, meter relocations, and meter replacements, and meter rehabilitation shall be measured and paid for as a completed unit of installation in accordance with the applicable items contained in the Bid Proposal, which payment shall include all materials, labor and equipment required to install, flush and place into service the applicable item.

802.8.2 SERVICE LINE TUBING: Unless otherwise authorized in the Contract Documents or by the ENGINEER, service line tubing shall be considered incidental to the applicable pay item established in the Bid Proposal.

802.8.3 PAVEMENT REMOVAL AND REPLACEMENT: Unless otherwise authorized in the Contract Documents or by the ENGINEER, pavement removal and replacement shall be considered incidental to the applicable pay item established in the Bid Proposal.

SECTION 910

STORM SEWER PIPE INSTALLATIONS

910.1 GENERAL

910.1.1 The construction items, specified in this section, are common to storm sewer pipe installation and pipe type culverts.

910.1.2 Reinforced concrete pipe may be used for storm sewer pipe installations or pipe type culverts. Corrugated metal pipe will only be used for pipe-type culverts.

910.2 REFERENCES

910.2.1 ASTM

C 43	C 478
C 361	D 3034
C 425	F 679
C 443	

910.2.2 AWWA

C 603

910.2.3 This publication per SECTIONS:

101	125
102	129
105	135
106	136
108	137
121	161
123	801
124	

910.3 MATERIALS

910.3.1 PIPE: Sewer line pipe and fittings shall be as specified in other sections, as follows:

Reinforced Concrete Pipe	Section 123
Reinforced Concrete Pressure Pipe	Section 124
Corrugated Metal Pipe and Arches	Section 135
Structural Plate for Pipe, Arches, and Pipe Arches	Section 136
Corrugated Aluminum Pipe and Arches	Section 137

910.4 CERTIFICATION

The OWNER/ENGINEER will be supplied with a certification on each item or type of material required in the sewer line, as to that item meeting the specifications and/or the reference specifications before that item is installed.

910.5 INSTALLATION

910.5.1 GENERAL:

910.5.1.1 Pipe and appurtenances shall be new and unused. The type of pipe to be installed shall be as approved by these specifications or unless otherwise shown on the drawings. Pipe and appurtenances shall be handled in such a manner as to insure delivery to the trench in sound, undamaged condition. Particular care shall be taken to prevent damage to any pipe coating.

910.5.1.2 The interior of the pipe shall be thoroughly cleaned of foreign material before being lowered into the trench and shall be kept clean during construction operations. When work is not in progress, the open ends of pipe shall be securely closed so that no foreign materials will enter the pipe. Any section of pipe found to be defective before or after laying shall be replaced with sound pipe, or repaired in a manner satisfactory to the ENGINEER, without additional expense to the OWNER.

910.5.1.3 The CONTRACTOR shall install a plug in the new sewer at any point of connection to an existing system. The plug shall remain in place until the ENGINEER authorizes its removal in writing. The CONTRACTOR shall not flush or otherwise discharge any flow into an existing system unless approved in writing by the ENGINEER.

910.5.1.4 Pipe shall be laid to line and grade as shown on the plans and as staked in the field. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel. Suitable excavation shall be made to receive the bell of the pipe and the joint shall not bear upon the bottom of the trench. All adjustment to the line and grade shall be made by scraping away or filling in with pipe zone material under the body of the pipe, and not by wedging or blocking. When connections are to be made to any existing manhole, pipe, or other improvement, the actual elevation or position of which cannot be determined without excavation, the CONTRACTOR shall excavate for and expose the existing improvement before laying the connecting pipe or conduit. When existing underground improvements may reasonably be expected to conflict with the line or

grade established for the new sewer line, the ENGINEER shall request and the CONTRACTOR shall excavate as necessary to expose and locate such potentially conflicting underground improvements prior to laying the new pipe. Any adjustment in line or grade which may be necessary to accomplish the intent of the plans will be made, and the CONTRACTOR will be paid for any additional work resulting from such change in line or grade in the manner provided for in the General Conditions.

910.5.1.5 CONTRACTOR shall submit to the ENGINEER the proposed method for making connections to existing manholes. Connection methods will be dependent upon manhole size and pipe sizes. Unnecessary damage to the existing manhole should be avoided.

910.5.1.6 Pipe shall be laid upgrade in a continuous operation from structure to structure, with the socket or collar ends of the pipe upgrade unless otherwise permitted by the ENGINEER. Concrete pipe with elliptical reinforcement shall be laid with the minor axis of the reinforcement cage in a vertical position. Corrugated metal pipe shall be laid with the external laps of the circumferential seams toward the inlet end.

910.6 JOINTS FOR PIPE

910.6.1 JOINT FOR CONCRETE PIPE:

910.6.1.1 The type of joint to be used shall be O-ring rubber gasket joints conforming to ASTM C 361 and C 443.

910.6.1.2 Gasketed Type of Joints for Reinforced Concrete Pipe

910.6.1.2.1 General--The ends of the pipe shall be so formed that when the pipes are laid together and joined, they shall make a continuous and uniform line of pipe with a smooth and regular surface.

910.6.1.2.2 Rubber gaskets for making compression-type joints for concrete pipe shall be factory fabricated in accordance with ASTM C 443; for pipes 12 inches in diameter and larger shall be O-ring and shall be handled, primed, installed, etc. in strict accordance with the manufacturer's recommendations.

910.6.1.2.3 The CONTRACTOR'S attention is particularly called to ASTM C 443, regarding storage of gaskets.

910.6.1.2.4 The CONTRACTOR shall furnish the ENGINEER complete information concerning the type and make of all joint material which he intends to use under the contract, including certification that the joint material meets the requirements of the specifications.

910.6.2 JOINTS FOR CORRUGATED METAL PIPE:

910.6.2.1 The seams of the pipe are to be placed at the sides, not on the bottom. The inside circumferential seams should be placed pointing downstream. Care should be taken to insure that dirt or other particles do not get between the outside of the pipe and the pipe coupling. Paved inverts should be placed and centered on the bottom of the trench. Any damage to the protective lining and coating shall be repaired prior to the backfilling around the pipe.

910.6.2.2 If waterproof joints are called for on the plans or specified in the Supplementary Specifications, the caulking compound or other waterproofing material used shall be subjected to the approval of the ENGINEER.

910.7 TESTING FOR LEAKAGE

Normally storm sewer lines need not be tested, but if in the opinion of the ENGINEER, the workmanship or materials do not appear to be satisfactory, the ENGINEER may require that a section of the storm sewer line be tested in a similar manner as that for a sanitary sewer line, see Section 905.

910.8 CLEANING AND INSPECTION

910.8.1 CLEANING: No pipe spalls, rocks, dirt, joint compounds, cement mortar and other trash or obstructions shall be left in a sewer pipe of any size or type. During flushing operations the manhole outlet shall be bagged or plugged so that the debris will not be carried into an existing active line.

910.8.2 INSPECTION: Before lines become operational or final acceptance of the installation, small size lines shall be inspected by a television camera and larger size lines will be inspected by walking through the line.

910.8.3 TELEVISION: After the CONTRACTOR has cleaned and flushed the line, the CONTRACTOR will notify the ENGINEER that the line is ready for television inspection, if required. Prior to the television inspection (possibly during flushing operation) the CONTRACTOR will insert a 1/4-inch nylon rope in the line for the purpose of towing the television unit through the pipe. The OWNER will perform the first television inspection at no cost to the CONTRACTOR. If during the first inspection debris is found in the line, the television inspection will cease. When further

cleanup has been completed, the CONTRACTOR will request the ENGINEER to have a second inspection performed. The cost of the second inspection and any subsequent inspections of that segment of the line will be paid for by the CONTRACTOR at the rate of $75.00 per hour while the television crew is at the line site.

910.9 MEASUREMENT AND PAYMENT

910.9.1 STORM SEWER PIPE: Installed pipe shall be measured and paid for as follows:

910.9.1.1 For straight lines the pipe length shall be the intervening distance between the centers of manholes along a line parallel to the pipe invert.

910.9.1.2 For curvilinear lines the pipe length shall be the intervening arc distance between the centers of manholes along a line parallel to the pipe invert.

910.9.1.3 For lateral lines, such as from main or manhole to a storm inlet, the pipe length shall be the distance between the center of a manhole or centerline of the main to the interior wall face of the storm inlet along a line parallel to the pipe invert.

910.9.1.4 Payment for pipe will be in accordance with the unit price per linear foot per size and material as defined in the Bid Proposal, and shall include pipe installed in the trench, jointing and coupling materials, and other materials necessary to connect to other sections of pipe, manholes, and other appurtenances.

910.9.2 REMOVAL AND DISPOSAL OF STORM SEWER PIPE: Removal and disposal of storm sewer pipe shall be measured by the linear foot within the specified pipe size increments. Payment will be made on the unit price per linear foot of specified pipe size in the Bid Proposal. Trenching, backfilling, and pavement removal and replacement will be paid for based on the unit prices for each appropriate bid item in the Bid Proposal. If new pipe is to be installed in the same trench as the removed pipe, only one payment will be made for trenching, backfilling, and pavement removal and replacement.

910.9.3 TESTING OF PIPE: No payment will be made for required initial or subsequent tests on sections of the storm sewer line.

SECTION 915

STORM SEWER DRAINAGE APPURTENANCES

915.1 GENERAL

The construction items, specified in this section, are related to the storm sewer underground facilities.

915.2 REFERENCES

915.2.1 This publication:

SECTION 300	SECTION 701
SECTION 501	SECTION 910

915.3 MATERIALS

915.3.1 The construction plans will specify the size and material for the pipe between the storm sewer main and the storm water collection structure.

915.3.2 The various types of storm inlets and their relation to curb and gutter, or valley gutter are shown on the Standard Detail Drawings. Construction plans will identify the type to be constructed.

915.3.3 Grating size, material, and configuration shall conform to the Standard Detail Drawings.

915.4 INSTALLATION OF DRAINAGE FACILITIES

915.4.1 Excavation and backfilling for the storm inlet shall be accomplished in accordance with Section 501.

915.4.2 Trenching, backfilling, and compaction for the connecting pipe between the storm sewer main and the storm inlet shall conform to the specifications contained in Section 701. Pipe shall be installed in accordance with Section 910.

915.4.3 All pipe and structures shall be installed per location and elevations, as shown on the construction plans. If during the course of installation, an underground obstruction (i.e., existing utility line) the work shall stop and the ENGINEER shall be immediately notified so that the problem can be resolved.

915.4.4 Direct connection to storm sewer main will be permitted if the main is a minimum of 36 inches in diameter (I.D.) and the connecting line is not greater than 12 inches (I.D.). If storm sewer mains are 48 inches (I.D.) or larger, the connecting line diameter may be increased to 18 inches (I.D.). For connecting line sizes greater than those specified above, the connection to the main will be made into a manhole or by inserting into the main a factory constructed wye. Connection to the main will comply with the Standard Detail Drawings.

915.4.5 Removal of curb and gutter, and sidewalk for installation of a storm inlet shall be made at a scored or full depth joint.

915.4.6 Existing pavement removal and replacement shall conform to Sections 300 and 801 and shall conform to residential or arterial pavement sections of the same material (asphalt or Portland Cement concrete) as the existing pavement.

915.4.7 No width greater than 1/2 inch will be permitted between the inlet grate and the roadside portion of the inlet frame.

915.5 Private drainage facility installations, which are to be constructed under the authorization of "Drainage Facilities Within Public Right-of Way," shall comply with the Standard Detail Drawings and appropriate sections of this publication.

915.6 MEASUREMENT AND PAYMENT

915.6.1 Pavement removal and replacement will be measured by the square yard. Payment will be made at the unit price per square yard per type of replacement paving material, as specified in the Bid Proposal.

915.6.2 Trenching, backfilling, and compaction shall be measured by the linear foot from the main side wall of the inlet to the centerline of the main. Payment will be made at the unit price per linear foot per the average depth increment between connection points, as defined in the Bid Proposal.

915.6.3 Connecting pipe shall be measured by the linear foot along centerline of pipe from the main side wall of the inlet to the centerline of the main. Payment will be made at the unit price per linear foot per type and size of pipe, and shall include pipe in place and all necessary jointing materials.

915.6.4 Storm inlets shall be measured on a unit basis. Payment will be made at the unit price per each type of storm inlet, and shall include structure, grating, excavation, backfilling and compaction, and curb removal and replacement, as defined in Bid Proposal.

915.6.5 Removal and replacement of sidewalk shall be measured by the square foot and payment will be made at the unit price per square foot.

915.6.6 Measurement and payment for manholes will be as indicated in Section 920.

SECTION 920

SANITARY AND STORM SEWER MANHOLES

920.1 GENERAL

This section contains items which are relative to the installation of sanitary and storm sewer manholes.

920.2 REFERENCES

920.2.1 ASTM

C 43	C 497
C 139	C 1557
C 478	

920.2.2 This publication

SECTION 101	SECTION 106
SECTION 102	SECTION 161
SECTION 105	

920.3 MANHOLE MATERIALS

Sewer manhole materials shall be as specified in other sections, as follows:

Portland Cement Concrete	Section 101
Steel Reinforcing	Section 102
Concrete Curing Compound	Section 105
Cement Mortar and Grout	Section 106
Gray Iron Castings	Section 161

920.4 MANHOLE CONSTRUCTION

920.4.1 GENERAL:

920.4.1.1 Soil Foundations for manhole base shall be compacted to a density of 95 percent of the maximum density per ASTM D 1557. Compaction limits shall be one foot beyond the perimeter of the concrete base and shall be a minimum of one foot in depth.

920.4.1.2 Manholes shall be constructed in accordance with the Standard Detail Drawings and as shown on the construction plans. Precast reinforced concrete units, concrete blocks or formed inplace, reinforced concrete may be used to construct the manhole.

920.4.1.3 Invert elevation of the pipes entering or exiting the manhole and interior inverts shall not vary more than 0.05 foot from the elevations indicated on the construction plans.

920.4.1.4 All cement used for poured foundations. Mortar, fillets, grout, and concrete shelf construction shall be Type II or approved equal.

920.4.1.5 All concrete for formed in place foundations or bases, concrete shelves. and pipe supports shall be 3000 psi compressive strength concrete.

920.4.1.6 Depending on the size of the pipe, connections to existing and new manholes shall be made by either core drilling through the manhole wall, per-formed for new precast units, or for large-size pipe the manhole wall may be removed by carefully chipping the wall segment which will permit entry of the pipe. In the latter operation, exposed manhole reinforcement should be bent and tied to the reinforcement of the pipe collar. If core drilling is not practical, the CONTRACTOR shall request the ENGINEER to authorize the chipping operation. During either operation the CONTRACTOR shall take care to avoid unnecessary damage to the manhole surfaces or walls.

920.4.2 PRECAST CONCRETE MANHOLES:

920.4.2.1 The vertical sections of the manhole may be of different dimensions in order that manholes of various depths can be readily assembled.

920.4.2.2 Concrete, used for precast bases, vertical sections, and eccentric cones, shall be 4000 psi compressive strength concrete.

920.4.2.3 Vertical sections of the manhole shall conform to the requirements of ASTM C 478.

920.4.2.4 The CONTRACTOR shall submit shop drawings of the precast base and eccentric cone to the ENGINEER for review and approval.

920.4.2.5 Circular precast manhole sections shall be provided with mastic gasket to seal joints between sections, such as RAM-NEK. KENT SEAL. or approved equal.

920.4.2.6 All lifting holes, except Type "C" manhole covers, and gaps at joints shall be filled with a nonshrink grout.

920.4.2.7 Precast concrete manhole bases may be used when approved by the ENGINEER. If approved. it shall be with the understanding that the CONTRACTOR shall be responsible for placing the bases at the specified elevation, location, and alignment.

920.4.3 FORMED INPLACE REINFORCED CONCRETE MANHOLE:

920.4.3.1 The CONTRACTOR shall submit preconstruction drawings of the proposed manholes to the ENGINEER for review and approval.

920.4.3.2 Concrete used for this type of manhole construction shall be 4000 psi compressive strength concrete.

920.4.3.3 If desired, a precast eccentric cone or a flat cover can be used.

920.4.4 CONCRETE BLOCK MANHOLE:

920.4.4.1 The CONTRACTOR shall submit preconstruction drawings of the proposed manhole to the ENGINEER for review and approval.

920.4.4.2 Concrete masonry units for the construction of this type of manhole shall conform to ASTM C 139 and the Standard Detail Drawings. All blocks shall be mortared into place.

920.4.4.3 Eccentric cone or flat-type cover shall be used.

920.4.5 TEE PIPE MANHOLE:

920.4.5.1 Tee pipe manholes will be used for all 4-foot-diameter mainline pipes and larger. Horizontal section of the tee pipe shall be the same class of pipe as the adjacent sections. The vertical sections shall comply with the requirements set forth in ASTM C 478.

920.4.5.2 Top of the vertical portion of tee pipe unit will extend a minimum of 18 inches above the outside diameter of the horizontal pipe. The 4-foot-diameter vertical section of the tee pipe shall be connected at the longitudinal center point of the horizontal pipe section. The minimum length of horizontal pipe section shall be 8 feet.

920.4.5.3 The CONTRACTOR shall submit to the ENGINEER for review and approval preconstruction shop drawings on the fabrication of the tee pipe section as developed by a precast reinforced concrete pipe manufacturer. Field fabrication of this eccentric pipe unit will not be accepted. Shop drawings for the eccentric cone will also be submitted for review and approval.

920.4.5.4 RAM-NEK, Kent Seal, or OWNER - approved equal sealants shall be used to seal the joints in the vertical portion of this manhole.

920.4.5.5 All lifting holes, except for Type "C" manhole covers, and gaps at joints shall be filled with a nonshrink grout.

920.4.5.6 Standard Detail Drawings show some of the components of the tee-type pipe manhole.

920.4.6 COATING OF MANHOLES:

920.4.6.1 Exterior of Manholes: Exterior coating of manholes shall be required in areas where ground water is present. The coating shall be a water-proofing type of bitumastic or asphaltic material, as approved by the ENGINEER. Application shall be in accordance with the manufacturer's published recommendations.

920.4.6.2 Interior of Manholes: Interior coating of manholes shalll be required only when specified on the construction plans. The coating shall be an epoxy resin-type material, be an epoxy resin-type material such as: "Zebron," "Plastite 7122," or approved equal, and shall be capable of protecting the concrete from deterioration due to a gaseous environment. Application shall be in accordance with the manufacturer's published recommendations.

920.4.6.3 Plastering of Manholes: The work shall include the coating of the surface of existing block manholes with plaster as required on the plans.

920.4.7 MANHOLE STEPS:

920.4.7.1 Manhole steps shall be 1/2" diameter, grade 60, reinforcing rod completely encapsulated in copolymer polypropylene or corrosion resistant rubber compound. Steps shall be designed to be cast in place or hammered into holes in manhole walls.

920.4.7.2 Approved manhole steps of only one manufacturer model shall be used on any specific project and shall not be intermixed with other approved steps. Approved steps must bear the manufacturer name and model on the exposed surface of the step and shall be one of the following products or approved equals: M.A. Industries, Inc. - Model PS-2-PFS H. Bowen Co.-Bowco, Model 81213 or 93813 Delta Pipe Products -WEDG-LOK, Model W-ll

920.4.7.3 The minimum width of step tread shall be 11 inches. Steps will be spaced uniformly in each manhole. Spacing may be between 12 inches to 16 inches on center. Lower step will be 12 inches above manhole shelf or top of main. The upper step shall be 6 inches below the top portion of the eccentric cone or 6 inches below the bottom of the flat cover.

Also the steps shall be aligned vertically with the opening of the cone or cover.

920.4.7.4 Steps shall be embedded in the manhole wall a minimum of 3" inches and protrude from the manhole interior surface a minimum of 4 3/4 inches.

920.4.7.5 Holes for step installation shall be drilled or precast per manufacturer's recommended size. or of sufficient size to allow for step insertion into the wall. Cast-in-plan sockets or tapered holes recommended by the step manufacturer may be used with prior approval of ENGINEER. If the hole has been drilled too large, then the step shall be secured in place by using epoxy grout for the full depth of the drilled hole.

920.4.6 Acceptable manhole step installations must be capable of withstanding a 400 pound. horizontal, pull out load applied in accordance with ASTM C-497.

920.4.8 ADJUSTMENT BRICKS:

920.4.8.1 Manhole adjustment bricks shall conform to the requirements for manhole bricks. per ASTM C 32 for Grade MS.

920.4.8.2 Mortar shall be used to lay the bricks. as well as coating the interior and exterior surfaces of the laid brick. Thickness of the mortar coating shall be 1/2 inch.

920.4. 9 MANHOLE FRAME AND COVER:

The manhole frame and cover for either the sanitary or storm sewer manholes shall conform to the specifications contained in Section 161.

920.5 TESTING OF SEWER MANHOLES:

920.5.1 All sanitary sewer manholes shall be tested for leakage by either a water exfiltration test or a vacuum test. Whichever test is utilized it is recommended that the test be performed prior to backfilling around the manhole and prior to placement of the manhole frame and cover. All inlet and outlet lines shall be properly plugged and the lift holes and barrel joints filled and sealed as specified. The CONTRACTOR shall be responsible for all materials and equipment necessary to perform the test and shall conduct the test in the presence of the ENGINEER or his representative. The CONTRACTOR has the option of performing a manhole test in increments appropriate to the depth of the manhole.

920.5.2 The water exfiltration test shall consist of filling the entire manhole with water to the bottom of the frame elevation. A stabilization period of one hour will be allowed for absorption. After which the manhole shall be refilled as necessary before starting the test. The test period shall be two (2) hours. After which the manhole shall be refilled, measuring the necessary quantity of water. The allowable leakage shall be 0.25 gallons per foot diameter per vertical foot per day, and is represented by the following formula:

$$V = 0.25\ DHT/24$$

where; V = Allowable loss in gallons
D = Manhole diameter in feet
H = Initial depth of water to invert in feet
T = Duration of test in hours

920.5.3 The vacuum test shall consist of utilizing an inflatable compression band, vacuum pump, gauges and appurtances specifically designed for vacuum testing. Test procedures shall be in accordance with the manufacturer's printed recommendations. The ENGINEER shall be the sole judge as to the adequacy of the equipment.

920.5.3.1 A vacuum of 10" Hg shall be placed in the manhole and the time measured for a drop to 8.5" Hg. The test shall be considered to be successful if the measured time exceeds the test period. Should the test fail, the man- hole shall be repaired as necessary and the test rerun. The test periods are:

920.5.3.2 Sixty (60) seconds for four (4) foot diameter manholes.

920.5.3.3 Seventy-five (75) seconds for five (5) foot diameter manholes.

920.5.3.4 Ninety (90) seconds for six (6) foot diameter manholes.

920.5.3.5 One hundred and Twenty (120) seconds for eight (8) foot diameter manholes.

920.5.4 Normally storm sewer manholes need not be tested unless specifically required by the project plans or supplemental technical specifications. However, if in the opinion of the ENGINEER, the workmanship or materials do not appear to be satisfactory, the ENGINEER may require that any storm sewer manhole be tested in a similar manner as that for a sanitary sewer manhole.

920.6 ABANDONMENT OF MANHOLES

920.6.1 Abandonment of manhole, which is part of a sewer line being abandoned, shall entail the following work and materials:

920.6.2 Manhole will not be removed but will be abandoned in place.

920.6.3 All manhole inlet and outlet lines shall be plugged with a 12-inch- thick concrete or concrete mortar plug.

920.6.4 Salvageable material shall be stockpiled on the job site. The CONTRACTOR shall contact the OWNER to arrange for a representative to inspect the materials for usability. Salvageable materials shall be transported by the CONTRACTOR as directed by the OWNER. CONTRACTOR will receive a receipt for the turned-in materials. Receipts will be submitted to the ENGINEER prior to final acceptance of the Project. Unusable materials will be disposed of by the CONTRACTOR.

920.6.5 Manhole bottom will be pulverized.

920.6.6 The manhole shall be filled with cement treated base (CTB) material to the bottom elevation of the asphalt base course of the pavement or to the ground surface level.

920.6.7 All labor, materials, and equipment necessary to complete this work shall be furnished by the CONTRACTOR.

920.6.8 For historical information the ENGINEER shall have a survey performed which will locate the abandoned manhole, relative to permanent survey markers.

920.7 SEWER MANHOLE REHABILITATION IN REPLACEMENT WORK

920.7.1 The work under this item shall be to replace the existing manhole frame and cover and to place a concrete pad around the existing manhole as required per the construction plans. This work will be done only when an existing man- hole is encountered in the normal course of the replacement work that has a light- weight, vented, multi-holed manhole cover.

920.7.2 The work and materials shall include the following:

920.7.2.1 Remove any and all existing brick under frame and replace with new Grade MS brick as necessary to bring new frame and cover up to street grade.

920.7.2.2 Remove and replace existing concrete pad, or construct a new pad.

920.7.2.3 Remove existing steps and replace with new steps or, if steps are nonexistent, install new steps. Steps will be installed as per Subsection 815.4.7.

920.7.2.4 Remove and replace pavement.

920.7.2.5 Excavation and compaction of backfill as necessary.

920.7.2.6 All materials, labor, and equipment necessary to do the work under this item shall be furnished by the CONTRACTOR.

920.7.2.7 The work and materials under this item shall be done according to the manner set forth in the Standard Detail Drawings and other sections of these specifications.

920.7.3 Salvageable material shall be stockpiled on the job site. The CONTRACTOR shall contact the OWNER to arrange for a representative to inspect the materials for usability. Salvageable materials shall be transported by the CONTRACTOR as directed by OWNER. CONTRACTOR will receive a receipt for the turned-in materials. Receipts will be submitted to the ENGINEER prior to final acceptance of the Project. Unusable materials will be disposed of by the CONTRACTOR.

920.8 MEASUREMENT AND PAYMENT

920.8.1 NEW MANHOLES:

920.8.1.1 Type "C," "E," "F," or "G" manholes of 4-foot or 6-foot diameters shall be measured per each within the following increments of depth: 3 to 6 feet, 6 to 10 feet, and 10 to 14 feet. Manholes which are greater in depth than 1 foot shall be measured by the vertical foot. Measurements will be made to the nearest foot and will be from the manhole rim elevation to the manhole invert elevation.

920.8.1.2 Payment for manholes 14 feet deep or less will be made on the unit price per manhole diameter per depth increment as specified in the Bid Proposal. Payment for manhole depths which exceed 14 feet will be made on the unit price per manhole diameter per vertical foot. This payment is in addition to the manhole unit price for the portion above the 14 foot depth.

920.8.1.3 Type "A" or Tee-type manholes shall be measured and paid for by the methods described in 920.8.1.1 and 920.8.1.2. Measurement will be from the invert of the main line to the manhole rim. Payment under this item will include the normal manhole costs described below, as well as any additional pipe costs for the precast tee and for the concrete cradle under the tee.

920.8.1.4 Payment for any type diameter or depth of manhole will include excavation, compacted backfilling, shelving, cover or cone, leveling bricks, frame and cover, and concrete pad or collar.

920.8.2 ELEVATION ADJUSTMENTS:

920.8.2.1 When a new manhole is installed, no measurement or payment will be made for rim elevation adjustments to conform to street surface grades.

920.8.2.2 The following measurements and payments for rim elevation adjustments on existing manholes will be made for indicated conditions:

920.8.2.2.1 Unit price per inch of adjustment ring for adjustment to manhole frame by the addition of adjustment ring.

920.8.2.2.2 Unit price per inch of leveling brick adjustment.

920.8.2.2.3 Unit price per manhole diameter per vertical foot of adjustment to cone and/or barrel.

920.8.2.3 As required, the following items will be included in the unit price per appropriate adjustment: pavement removal and replacement, excavation, compacted backfilling, concrete collar or pad, leveling bricks, adjusting rings, and/or frame and cover.

920.8.3 COATING OF MANHOLE: Plastering or epoxy coating for manholes shall be measured and paid for on the unit price per square foot of surface area covered.

920.8.4 MANHOLE STEPS: Unless otherwise shown on the Bid Proposal, the cost of manhole steps shall be incidental to the unit prices for construction of manholes of various types and depths.

920.8.5 ABANDONMENT OF MANHOLES: Measurement and payment for abandonment of a manhole shall be the unit price per manhole for defined work in Subsection 920.6.

920.8.6 MANHOLE REHABILITATION IN RE-PLACEMENT WORK: Work under this item shall be measured and paid for by the unit price per manhole for work specified in the Bid Proposal.

920.8.7 TESTING: There will be no payment for required testing of sewer manholes.

SECTION 1012
MISCELLANEOUS SEEDING

1012.1 GENERAL

1012.1.1 SCOPE

Furnish all labor, materials and equipment necessary for preparation of seedbed, furnishing and installation of seed, fertilizer, erosion control measures, soil amendments, and related work specified herein and as indicated on plans or as authorized by the LANDSCAPE ARCHITECT or ENGINEER.

1012.1.2 APPLICABLE STANDARDS & REFERENCES:

1012.1.2.1 Drawings and general provisions of the Contract, including City of Albuquerque Standard Specifications for Public Works Construction, Latest Edition. General Conditions and any Supplemental Special Provisions, apply to this Section.

1012.1.2.2 All seed shall be certified by state of origin. The certification authority for the state of New Mexico is the New Mexico Crop Improvement Association.

1012.1.2.3 Reclamation efforts are controlled by the requirements stipulated in the National Pollution Discharge Elimination System General Permit for Region VI of the Environmental Protection Agency.

1012.1.3 PERFORMANCE REQUIREMENTS

1012.1.3.1 The CONTRACTOR shall be responsible for protecting and caring for seeded areas until final acceptance of the work and shall repair at CONTRACTOR expense any damage to seeded areas caused by pedestrian, vehicular traffic, vandalism or other cause.

1012.1.4 SUBMITTALS

1012.1.4.1 THIS PUBLICATION - Section 1502 - Submittals

1012.1.4.2 Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging. Include state, origin and name and telephone number of supplier.

1012.1.4.3 Product Certificates: For fertilizers and organic amendments, from manufacturer.

1012.1.4.4 Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1012.1.4.5 Sources of supply for native grass hay, straw, hydro-mulch, erosion control blankets, and/or gravel mulch.

1012.1.5 DELIVERY, STORAGE & HANDLING

1012.1.5.1 Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

1012.1.5.2 Bulk Materials:

a. Do not dump or store bulk materials near fuel containers, herbicides, structures, utilities, walkways and pavements, or on existing turf areas or plants.

b. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

c. Accompany each delivery of bulk materials with appropriate certificates.

1012.2 PRODUCTS

1012.2.1 SEED

1012.2.1.1 Native Seed: The native seed species and rate of application shall be as shown below and shall be used based on the type of soil or as specified on the plans or in the Supplemental Technical Specifications.

1012.2.1.2 Grass seed shall be fresh, re-cleaned seed of the latest crop, mixed in the proportions by weight, and be pure live seed as denoted within these specifications or as per the plans.

1012.2.1.3 Seed shall be delivered to the site in the original unopened containers which shall bear the vendor’s guarantee of analysis. Labeling of seed shall be in accordance with Federal Seed Laws and the New Mexico Department of Agriculture labeling laws. Federal seed laws require that analysis shall be no older than five months for seed shipped interstate and no older than nine months for seed shipped intra-state. Seeds may be pre-mixed by a seed dealer. Documentation must be provided, the same as if the seeds were sold or bagged separately. The LANDSCAPE ARCHITECT or ENGINEER shall receive all labels from all bags of seed used for verification. For each species included in the mix the following information will be found on each bag tag:

a. Variety - specify if certified.

b. Kind of seed

c. Lot number

d. Purity

e. Germination

f. % of Crop seed, % inert, % noxious weed

g. Origin

h. Test date

i. Pounds of this species or percentage of total lot.

1012.2.1.4Seed Mixture and Rate: Seed species mixtures and application rates shall be as follows and shall be used based on the soil type unless otherwise specified in the plans or Supplemental Technical Specifications.

a. Gravelly Uplands and Slopes (Mainly East Foothills): Seed rate is given in pounds of pure live seed (PLS) per acre. Shrub species noted shall only be included in the seed mix if required in the plans or approved by the LANDSCAPE ARCHITECT or ENGINEER prior to seeding. Contractor shall use at least two of the shrub species listed below at a total application rate of 0.5# PLS/AC. If the area to be seeded is along a recreational trail or roadway the shrub species shall not be included in the mix. Perennial wildflower species shall be included if required in the plans. Contractor shall use at least four of the perennial wildflower species listed below at a total application rate of 1.0# PLS/AC.

a. Gravelly Uplands & Slopes	#PLS/AC	Notes
Bouteloua gracilis 'Hachita' – Blue Grama	7.0	
Bouteloua curtipendula 'Niner' - Sideoats Grama	5.0	
Stipa neomexicana – Needle & Thread Grass	2.0	
Oryzopsis hymenoides - Indian Rice Grass	2.0	
Koeleria macrantha – June Grass	1.0	
Pleuraphis jamesii 'Viva' – Galleta	1.0	
Fallugia Paradoxa - Apache Plume	.25	Shrub
Krascheninnikovia lanata - Winterfat	.25	Shrub
Yucca glauca – Soapweed Yucca	.25	Shrub
Ericameria nauseosa – Chamisa	.25	Shrub
Dalea purpurea var purpurea – Purple Prairie Clover	.25	Perennial Wildflower
Ratibida columnifera forma pulcherrima – Mexican Hat	.25	Perennial Wildflower
Gaillardia aristata - Blanket Flower	.25	Perennial Wildflower
Sphaeralcea parvifolia - Nelson Globemallow	.25	Perennial Wildflower
Oenothera pallida - White Evening Primrose	.25	Perennial Wildflower
Baileya multiradiata - Desert Marigold	.25	Perennial Wildflower
Abronia fragrans or Abronia villosa - Sand Verbena	.25	Perennial Wildflower

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b. Sandy Soils: (Mainly Westside Areas) Seed rate is given in pounds of pure live seed (PLS) per acre. Shrub species noted shall only be included in the seed mix if required in the plans or approved by the LANDSCAPE ARCHITECT or ENGINEER prior to seeding. Contractor shall use at least two of the shrub species listed below at a total application rate of 0.5# PLS/AC. If the area to be seeded is along a recreational trail or roadway the shrub species shall not be included in the mix. Perennial wildflower species shall be included if required in the plans. Contractor shall use at least four of the perennial wildflower species listed below at a total application rate of 1.0# PLS/AC.

b. Sandy Soils	#PLS/AC	Notes
Hilaria jamesii 'Viva' - Galleta	7.0	
Oryzopsis hymenoides 'Paloma' - Indian Rice	5.0	

b. Sandy Soils	#PLS/ AC	Notes
Grass		
Bouteloua gracilis 'Hachita' – Blue Grama	2.0	
Bouteloua curtipendula 'Vaughn' – Sideoats Grama	1.0	
Agropyron smithii 'Arriba' – Western Wheat	1.0	
Sporobolus cryptandrus – Sand Dropseed	1.0	
Sporobolus airoides 'Salado' – Alkali Sacaton	1.0	
Rhus trilobata – Three Leaf Sumac	.25	Shrub
Artemisia frigida – Fringed sagebush	.25	Shrub
Atriplex canescens – Fourwing Saltbush (NM Origin)	.25	Shrub
Artemisia filifolia – Sand Sage	.5	Shrub
Yucca glauca – Soapweed Yucca	.5	Shrub
Sphaeralcea ambigua – Desert Globemallow	.25	Perennial wildflower
Spaeralcea parvifolia – Nelson Globemallow	.25	Perennial wildflower
Oenothera pallida – White Evening Primrose	.25	Perennial wildflower
Baileya multiradiata – Desert Marigold	.25	Perennial wildflower
Abronia fragrans or Abronia villosa – Sand Verbena	.25	Perennial wildflower
Dalea purpurea var purpurea – Purple Prairie Clover	.25	Perennial Wildflower
Ratibida columnifera forma pulcherrima – Mexican Hat	.25	Perennial Wildflower

c. Clay, Clay Loam Soils: Mainly Valley & Bosque areas). Seed rate is given in pounds of pure live seed (PLS) per acre. Shrub species noted shall only be included in the seed mix if required in the plans or approved by the LANDSCAPE ARCHITECT or ENGINEER prior to seeding. Contractor shall use at least two of the shrub species listed below at a total application rate of 0.5# PLS/AC. If the area to be seeded is along a recreational trail or roadway the shrub species shall not be included in the mix. Perennial wildflower species shall be included if required in the plans. Contractor shall use at least three of the perennial wildflower species listed below at a total application rate of 0.5# PLS/AC.

c. Clay, Clay Loam Soils	#PLS/AC	Notes
Hilaria jamesii 'Viva' - Galleta	4.0	
Bouteloua curtipendula 'Vaughn' – Sideoats Grama	3.0	
Oryzopsis hymenoides 'Paloma' - Indian Rice Grass	2.0	
Sporobolus airoides 'Salado' – Alkali Sacaton	2.0	
Agropyron smithii 'Arriba' – Western Wheat	1.0	
Bouteloua gracilis 'Hachita' – Blue Grama	1.0	
Sporobolus cryptandrus – Sand Dropseed	1.0	
Soraghastrum nutans – Indian Grass	.5	
Krascheninnikovia lanata - Winterfat	.25	Shrub
Artemisia ludoviciana – Prairie Sage	.25	Shrub
Ericameria nauseosa – Rubber Rabbitbrush	.25	Shrub
Atriplex confertifolia - Shadscale	.25	Shrub
Oenothera hookeri – Evening Primrose	.25	Perennial wildflower
Oenothera pallida – White Evening Primrose	.25	Perennial wildflower
Baileya multiradiata - Desert Marigold	.25	Perennial wildflower
Linum lewisii – Blue Flax	.25	Perennial wildflower
Dalea purpurea var purpurea – Purple Prairie Clover	.25	Perennial Wildflower
Ratibida columnifera	.25	Perennial

forma pulcherrima – Mexican Hat		Wildflower

d. Specific seed mixture application areas shall be determined in the field with the LANDSCAPE ARCHITECT or ENGINEER prior to seed installation. Alternate seed mixes, variations of species, and variations of application rates are acceptable if noted on the plans or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER. Variations in application rates due to the presence of irrigation are acceptable if noted on the plans or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER.

1012.2.2 NATIVE GRASS AND WILDFLOWER MEADOWS

1012.2.2.1 Native grass and wildflower meadow seeding shall be installed to the extents shown on the plans. Seed mix for meadow plantings shall differ from those identified in 1012.2.1.4 as follows:

1012.2.2.2 Wildflower Seed: Fresh, clean, and dry new seed, of mixed species as follows:

a. Wildflower seed mix shall be developed based on soil type from seed mixes listed in Section 1012.2.1.4 and applied at a rate of 50# PLS/AC or as specified on the plans

1012.2.2.3 Native-Grass Seed: Fresh, clean, and dry new seed, of mixed species as follows:

a. Native-grass seed mix shall be 50% / 50% (by weight) combination of Bouteloua gracilis 'Hachita' – Blue Grama, and Buchloe dactyloides – Buffalo grass, applied at a rate of 100# PLS/AC, or as specified on the plans

1012.2.2.4 Wildflower and Native-Grass Seed: Fresh, clean, and dry new seed, of mixed species as follows:

a. Wildflower and native grass seed mix shall be an equal combination of 1012.2.2.2 and 1012.2.2.3 above applied at rates noted.

1012.2.2.5 Seed Carrier: Inert material, sharp clean sand, or perlite.

1012.2.3 MULCHES

1012.2.3.1 Hydro-mulch/Tackifier:

a. Hydro-mulch shall consist of a mulch/tackifier combination independently laboratory tested for erosion control performance using a rainfall simulator raining at 4 inches per hour and mulch/tackifier applied at 1,600 lbs. per acre. No combination of mulch and tackifier shall be used unless laboratory test results based upon the above conditions show the mulch-tackifier combination to give a calculated apparent erosion rate of 5 tons per acre per hour or less.

b. The mulch shall include anionic Poly Acrylamide Tackifier (P.A.M) or approved equal tackifier. This tackifier shall be adhered to the fibers during manufacturing, or added during mixing in the hydraulic mulching equipment. The tackifier shall be homogenous within the unit package. It shall have no growth or germination inhibiting factors and be nontoxic.

c. The mulch material shall consist of fibers manufactured expressly from annually renewable organic fibers. The fibers shall be processed in such a manner as to contain no growth or germination inhibiting factors. Fiber shall not be produced from residue from wood pulp and paper plants.

d. The fibers of the mulch must maintain uniform suspension in water under agitation. The fiber mulch shall blend with the additives to form homogenous slurry. Upon application, the mulch material shall form a blotter-like mat covering the ground. This mat shall have the characteristics of moisture absorption and percolation and shall cover and hold grass seed in contact with the soil. The fiber mulch shall be dyed with biodegradable dye and not inhibit plant growth.

e. The rate of application of the mulch/tackifier shall be a minimum 2,000 lbs. per acre. This application rate may vary according to soil type and slope as noted in the plans.

f. Alternate hydro-mulch/tackifier products and applications are acceptable if specified on the plans or with prior written approval by the LANDSCAPE ARCHITECT or ENGINEER.

1012.2.3.2 Native Grass Hay and Straw Mulch

a. Hay Mulch: Perennial native or introduced grasses of fine-stemmed varieties shall be used unless otherwise specified on the plans or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER. At least 50 percent of the herbage by weight of each bale of hay shall be 10 inches in length or longer. Hay with noxious seed or plants will not be acceptable. Rotted, brittle, or moldy hay will not be acceptable. Marsh grass or prairie hay composed of native grass species to be seeded will be acceptable. Marsh grass hay shall be composed of mid and tall native, usually tough and wiry grass and grass-like plants found in the lowland areas within the Rocky Mountain region. Tall wheat

grass, Timothy grass, intermediate wheat grass, switch grass, or orchard hay will be acceptable only upon prior written approval of the LANDSCAPE ARCHITECT or ENGINEER and then only if cut prior to seed formation. Hay shall be properly cured prior to use. Hay which is brittle, short fibered or improperly cured is not acceptable.

b. Straw Mulch: Small grain straw such as wheat, barley, rye or oats will not be allowed except by prior written approval of the LANDSCAPE ARCHITECT or ENGINEER and with the concurrence of the Air Division of the Environmental Health Department. Other materials, such as alfalfa, are not acceptable. Material which is brittle, shorter than 10 inches or which breaks or fragments during the crimping operation will not be acceptable.

1012.2.3.3 Germination/Erosion Control Mats

a. Erosion-Control Blankets: As specified in the plans. Maximum 1-inch thick biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long, or 11 ga. 6” pins with washers.

b. Other products as specified on the plans or within the Supplemental Technical Specifications, or as approved by the LANDSCAPE ARCHITECT or ENGINEER.

1012.2.3.4 Aggregate Mulch: Sloped areas steeper than 3:1

a. Aggregate mulch shall consist of 3/4 inch to 1.5 inch depth maximum size crushed or angular material and will only be allowed with prior written approval of the LANDSCAPE ARCHITECT or ENGINEER. Install aggregate mulch at a depth equal to material size. Aggregate mulch shall be installed at a density not greater than 75% of the surface area.

1012.2.4 SOIL AMENDMENT

1012.2.4.1 Fertilizer: Fertilizer and Soil Amendments: Unless otherwise specified on the plans or in the Supplemental Technical Specification, no fertilizer or other soil amendments are required on areas specified to receive native seeding. If fertilizer and/or other soil amendments are required they shall be in accordance with Section 1011.2.2 of these specifications. If fertilizer and soil amendments are required CONTRACTOR shall perform a soils test in accordance with Section 1011.1.6.1 of these specifications.

1012.3 EXECUTION

1012.3.1 EXAMINATION

1012.3.1.1 Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

a. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

b. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

c. Uniformly moisten excessively dry soil that is not workable or which is dusty.

1012.3.1.2 Proceed with installation only after unsatisfactory conditions have been corrected.

1012.3.1.3 If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by the LANDSCAPE ARCHITECT or ENGINEER and replace with new planting soil at no additional cost to the OWNER.

1012.3.2 PREPARATION

1012.3.2.1 Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by seeding operations.

a. Protect grade stakes set by others until directed to remove them.

1012.3.2.2 Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Reference project NEPA and/or SWPPP requirements if applicable.

1012.3.3 SEED BED PREPARATION

1012.3.3.1 Prior to the starting of any seed bed preparation the final grades of all earthwork shall be inspected and approved by the LANDSCAPE ARCHITECT or ENGINEER.

1012.3.3.2 No preparation shall be performed when the surface is wet or muddy or when the soil moisture content is such that the soil is not fully loosened by the disking operation.

1012.3.3.3 The extent of seed bed preparation shall not exceed the area on which seeding, mulching and crimping operations can be completed prior to crusting or wind or water erosion of the prepared surface. If erosion, crusting or re-compaction occurs, the affected area shall be re-worked beginning with seed bed preparation. Depth of preparation must be approved by the LANDSCAPE ARCHITECT or ENGINEER prior to the seeding and mulching operations.

1012.3.3.4 Mechanical Preparation: Seed bed shall be prepared to a minimum depth of 4 inches, tilling with a disc, harrow or chiseling tools. Seed bed preparation shall be confined to disturbed areas unless otherwise specifically directed by the LANDSCAPE ARCHITECT or ENGINEER. Area of heavy or compacted soil may require additional preparation such as chiseling or ripping if disking alone does not result in specified depth. All competitive vegetation shall be uprooted during seed bed preparation and the soil shall be uniformly worked to a smooth, firm surface free of clods, stones or other foreign materials, 4 inches or larger, that would interfere with seeding or crimping equipment operations and germination. Tilling shall not occur when the steady wind speed is over 15 mph and is causing a dust problem to adjoining areas. No work shall be done when the moisture content of the soil is unfavorable or the ground is otherwise in an un-tillable condition.

1012.3.3.5 Hand preparation: Areas which cannot be prepared with mechanized equipment because of small size or irregular shape, slope angle, or significant existing vegetation which is to remain, may be loosened to a minimum depth of 2 inches using hand tools or small mechanized equipment. Any such areas will be specified on the plans or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER.

1012.3.4 PREPARATION FOR GERMINATION / EROSION-CONTROL MATERIALS

1012.3.4.1 For erosion-control mats, provide seed bed preparation and seeding prior to installation as specified within this section. Install erosion-control germination materials and fasten as recommended by material manufacturer.

1012.3.4.2 For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

1012.3.4.3 Moisten prepared area after planting if surface is dry. Water thoroughly without creating erosion or run-off.

1012.3.5 SEEDING

1012.3.5.1 General: Seed types and rates shall be as shown on plans or as directed by the LANDSCAPE ARCHITECT or ENGINEER. Three specific seed mixes have been specified for distinct areas of the city. Seeded areas shall be drilled seeded and mulched where slopes are flatter than 3:1 unless otherwise directed by the LANDSCAPE ARCHITECT or ENGINEER. Slopes steeper than 3:1 shall be broadcast seeded and hydro-mulched, aggregate mulched or erosion control blankets applied as per plans or as directed by the LANDSCAPE ARCHITECT or ENGINEER.

a. Seeding shall not start until the seed bed preparation has been inspected and approved by the LANDSCAPE ARCHITECT or ENGINEER.

b. CONTRACTOR'S vehicles and other equipment shall not travel over the prepared areas. If, as determined by the LANDSCAPE ARCHITECT or ENGINEER, that rain or some other factor has impacted prepared surfaces so that it is not possible to seed to the proper depth, the CONTRACTOR shall again prepare the seed bed without additional compensation.

c. No more area may be seeded than can be stabilized (i.e. covered with mulch and crimped, covered with gravel mulch or erosion control mats, hydro-mulched) by the end of the work day. No seeding operations may be conducted when steady wind speeds exceed 15 mph. If steady winds exceed 15 mph, seeding operations will be halted and any areas seeded shall be mulched.

d. Weather Limitations: Proceed with seeding operations only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to this specification.

1012.3.5.2 Drill Seeding: Drill seeding is required for reclamation areas unless otherwise specified in the plans or in the Supplemental Technical Specifications or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER. Seed shall be applied with a landscape seeder with double rollers, or "rangeland" type seed drill equipped with packer wheels. Seed shall be drilled to a maximum depth of 1/2 inch unless otherwise specified. Direction of seeding shall be in long sweeping and overlapping S-curves on flats and perpendicular to slopes and on the contour whenever possible.

1012.3.5.3 Broadcast Seeding: Seed may be applied by hand or by utilizing a rotary spreader or a seeder box with a gear feed mechanism if mechanized seeding is not possible due to limited size, irregular shape, or slope angle exceeding 3:1. Rice hulls or other fillers shall be used to prevent uneven separation of lighter seed. Seed shall be evenly distributed and applied at a rate which is a minimum of twice that of drilled seed rate unless otherwise specified. Immediately following the seeding operation, the seed-bed shall be lightly raked to provide approximately 1/2 inch cover of soil over most of the seed.

1012.3.5.4 A hydro-mulch slurry blower may be used only with the prior written approval of the LANDSCAPE ARCHITECT or ENGINEER.

1012.3.6 MEADOW SEEDING

1012.3.6.1 Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 15 mph.

a. Before sowing, mix seed with seed carrier at a ratio of not less than four parts seed carrier to one part seed.

b. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

c. Do not use wet seed or seed that is moldy or otherwise damaged.

1012.3.6.2 Broadcast, hand or hydro-seed as specified within this section. Brush or rake seed into top 1/16 inch of soil, roll lightly, and water with fine spray.

1012.3.6.3 On slopes steeper than 3:1, protect seeded areas from hot, dry weather or drying winds by applying erosion control/germination materials within same day after completing seeding operations.

1012.3.6.4 Water newly planted areas and keep moist until meadow is established.

1012.3.7 MULCHING FOR MISCELLANEOUS SEEDING

1012.3.7.1 General: All seeded areas shall be mulched unless otherwise specified on the plans or in the Supplemental Technical Specifications or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER.

1012.3.7.2 On seeded areas that are level or have slopes 3:1 or flatter, fiber mulching or hydraulic mulching shall be utilized unless otherwise specified on the plans or in the Supplemental Technical Specifications or with prior written approval of the LANDSCAPE ARCHITECT or ENGINEER. On seeded areas that have slopes steeper than 3:1, only hydro-mulch, gravel mulch, or erosion control mats may be used as specified on the plans and in the Supplemental Technical Specifications.

1012.3.7.3 Hay/Straw Mulching: Hay mulch shall be applied at a minimum rate of 2.5 tons per acre of air-dry hay. If approved, straw mulch shall be applied at a minimum rate of 2.5 tons per acre of air-dry straw.

a. Crimping: Hay and/or straw mulch shall be crimped into the soil. The mulch shall be spread uniformly over the area either by hand or with a mechanical mulch spreader. When spread by hand, the bales of mulch shall be torn apart and fluffed before spreading. Mulching will not be permitted when wind velocity exceeds 15 miles per hour. A heavy disc such as a mulch-tiller, with flat serrated discs at least 1/4 inch in thickness, having dull edges and the disc spaced up to 8 inches apart shall be used to crimp (or anchor) the mulch into the soil to a minimum depth of 2 inches or as specified on the plans or in the Supplemental Technical Specifications. The discs shall be of sufficient diameter to prevent the frame of the equipment from dragging the mulch.

b. The crimping operations shall be across the slope where practical but not be parallel to prevailing Westerly winds (270 degrees magnetic). Crimping shall be in a general north-south direction where practical, and with tight interlocking “S” curves to avoid straight crimp lines.

c. If small grain straw mulch is used it shall be crimped in two directions in a cross-hatch pattern.

1012.3.7.4 Hydro-mulching: Immediately following the drilling operation, all seeded areas shall receive hydro-mulch application with tackifier at the minimum rate of 2,000 lbs. per acre. The slurry shall be mixed in a tank with an agitation system and shall be sprayed, under pressure, uniformly to a depth of 1/8 inch over the soil surface. The hydraulic mulching equipment shall keep all materials in uniform suspension throughout the mixing and suspension cycle. The applicator shall use both horizontal and vertical movements to achieve an even application of the slurry material. All areas receiving insufficient coverage in the opinion of the LANDSCAPE ARCHITECT or ENGINEER shall receive additional slurry.

1012.3.7.5 Erosion Control, Germination Blankets, Mats, or Fabric

a. The erosion control blankets shall be applied over

seeded slope areas on the same day that seeding occurs without exception. Installation and anchoring of blankets shall occur as per approved manufacturer's specifications.

1012.3.7.6 Aggregate Mulch

a. If slope is accessible by appropriate equipment, steep slopes can be mulched with aggregate mulch with written approval of the LANDSCAPE ARCHITECT or ENGINEER. Immediately following seeding operation, all seeded areas shall receive aggregate mulch as noted in the plans. The mulch shall be placed in a layer approximately one stone deep over seeded areas. Seeding and mulch shall be completed simultaneously in strips from the top of the slope to the bottom so that seeded areas are not damaged by equipment use over seeded areas.

1012.3.8 MAINTENANCE AND PROTECTION

1012.3.8.1 The CONTRACTOR shall maintain the seeded areas regularly following installation until final acceptance.

1012.3.8.2 The CONTRACTOR shall be responsible for protecting and caring for seeded and mulched areas until final acceptance of the work and shall repair at his/her expense any damage to seeded and mulched areas caused by pedestrian or vehicular traffic or vandalism.

1012.3.9 MEADOW MAINTENANCE

1012.3.9.1 Maintain and establish areas designated as meadows by watering, weeding, mowing, trimming, replanting, and performing other operations as required to establish a healthy, viable meadow. Roll, re-grade, and replant bare or eroded areas and re-mulch. Provide materials and installation the same as those used in the original installation.

a. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and meadow damaged or lost in areas of subsidence.

b. In areas where erosion control/germination materials have been disturbed by wind or maintenance operations, add new mats and anchor as required to prevent displacement.

1012.3.9.2 Watering:

a. Schedule watering to provide germination and establishment, prevent wilting, puddling, erosion, and displacement of seed or erosion control/germination materials.

1012.3.10 PEST AND WEED CONTROL

1012.3.10.1 Pest Control: Apply pesticides and other chemical products and biological control agents according to requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with the LANDSCAPE ARCHITECT or ENGINEER and any others in proximity to the Work. Notify the LANDSCAPE ARCHITECT or ENGINEER before each application is performed. Pest control shall be implemented as necessary at no cost to the OWNER until final acceptance of the Project.

1012.3.10.2 CONTRACTOR shall control germination of weed species that are not included as part of the seed mix. Weed control may be mechanical or hand removal methods as determined by the CONTRACTOR with approval by the LANDSCAPE ARCHITECT or ENGINEER. Weed control shall be implemented as necessary at no cost to the OWNER until final acceptance of the Project.

1012.3.11 WARRANTY

1012.3.11.1 If at the end of one complete growing season, it has been determined by the LANDSCAPE ARCHITECT or ENGINEER that insufficient germination has occurred in meadow areas the CONTRACTOR shall reseed such areas with no additional cost to the OWNER.

1012.3.11.2 Where miscellaneous seeding is installed in areas without an irrigation system, no warranty shall be required after the date of final acceptance.

1012.3.11.3 CONTRACTOR shall provide a certificate to the OWNER prior to final acceptance that all requirements of this specification have been met.

1012.3.12 REVIEWS AND OBSERVATIONS

1012.3.12.1 The following shall be the minimum required reviews and observations during the course of construction. Additional reviews and observations can be made at any time at the discretion of the LANDSCAPE ARCHITECT or ENGINEER. It shall be the responsibility of the CONTRACTOR to notify the LANDSCAPE ARCHITECT or ENGINEER, in writing, 48 hours in advance of each required review or observation.

1012.3.12.2 The sequence of required reviews and observations shall not be changed from the sequence listed below. The CONTRACTOR shall not proceed with work of the next phase without written approval of the work of the previous phase by the LANDSCAPE

ARCHITECT or ENGINEER. Payment will not be approved for items which have not been reviewed and approved in writing.

a. Each phase of soil preparation shall be observed in process.

b. Finish grade shall be reviewed.

c. Implementation plan shall be approved prior to seeding.

d. Seed shall be reviewed prior to seeding.

e. Seeded area shall be reviewed after completion.

f. Mulched areas shall be reviewed after completion.

g. Final review and acceptance.

h. Warranty review

1012.3.13 MEASUREMENT & PAYMENT

1012.3.13.1 Measurement: The measurement of native grass seeding shall be by the acre.

1012.3.13.2 Payment: Payment shall be made at the contract unit price per acre, of native grass seeding complete in place, which shall include the seed, fertilizer (if required), area preparation, seeding, soil amendments (if required), and mulching.

Interim Guideline SECTION 1013
SLOPE STABILIZATION AND SEEDING

1013.1 GENERAL

1013.1.1 SCOPE

Furnish all labor, materials and equipment necessary for preparation of seedbed, furnishing and installation of seed, erosion control measures, soil amendments, and related work specified herein and as indicated on plans or as authorized by the LANDSCAPE ARCHITECT or ENGINEER.

This specification shall apply to large ponding areas on sites where a landscape plan for building permit is not required, and all ponds that are greater than or equal to 2 acres in size.

Smaller water quality ponds shall incorporate Low Impact Development Strategies as described in the City of Albuquerque Development Process Manual (DPM). Treatments described in this specification may apply as Best Management Practices where deemed practicable by the LANDSCAPE ARCHITECT or ENGINEER.

1013.1.2 APPLICABLE STANDARDS & REFERENCES:

1013.1.2.1 Drawings and general provisions of the Contract, including City of Albuquerque Standard Specifications for Public Works Construction, Latest Edition. General Conditions and any Supplemental Special Provisions, apply to this Section.

1013.1.2.2 All seed shall be certified by state of origin. The certification authority for the state of New Mexico is the New Mexico Crop Improvement Association.

1013.1.2.3 Reclamation efforts are controlled by the requirements stipulated in the National Pollution Discharge Elimination System General Permit for Region VI of the Environmental Protection Agency.

1013.1.3 PERFORMANCE REQUIREMENTS

1013.1.3.1 The CONTRACTOR shall be responsible for protecting and caring for seeded areas until final acceptance of the work and shall repair at CONTRACTOR expense any damage to seeded areas caused by pedestrian, vehicular traffic, vandalism or other cause.

1013.1.4 SUBMITTALS

1013.1.4.1 THIS PUBLICATION - Section 1502 - Submittals

1013.1.4.2 Certification of Seed: From seed vendor for each mixture, stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging. Include state, origin and name and telephone number of supplier.

1013.1.4.3 Product Certificates: For organic amendments from manufacturer.

1013.1.4.5 Sources of supply, color, and size for aggregate mulch.

1013.4.6 Source of supply and product information for wood mulch.

1013.1.5 DELIVERY, STORAGE & HANDLING

1013.1.5.1 Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

1013.1.5.2 Bulk Materials:

a. Do not dump or store bulk materials near fuel containers, herbicides, structures, utilities, walkways and pavements, or on existing turf areas or plants.

b. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

c. Accompany each delivery of bulk materials with appropriate certificates.

1013.2 PRODUCTS

1013.2.1 SEED

1013.2.1.1 Seed: The seed species and rate of application shall be as shown below and shall be used based on the type of soil or as specified on the plans or in the Supplemental Technical Specifications.

1013.2.1.2 Seed shall be fresh, re-cleaned seed of the latest crop, mixed in the proportions by weight, and be pure live seed as denoted within these specifications or as per the plans.

1013.2.1.3 Seed shall be delivered to the site in the original unopened containers which shall bear the vendor's guarantee of analysis. Labeling of seed shall be in accordance with Federal Seed Laws and the New Mexico Department of Agriculture labeling laws. Federal seed laws require that analysis shall be no older than five months for seed shipped interstate and no older than nine months for seed shipped intra-state. Seeds may be pre-mixed by a seed dealer. Documentation must be provided, the same as if the seeds were sold or bagged separately. The LANDSCAPE ARCHITECT or ENGINEER shall receive all labels from all bags of seed used for verification. For each species included in the mix the following information will be found on each bag tag:

a. Variety - specify if certified.

b. Kind of seed

c. Lot number

d. Purity

e. Germination

f. % of Crop seed, % inert, % noxious weed

g. Origin

h. Test date

i. Pounds of this species or percentage of total lot.

1013.2.1.4Seed Mixture and Rate: Seed species mixtures and application rates shall be as follows and shall be used based on the soil type unless otherwise specified in the plans or Supplemental Technical Specifications.

a. Gravelly Uplands and Slopes (Mainly East Foothills): Seed rate is given in pounds of pure live seed (PLS) per acre.. Mix shall include at least four of the wildflower species listed below at a total application rate of at least 2.0# PLS/AC.

a. Gravelly Uplands & Slopes	**#PLS/AC**	**Notes**
Bouteloua gracilis 'Hachita' – Blue Grama	7.0	
Bouteloua curtipendula 'Niner' - Sideoats Grama	5.0	
Stipa neomexicana – Needle & Thread Grass	2.0	
Oryzopsis hymenoides - Indian Rice Grass	2.0	
Koeleria macrantha – June Grass	1.0	
Aristida purpurea – *Purple Threeawn*	1.0	
Pleuraphis jamesii 'Viva' – Galleta	1.0	
Dalea purpurea var purpurea – Purple Prairie Clover	.25	Perennial Wildflower
Ratibida columnifera forma pulcherrima – Mexican Hat	.25	Perennial Wildflower
Gaillardia aristata - Blanket Flower	.25	Perennial Wildflower
Sphaeralcea parvifolia - Nelson Globemallow	.25	Perennial Wildflower
Oenothera pallida - White Evening Primrose	.25	Perennial Wildflower
Baileya multiradiata - Desert Marigold	.25	Perennial Wildflower
Berlandiera lyrata – Chocolate Flower	.25	Perennial Wildflower
Abronia fragrans or *Abronia villosa* - Sand Verbena	.25	Perennial Wildflower

b. Sandy Soils: (Mainly Westside Areas) Seed rate is given in pounds of pure live seed (PLS) per acre. Mix shall include at least four of the wildflower species listed below at a total application rate of at least 2.0# PLS/AC.

b. Sandy Soils	**#PLS/ AC**	**Notes**
Hilaria jamesii 'Viva' - Galleta	7.0	
Oryzopsis hymenoides 'Paloma' - Indian Rice Grass	5.0	
Bouteloua gracilis 'Hachita' – Blue Grama	2.0	
Bouteloua curtipendula 'Vaughn' – Sideoats Grama	1.0	
Agropyron smithii 'Arriba' – Western Wheat	1.0	
Sporobolus cryptandrus – Sand Dropseed	1.0	
Sporobolus airoides 'Salado' – Alkali Sacaton	1.0	
Artemisia frigida – Fringed sagebush	.25	Low Shrub
Sphaeralcea ambigua – Desert Globemallow	.25	Perennial wildflower
Spaeralcea parvifolia – Nelson Globemallow	.25	Perennial wildflower
Helianthus annuus	.5	Annual wildflower
Oenothera pallida – White Evening Primrose	.25	Perennial wildflower
Baileya multiradiata – Desert Marigold	.25	Biennial wildflower
Abronia fragrans or Abronia villosa – Sand Verbena	.25	Perennial wildflower

b. Sandy Soils	**#PLS/ AC**	**Notes**
Dalea purpurea var purpurea – Purple Prairie Clover	.25	Perennial Wildflower
Machaeranthera canescens – Hoary tanseyaster	.25	Perennial wildflower
Berlandiera lyrata – Chocolate Flower	.25	Perennial Wildflower
Ratibida columnifera forma pulcherrima – Mexican Hat	.25	Perennial Wildflower

c. Clay, Clay Loam Soils: Mainly Valley & Bosque areas). Seed rate is given in pounds of pure live seed (PLS) per acre. Mix shall include at least four of the perennial wildflower species listed below at a total application rate of 2.0# PLS/AC.

c. Clay, Clay Loam Soils	**#PLS/AC**	**Notes**
Hilaria jamesii 'Viva' - Galleta	4.0	
Bouteloua curtipendula 'Vaughn' – Sideoats Grama	3.0	
Oryzopsis hymenoides 'Paloma' - Indian Rice Grass	2.0	
Sporobolus airoides 'Salado' – Alkali Sacaton	2.0	
Agropyron smithii 'Arriba' – Western Wheat	1.0	
Bouteloua gracilis 'Hachita' – Blue Grama	1.0	
Sporobolus cryptandrus – Sand Dropseed	1.0	
Soraghastrum nutans – Indian Grass	.5	
Artemisia ludoviciana – Prairie Sage	.25	Low Shrub
Oenothera hookeri – Evening Primrose	.25	Perennial wildflower
Oenothera pallida – White Evening Primrose	.25	Perennial wildflower
Machaeranthera canescens – Hoary tanseyaster	.25	Perennial wildflower
Linum lewisii – Blue Flax	.25	Perennial wildflower
Helianthus annuus - Sunflower	.5	Annual wildflower
Sphaeralcea ambigua Desert Globemallow	.25	Perennial wildflower
Dalea purpurea var purpurea – Purple Prairie Clover	.25	Perennial Wildflower
Ratibida columnifera forma pulcherrima – Mexican Hat	.25	Perennial Wildflower

d. Specific seed mixture application areas shall be determined in the field with the LANDSCAPE ARCHITECT or ENGINEER prior to seed installation. Alternate seed mixes, variations of species, and variations of application rates are acceptable if noted on the plans or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER. Variations in application rates due to the presence of irrigation are acceptable if noted on the plans or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER.

1013.2.3 MULCHES

1013.2.3.1 Aggregate Mulch on slopes flatter than 3:1
a. Aggregate mulch shall be 1" to 4" size angular material. Pumice and black aggregate are not acceptable.

1013.2.3 Aggregate Mulch on slopes between 3:1 and 2:1

a. Aggregate mulch shall consist of 2" to 8" size angular material. Pumice and black aggregate are not acceptable.

1013.2.4 Aggregate Mulch at base of slope

a. Aggregate mulch at base of slope shall consist of 2" to 4" size angular material. Pumice and black aggregate are not acceptable.

1013.2.5 Wood mulch: Base of slope

a. Wood mulch installed under angular aggregate at base of slope shall be chipped or shredded and free of foreign materials (see materials supply guide from the City of Albuquerque). Individual pieces of wood shall vary in size.

1013.2.4 SOIL AMENDMENT

1013.2.4.1 Soil Amendments:

The Contractor shall furnish and place composted mulch in all revegetation areas flatter than 3:1 slope (see materials supply guide from the City of Albuquerque).

1013.3 EXECUTION

1013.3.1 EXAMINATION

1013.3.1.1 Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

a. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

b. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

c. Uniformly moisten excessively dry soil that is not workable or which is dusty.

1013.3.1.2 Proceed with installation only after unsatisfactory conditions have been corrected.

1013.3.1.3 If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by the LANDSCAPE ARCHITECT or ENGINEER and replace with new planting soil at no additional cost to the OWNER.

1013.3.2 PREPARATION

1013.3.2.1 Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings from damage caused by seeding operations.

a. Protect grade stakes set by others until directed to remove them.

1013.3.2.2 Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Reference project NEPA and/or SWPPP requirements if applicable.

1013.3.3 SEED BED PREPARATION

1013.3.3.1 Prior to the starting of any seed bed preparation the final grades of all earthwork shall be inspected and approved by the LANDSCAPE ARCHITECT or ENGINEER.

1013.3.3.2 No preparation shall be performed when the surface is wet or muddy or when the soil moisture content is such that the soil is not fully loosened by the disking operation.

1013.3.3.1. No preparation shall be performed when the ground is frozen or when air temperatures are below 32 degrees Fahrenheit.

1013.3.3.3 The extent of seed bed preparation shall not exceed the area on which seeding and mulching operations can be completed prior to crusting or wind or water erosion of the prepared surface. If erosion, crusting or re-compaction occurs, the affected area shall be re-worked beginning with seed bed preparation. Depth of preparation must be approved by the LANDSCAPE ARCHITECT or ENGINEER prior to the seeding and mulching operations.

1013.3.3.4 Mechanical Preparation: All areas flatter than 3:1 slope shall be mechanically prepared. Seed beds shall be prepared to a minimum depth of 4 inches, tilling with a disc, harrow or chiseling tools. Seed bed preparation shall be confined to disturbed areas unless otherwise specifically directed by the LANDSCAPE ARCHITECT or ENGINEER. Area of heavy or compacted soil may require additional preparation such as chiseling or ripping if disking alone does not result in specified depth. All competitive vegetation shall be uprooted during seed bed preparation and the soil shall be uniformly worked to a smooth, firm surface free of clods, stones or other foreign materials, 4 inches or larger, that would interfere with seeding or crimping equipment operations and germination. Tilling shall not occur when the steady wind speed is over 15 mph and is causing a dust problem to adjoining areas. No work shall be done when the moisture content of the soil is unfavorable or the ground is frozen or is otherwise in an un-tillable condition.

Following disking of seed beds, 1” depth of compost shall be applied to all mechanically prepared areas and disked or tilled to a 4” depth.

1013.3.3.5 Hand preparation: Areas which cannot be prepared with mechanized equipment because of small size or irregular shape, significant existing vegetation which is to remain, may be loosened to a minimum depth of 2 inches using hand tools or small mechanized equipment. Any such areas will be specified on the plans or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER.

1013.3.5 SEEDING

1013.3.5.1 General: Three specific seed mixes have been specified for distinct areas of the city. Seeded areas shall be drill seeded and mulched where slopes are flatter than 3:1 unless otherwise directed by the LANDSCAPE ARCHITECT or ENGINEER. Slopes steeper than 3:1 shall be broadcast seeded or hydro-seeded as per plans or as directed by the LANDSCAPE ARCHITECT or ENGINEER.

a. Seeding shall not start until the seed bed preparation has been inspected and approved by the LANDSCAPE ARCHITECT or ENGINEER.

b. CONTRACTOR’S vehicles and other equipment shall not travel over the prepared areas. If, as determined by the LANDSCAPE ARCHITECT or ENGINEER, that rain or some other factor has impacted prepared surfaces so that it is not possible to seed to the proper depth, the CONTRACTOR shall again prepare the seed bed without additional compensation.

c. No more area may be seeded than can be stabilized (i.e. covered with gravel mulch if on a slope) by the end of the work day. No seeding operations may be conducted when steady wind speeds exceed 15 mph. If steady winds exceed 15 mph, seeding operations will be halted and any areas seeded shall be mulched.

d. Weather Limitations: Proceed with seeding operations only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to this specification.

1013.3.5.2 Drill Seeding: Drill seeding is required for areas flatter than 3:1 unless otherwise specified in the plans or in the Supplemental Technical Specifications or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER. Seed shall be applied with a landscape seeder with double rollers, or "rangeland" type seed drill equipped with packer wheels. Seed shall be drilled to a maximum depth of 1/2 inch unless otherwise specified. Direction of seeding shall be in long sweeping and overlapping S-curves on flats and perpendicular to slopes and on the contour whenever possible.

1013.3.5.3 Broadcast Seeding: Seed may be applied by hand or by utilizing a rotary spreader or a seeder box with a gear feed mechanism if mechanized seeding is not possible due to limited size, irregular shape, or slopes between 3:1 and 2:1. Rice hulls or other fillers shall be used to prevent uneven separation of lighter seed. Seed shall be evenly distributed and applied at a rate which is a minimum of twice that of drilled seed rate unless otherwise specified. Immediately following the seeding operation, the seed-bed shall be lightly raked to provide approximately 1/2 inch cover of soil over the seed.

1013.3.5.4 Hydro Seeding: Areas with slopes between 3:1 and 2:1 may be hydroseeded. Seed shall be applied in a slurry with biodegradable dye and 500 lbs/acre of wood fiber. Hydroseed shall be uniformly using broad sweeping strokes. Seed shall not remain in the tank for more than 30 minutes.

1013.3.7 MULCHING

1013.3.7.1 General: All seeded areas on slopes shall be mulched unless otherwise specified on the plans or in the Supplemental Technical Specifications or approved in writing by the LANDSCAPE ARCHITECT or ENGINEER. The pond bottom does not require mulching.

1013.3.7.2 On seeded areas that are level no mulch is required unless otherwise specified on the plans or in the Supplemental Technical Specifications or with prior written approval of the LANDSCAPE ARCHITECT or ENGINEER. On seeded areas that have slopes only gravel mulch may be used as specified on the plans and in the Supplemental Technical Specifications.

1013.3.7.6 Aggregate Mulch on sloped areas flatter than 3:1

a. Slopes shall receive aggregate mulch immediately following seeding operations. 1" – 4" size aggregate mulch shall be placed in a layer one rock deep over seeded areas. Aggregate mulch shall be installed at a density approximately equal to 80%-100% coverage of the surface area. Gaps present between pieces of aggregate are desired. Contractor shall not fill the inherent gaps with smaller graded aggregate. Seeding and mulching shall be completed simultaneously in strips from the top of the slope to the bottom so that seeded areas are not damaged by equipment for installation of aggregate. See sketch 1013-SKL-1.

1013.3.7.7 Aggregate mulch on sloped areas between 3:1 and 2:1

a. Slopes shall receive aggregate mulch immediately following seeding operations. 2" – 8" size aggregate mulch shall be placed in a layer one rock deep over seeded areas. Aggregate mulch shall be installed at a density approximately equal to 80%-100% coverage of the surface area. Gaps present between pieces of aggregate are desired. Contractor shall not fill the inherent gaps with smaller graded aggregate. Seeding and mulching shall be completed simultaneously in strips from the top of the slope to the bottom so that seeded areas are not damaged by equipment for installation of aggregate. See sketch 1013-SKL-2.

1013.3.7.8 Aggregate mulch at base of slope

a. An approximately 6'-0" buffer at the base of the slope shall receive a 4" depth of aggregate mulch over wood mulch. See sketches 1013-SKL-1 and 1013-SKL-2.

b. All other slopes shall receive aggregate mulch immediately following seeding operations.

1013.3.7.9 Wood Mulch at base of slope at pond edges

a. Wood mulch at base of slope at pond edges shall be installed at a 3" depth under aggregate. See sketches 1013-SKL-1 and 1013-SKL-2.

1013.3.7.10 SUMMARY OF EXECUTION

Operation	Basin Bottom	Base of Slope at ponding area	Slope flatter than 3:1	Slope between 3:1 and 2:1
Disk seed bed to four inches (4")	X		X	
Apply one inch (1") of com-post, disk to 4"	X		X	
Drill Seed	X		X	
Hand Broad-cast or Hydroseed	X		X	X
Apply 3" depth chipped or shredded wood mulch		X		
Apply one-rock deep layer of 1" – 4" aggre-gate		X	X	
Apply one-rock deep layer of 2"-8" aggre-gate				X

1013.3.8 MAINTENANCE AND PROTECTION

1013.3.8.2 The CONTRACTOR shall be responsible for protecting seeded and mulched areas until final acceptance of the work and shall repair at his/her expense any damage to seeded and mulched areas caused by pedestrian or vehicular traffic or vandalism.

1013.3.11 WARRANTY

1013.3.11.1 If at the end of one complete growing season, it has been determined by the LANDSCAPE ARCHITECT or ENGINEER that insufficient germination has occurred in the CONTRACTOR shall reseed such areas with no additional cost to the OWNER.

1013.3.11.3 CONTRACTOR shall provide a certificate to the OWNER prior to final acceptance that all requirements of this specification have been met.

1013.3.12 REVIEWS AND OBSERVATIONS

1013.3.12.1 The following shall be the minimum required reviews and observations during the course of construction. Additional reviews and observations can be made at any time at the discretion of the LANDSCAPE ARCHITECT or ENGINEER. It shall be the responsibility of the CONTRACTOR to notify the LANDSCAPE ARCHITECT or ENGINEER, in writing, 48 hours in advance of each required review or observation.

1013.3.12.2 The sequence of required reviews and observations shall not be changed from the sequence listed below. The CONTRACTOR shall not proceed with work of the next phase without written approval of the work of the previous phase by the LANDSCAPE ARCHITECT or ENGINEER. Payment will not be approved for items which have not been reviewed and approved in writing.

a. Each phase of soil preparation shall be observed in process.

b. Finish grade shall be reviewed.

c. Implementation plan shall be approved prior to seeding.

d. Seed shall be reviewed prior to seeding.

e. Seeded area shall be reviewed after completion.

f. Mulched areas shall be reviewed after completion.

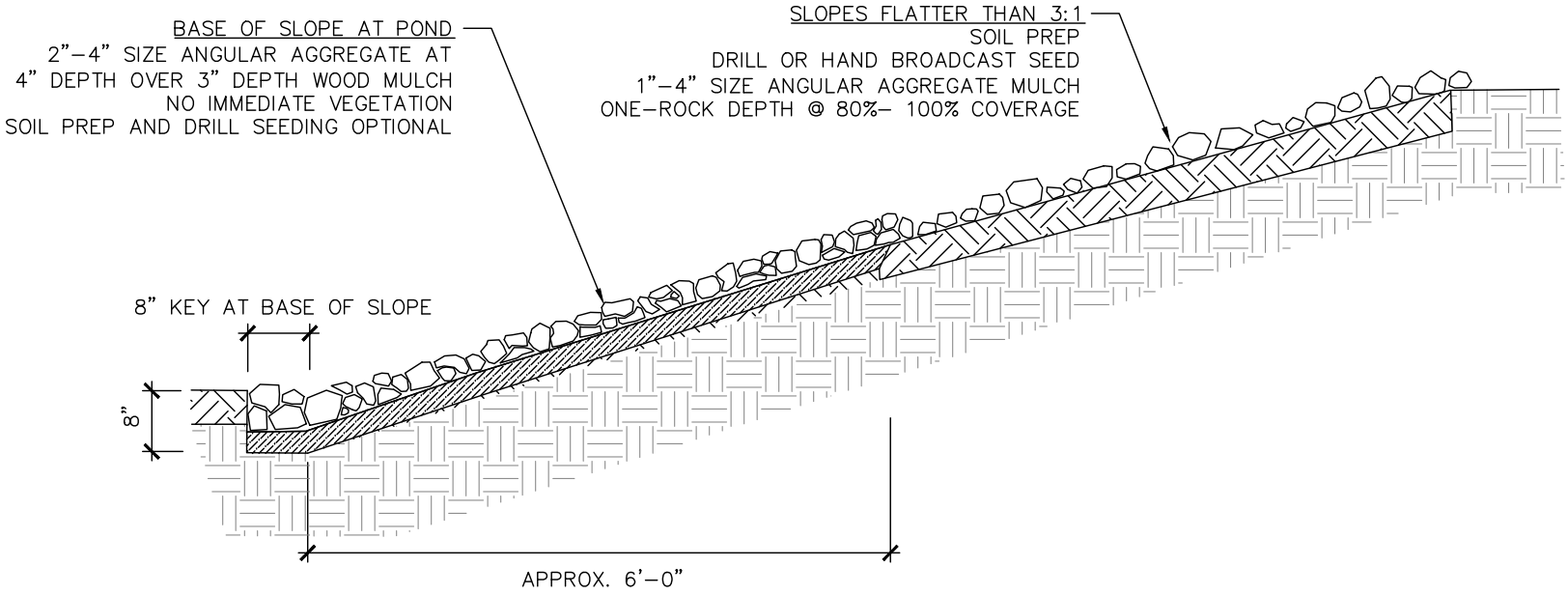
g. Final review and acceptance.

h. Warranty review

1013.3.13 MEASUREMENT & PAYMENT

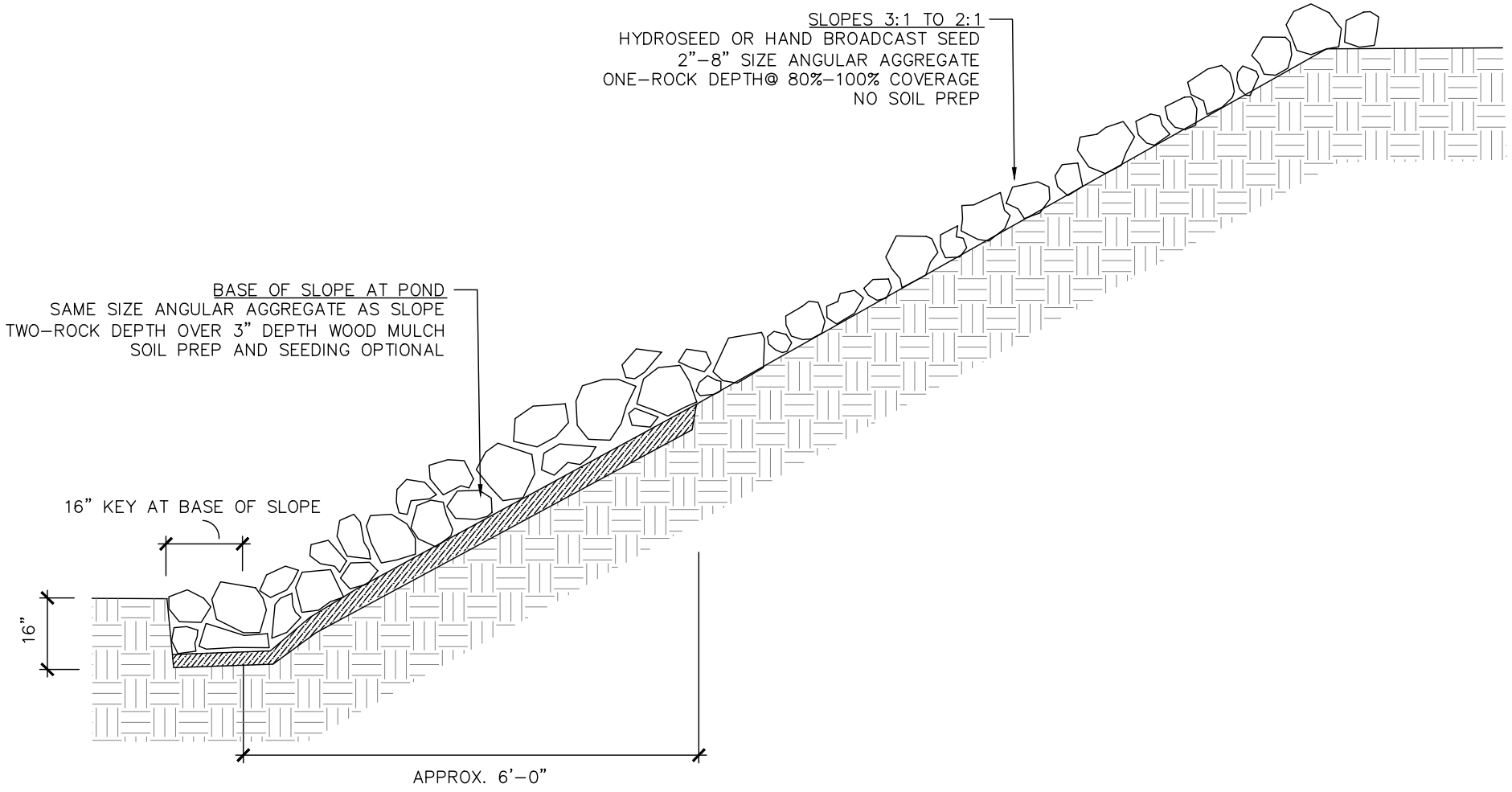
1013.3.13.1 Measurement: The measurement of grass seeding shall be by the acre.

1013.3.13.2 Payment: Payment shall be made at the contract unit price per acre, of seeding complete in place, which shall include the seed, area preparation, seeding, soil amendments, and mulching.



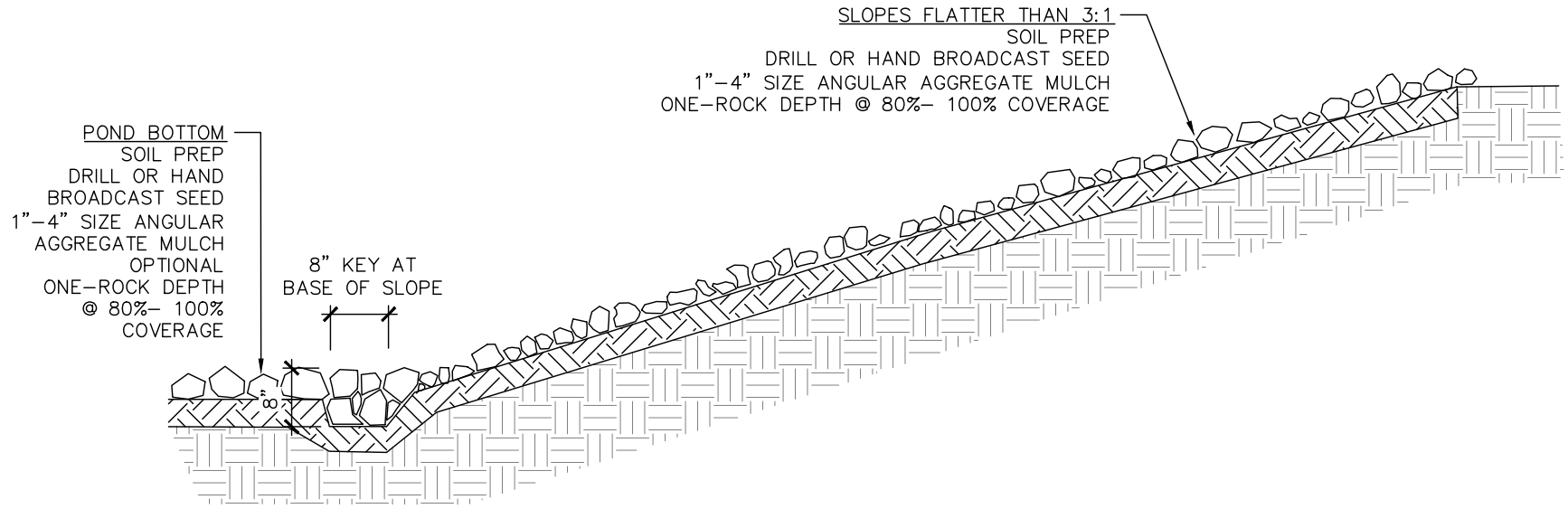
A1 1013–SKL–1: SLOPES FLATTER THAN 3:1

SCALE: N.T.S.



A2 1013–SKL–2: SLOPES 3:1 TO 2:1

SCALE: N.T.S.



A3 SLOPES FLATTER THAN 3:1, PRIVATE PONDS

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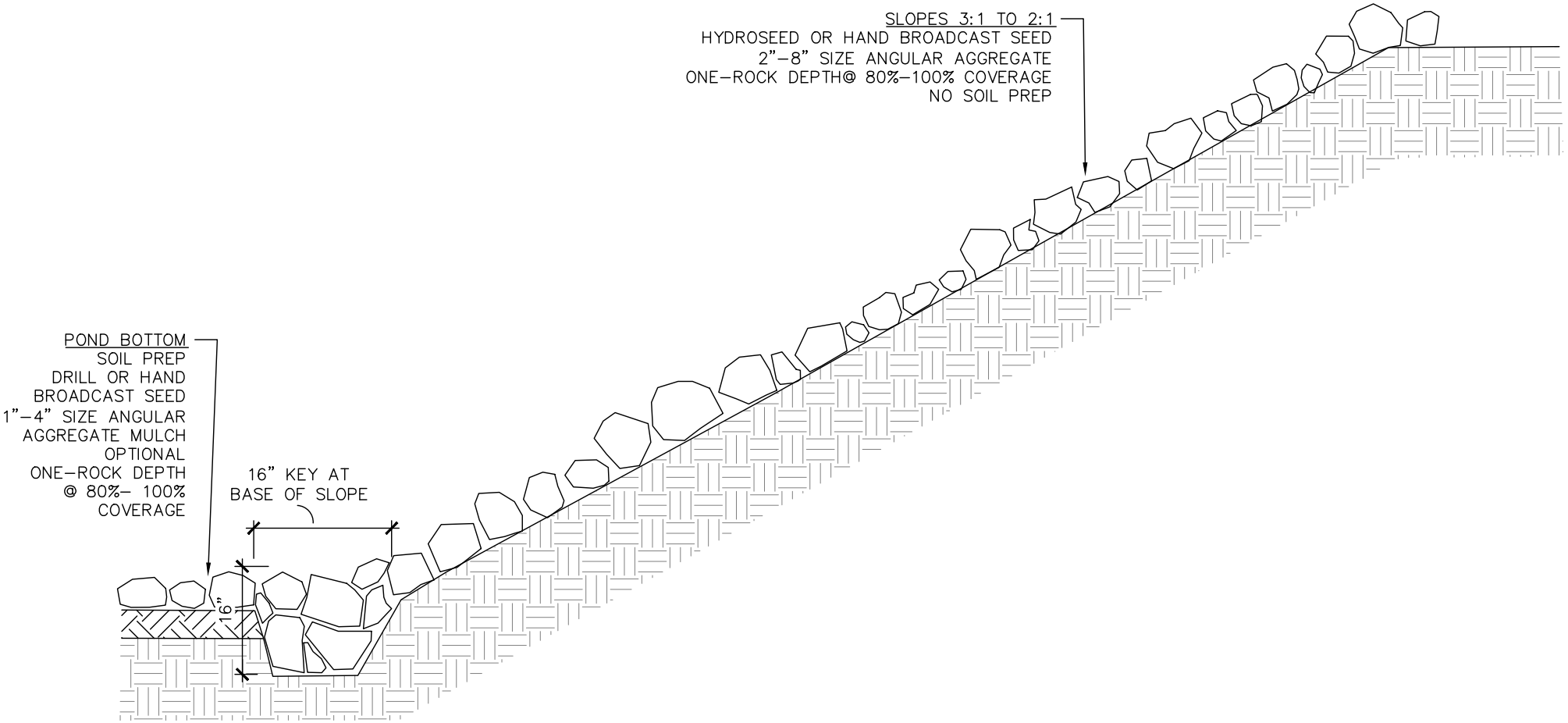

A4 SLOPES 3:1 TO 2:1, PRIVATE PONDS

SCALE: N.T.S.

SECTION 1200

BARRICADING AND TEMPORARY TRAFFIC CONTROL

1200.1 GENERAL: The work under this section includes, but is not limited to, traffic control standards needed to ensure safety to motorists, the public, construction workers, and special event participants when City roadways are temporarily disrupted due to construction efforts or special events.

1200.2 REFERENCES

1200.2.1 Manual on Uniform Traffic Control Devices, (MUTCD), Part VI, FHWA.

1200.2.3 The American Traffic Safety Services Association (ATSSA), Quality Standards for Work Zone Traffic Control Devices.

1200.2.3 This Publication, Latest Edition

SECTION 19 CONSTRUCTION TRAFFIC CONTROL
SECTION 400 TRAFFIC CONTROL

1200.3 BARRICADING STANDARDS

1200.3.1 Before construction begins all traffic control signs and barricades must be installed in accordance with the approved traffic control plan, construction plans, barricading detour plan or as directed by the OWNER. No construction signing and barricading shall commence until CONTRACTOR is assured that all equipment, manpower, and resources are available to start and complete the work. Where applicable, all signs, barricades, and/or barrels will be moved forward as the construction progresses.

1200.3.2 The name and telephone number of the owner shall be permanently stenciled on all barricades and traffic control equipment. The name and telephone number shall be a non-retroreflective color not over 2 inches in height, and be placed on a non-retroreflective surface of all equipment. Graffiti shall be promptly removed from any all barricades and traffic control equipment. If notified by the OWNER or the ENGINEER, graffiti shall be removed, or the equipment replaced with clean equipment, within four hours or the barricade permit is subject to revocation.

1200.3.3 All advance warning signs approaching a construction zone shall be double indicated (one sign each on left and right sides of approaching traffic) for all multiple-lane roadways with painted or raised medians and where adequate space is available. All double indicated signs shall be the same size. When a sign is placed in a painted median, especially a two-way continuous left-turn lane, a reflectorized barricade must be placed on the back side of the sign to alert motorists approaching from the opposite direction.

1200.3.4 It shall be the responsibility of the CONTRACTOR to remove all construction barricades, signing, and traffic control devices not required at the end of the working day.

1200.3.5 All advance warning signs shall be a minimum of thirty-six inches by thirty-six inches in size with super engineering grade sheeting or better. On high-speed (posted 45mph and above), rural section roadways where adequate pedestrian space is available, forty-eight inch by forty-eight inch signs is preferred. The use of forty-eight inch signs shall be required at locations as published on a list by the ENGINEER. All advance-warning signs not directly applicable shall be removed when not needed, and shall not be left in public right-of-way. All construction signing shall be black on a reflectorized orange field unless otherwise specified.

1200.3.6 Existing posts may be used at some locations, with approval of the ENGINEER. Portable sign supports will be acceptable as an alternate for signs which are to be in place for less than three (3) weeks. The bottom of advance warning signs mounted on barricades or temporary sign supports shall be no less than one foot above the traveled way. All regulatory and advisory signs shall be mounted on sign stands or as otherwise approved by ENGINEER . The placement of portable sign supports shall not block or impede pedestrian access. All signs ground mounted on single or double posts shall have the bottom of the sign seven (7) feet above pavement level.

1200.3.7 Barrels and different types of barricades are generally not intended to be intermixed in the same series of channelization. All barrels may have sand or water ballast limited to one hundred (100) pounds. All barricades shall be placed correctly with diagonal stripes sloping downwards in the direction traffic is to pass. Where barricades extend entirely across a roadway, the stripes must slope downward in the direction toward which traffic must turn. Where both right and left turns are provided, the stripes must slope downward in both directions from the center of the barricade or barricades. Where no turns are intended, the stripes must slope downward toward the center of the barricade or barricades.

1200.3.8 The CONTRACTOR shall inspect and maintain all barricades at least once each day except for barricades on or adjacent to arterial and collector streets which shall be checked twice daily, including inspection during hours of darkness. A log of these

inspections showing project, location, date, and time shall be kept and a copy sent to the Construction Coordination Division upon request. Upon request, the CONTRACTOR shall immediately produce current traffic control logs. Failure to do so may result in suspension of work or revocation of barricade permit.

1200.3.9 All traffic control devices required within traveled lanes after dark are to be equipped with warning lights. Type (A) flashing warning lights shall be used on all devices which are intended to warn motorists or pedestrians of hazards or obstructions in or near the travel path. Type © steady burn lights shall be used on all devices which are intended to define the travel path. All lights shall be operational. Traffic control devices that are damaged, dirty or have substandard reflectorization shall be immediately brought up to standard. Reflectorized sheeted panels shall not be considered as a replacement for a required warning light. Warning lights shall be incidental to payment for traffic control.

1200.3.10 Equipment and materials are not to be stored within fifteen (15) feet of a traveled lane during non-working hours, unless approved by the ENGINEER, which approval cannot be unreasonably withheld.

1200.3.11 CONTRACTOR shall provide and maintain a safe and adequate means of channelizing pedestrian traffic around all work areas throughout the periods of construction. All such channelization shall be arranged to prevent pedestrians from having to enter the roadway in order to pass around the work area. Where required, pedestrian detour signs will be installed by the CONTRACTOR. Where construction impedes or obstructs sidewalk access, CONTRACTOR shall barricade sidewalks and place "Sidewalk Closed" signs accompanied with the appropriate pedestrian detour signing. Pedestrian detour signs shall be incidental to payment for traffic control.

1200.3.12 CONTRACTOR shall provide and maintain a safe and adequate means of channelizing bicycle traffic around all work area throughout the periods of construction when existing bicycle trails, lanes, or routes are designated. Where possible, adequate space for bicyclists must be provided, and bicycle detour signs, including "Share the Road" signs shall be installed. When adequate space is not available to provide for bicycle access, the bicycle facilities shall be adequately detoured around the construction site. The detour route shall minimize out-of-direction travel distance, and shall be adequately signed and directed. Bicycle detour signs shall be incidental to payment for traffic control.

1200.3.13 All barricades, signs, and traffic control equipment shall be properly and adequately ballasted for normal wind loads. For equipment placed for extended periods (seven days or more), or during the months of February through May, additional ballast shall be required.

1200.3.14 The use of roll-up advance warning signs is allowed, so long as the reflectivity required in the MUTCD is provided. Such signs shall be adequately braced to resist rotation under normal wind loads.

1200.3.15 The use of orange warning flags mounted atop construction warning signs is encouraged and is required in certain instances. Flags mounted atop construction signs is required on all "Reduced Speed Ahead (R2-5a)" signs, "Reduced Speed (R2-5b and R2-1)" signs, all "Double Fine Zone" signs, "Road Closed Ahead (W20-3)" signs, "Detour Ahead (W20-2)" signs, "Flagger Ahead (W20-7)" signs, "Flagger Symbol (W20-7a)" signs, and "Be Prepared to Stop (W20-7b")" signs.

1200.3.16 Cones are an acceptable traffic control device under certain situations. Traffic cones are not to be used to separate traffic traveling in different directions. All cones must be a minimum of 28 inches tall. The use of cones as traffic control devices is not allowed during nighttime hours; however if used, all cones used at night must include white, reflectorized bands per MUTCD standards. The use of cones is encouraged for daytime moving closure operations, projects in duration of two hours or less, and special events.

1200.3.17 Type III barricades must be used at all road closures. Multiple type III barricades of the same configuration placed next to each other in the same direction is allowed. A type III barricade or illuminated arrow panel must be used for each lane closure. A minimum of two feet of exposed railing is required on the traveled side (open lanes) of type III barricades. The minimum length of type III barricade for each lane closure is eight (8) feet per lane twelve (12) feet or less in width, and the minimum length of type III barricade required for a sidewalk closure is four (4) feet. The minimum length of type III barricades for a double lane closure is sixteen (16) feet. Additional barricades above the minimum required may be required to fill in gaps for wide lanes, multiple lane closures, or shoulder areas.

1200.3.18 Road closures shall be pre-warned by the use of a "Road Closed to Through Traffic" (R11-4) sign, where appropriate. These signs shall be placed at intersections approaching the road closure with appropriate detour signing. When mounted on a three rail barricade support, the maximum width of sign support shall be six feet. If the detour route is more than one intersection before the road closure, then additional R11-4 signs shall be placed at each

intersection between the detour route and the road closure. "Road Closed to Through Traffic" signs are encouraged to be placed on or near the center of the roadway, but R11-4 signs shall not be placed in an area that block sight distance for motorists and pedestrians. Where sight distance becomes a problem, low-volume intersections may be temporarily converted to a four-way Stop condition, with the approval of the ENGINEER.

1200.3.19 Illuminated arrow panels with a minimum size of 32 square feet may be used in lieu of type III barricades for lane and roadway closures. Arrow panels must be battery or solar powered. The use of diesel, or other noise generating power sources, is not allowed. For roadways with a previously posted speed limit of 35 mph or higher, the use of arrow panels is required for all lane closures. An arrow panel is required for each lane reduction, but is not required for shifting tapers. In residential areas where the arrow panel will be used at night, directional lighting limited to 30 degrees or less must be used to reduce glare into nearby properties. When illuminated arrow panels are used for a lane closure, then the use of vertical panels at the regular MUTCD minimum spacing for the lane reduction taper is allowed.

1200.3.20 For work expected to last one hour or less and for moving closures, reduced barricading may be allowed as approved by the ENGINEER. Reduced barricading on arterial or collector roads shall consist of a minimum of one advance warning sign, a minimum of a three barricade or cone taper, and an illuminated arrow panel.

1200.3.21 For emergency utility work on arterial or collector roadways, the CONTRACTOR must notify the traveling public. If a variable message board is not required by the ENGINEER, a "Utility Emergency Ahead" sign must be installed for each direction of arterial / collector traffic approaching the work site. The "Utility Emergency Ahead" sign must be placed in addition to, and preceding, the three normally required advance warning signs at the same spacing required in the MUTCD for advance warning signs.

1200.3.2 Double fine zones shall be delineated by the
use of "Double Fine Zone" signs as outlined in this section. Double fine zones shall be delineated for construction zones and construction curtilage zones at the request of either the OWNER or ENGINEER. In addition, double fine zones are required on all arterial / collector roadways where there is a: 1.) reduced speed limit; 2.) lane reduction; 3.) reduced design speed; or 4.) traffic hazard. Double fine zones are required for all flagging operations, and work zones with an imminent danger to workers, regardless of the roadway classification. The beginning of the double fine zone shall be clearly marked with a sign stating: "*Construction* – Begin Double Fine Zone". The end of the double fine zone shall be clearly marked with a sign stating: "*Construction* – End Double Fine Zone". If the double fine zone extends beyond one-half mile in length, intermittent signs must be placed no more than one-half mile apart stating: "*Construction* – Double Fine Zone". Additional intermittent signs are needed following side street entrances. Details for the double fine zone signs are on file with the ENGINEER. Placement of the Begin Double Fine Zone sign shall be immediately following the "Road Work Ahead" sign. Placement of the End Double Fine Zone sign shall be immediately preceding the "End Road Work" sign.

1200.3.23 On arterial or collector roadways with multiple lane closures, the advance warning signs shall indicate the correct number of lanes closed. Arrow panels are required for each lane closure of multiple lane closures on arterial or collector roadways, regardless of the previously posted speed limit.

1200.4 CONFLICTS WITH EXISTING SIGNING, STRIPING, AND SIGNALS

1200.4.1 CONTRACTOR shall not remove, realign, or adjust any official OWNER traffic control device including stop signs, warning signs, or any other traffic or parking control signs, unless approved by the OWNER. CONTRACTOR shall give the OWNER three (3) working day's prior notice of any official OWNER traffic control device that needs to be moved. The OWNER shall take all appropriate actions as soon as practical thereafter. When CONTRACTOR places regulatory signing reducing the posted speed limit as approved by the OWNER, the CONTRACTOR must temporarily cover any and all conflicting speed limit signs. Such covers must be immediately removed once the temporary speed limit reductions are removed.

1200.4.2 The CONTRACTOR is responsible for obliteration of any conflicting striping and responsible for all temporary striping. For temporary situations lasting seven days or less, conflicting pavement markings may be addressed with the proper use of channelization devices and signing, unless otherwise approved or required by the ENGINEER.

1200.4.3 When the construction activity or traffic detouring plans result in less than two signals being visible in any direction at a signalized intersection, additional temporary traffic signals shall be required. A minimum of two signals must be visible within a twenty degree horizontal and vertical cone of vision, as measured from the stop bar for each lane approaching a signalized intersection.

1200.5 STREET AND LANE CLOSURES

1200.5.1 CONTRACTOR shall maintain access to all public and private facilities adjacent to the construction area at all times, including businesses and/or residents. When denying access is unavoidable, CONTRACTOR must coordinate access restriction to times and locations that are reasonably convenient to the property owners and/or residents affected. CONTRACTOR shall construct and maintain access roads, including paved ramps, where deemed necessary by ENGINEER to maintain traffic flow. Business access signs may be required to direct traffic to existing businesses, as directed by ENGINEER or OWNER. No more than three businesses shall be placed on a single sign. In areas of multiple adjacent businesses, only generic "Business Access Only (arrow)" signs are required. For shopping centers with multiple business tenants, the name of the shopping center shall be placed on a sign at each access location. Access signs shall have 5 inch high, white letters with a directional arrow on a reflectorized blue background. Business access shall be rectangular in shape, no taller than wide, and shall be no larger than four feet wide by three feet tall. Business access signs shall not be placed where they block sight distance for either motorists or pedestrians.

1200.5.2 CONTRACTOR shall notify the following services forty-eight (48) hours in advance of any complete street or access closures: Police Department, Fire Department, U.S. Postal Service, Solid Waste Department, Ambulance Services, local schools, and the Transit Department. The CONTRACTOR shall also notify all businesses and residents directly affected by the road closure. For the total closure of arterial or collector roadways, a variable message board must be installed for a minimum of two days prior to the road closure notifying motorists of the dates and times for the closure. A minimum of one variable message board is required for each direction of closure. For the total closure of a local roadway, a sign must be installed for a minimum of two days prior to the road closure notifying motorists and residents of the dates and times of the closure. A minimum of one sign is required for each direction of closure.

1200.5.3 The CONTRACTOR shall be responsible, and shall make appropriate accommodation, for garbage and trash collection, mail delivery, and other essential services needed by residents and businesses affected by CONTRACTOR operations. This effort shall include coordination with U.S. Post Office, Solid Waste Department, and other agencies. Where required, CONTRACTOR shall notify all residents in writing at least two days prior. Such notice shall include at a minimum: dates and times of construction activities and the name and telephone number of the CONTRACTORS contact person. CONTRACTOR shall collect all trash and garbage in the project area and deliver to an accessible location for collection by 7:00 a.m. on the designated trash collection day. Such trash and garbage cannot be deposited onto private property, must not block access, and shall be immediately cleaned up by CONTRACTOR upon pick up by the Solid Waste Department or private trash collection company.

1200.5.4 Total or partial closure of some streets may be restricted to certain hours of the day by the OWNER. Streets having working hour limitations may be noted on the approved construction plans. In cases of emergency work or permit work, streets having working hour limitations will be designated by the ENGINEER. Waivers of the working hour limitations can be obtained from the ENGINEER.

1200.5.5 If construction on streets with working hour limitations is expected to extend past the allowed working hours, plating of the trench and/or temporary asphalt concrete pavement shall be provided so that the roadway is opened to traffic within the allowable work hours. Such excavations must be plated, temporarily patched or resurfaced prior to opening to traffic. A minimum width of 11 feet for each lane of traffic shall be provided, unless otherwise directed by the ENGINEER.

1200.5.6 When detouring low and moderate-volume traffic onto a previously unpaved area, see Table 1200.1 for surfacing requirements.

Table 1200.1

Time	Shoulder Residential	Shoulder (Other)	Local / Residential	Major Local	Collector	Arterial
Under one day	Compacted Subgrade	Compacted Subgrade	Compacted Subgrade	Compacted Subgrade	Gravel or millings	Gravel or millings
1-3 days	Compacted Subgrade	Gravel or millings	Gravel or millings	Gravel or millings	Treated Millings	2" Asphalt
4-7 days	Gravel or millings	2" Asphalt	Gravel or millings	Treated Millings	2" Asphalt	2" Asphalt
8-30 days	Treated Millings	2" Asphalt	Treated Millings	2" Asphalt	4" Asphalt	4" Asphalt

Table Notes:

The contractor shall be responsible to continually maintain all detours, providing a smooth, drained, and safe roadway surface. All compacted subgrade areas shall be graded regularly to provide a smooth driving surface, and must be treated regularly with water or other approved dust control palliative. During periods of dry and/or windy weather, a water truck must be on-site at all times, and frequent watering may be necessary.

Gravel, millings, or treated millings must be bladed and compacted to provide a stable, smooth driving surface prior to opening to traffic. Such surfacing shall be regularly maintained to provide a smooth and stable driving surface. All temporary asphalt pavement shall be placed upon a compacted subgrade which shall be graded to drain. Treated millings includes millings stabilized with an applied emulsive asphalt.

1200.6 MEASUREMENT AND PAYMENT

1200.6.1 Measurement and payment for barricading and temporary traffic control shall be per lump sum per project except for the items listed below. Payment of additional items will only be made if such traffic control device or services is either approved in the construction plan set or requested by the OWNER in writing. Payment shall include the cost of obtaining all permits and approvals; preparation of traffic control plans; working restricted or extended hours when required; notification to all affected residents, businesses, agencies, or other public contacts; setting and resetting barricades, maintaining barricades, daily removal of barricades when required, flagman operations when required, installation of temporary traffic signals when not required by the OWNER or in the construction plans; coordination with ENGINEER on traffic signal re-timing; hiring of off-duty Police Department Officers; and any and all other costs associated with temporary traffic control except the following:

1200.6.1.1 Measurement and payment of the installation of temporary striping shall be made per lineal foot of striping installed per four inch wide.

1200.6.1.2 Measurement and payment of business access and special signs shall be made on a per square foot basis project duration.

1200.6.1.3 Measurement and payment of Variable Message Boards shall be made per each on a per day (24-hour period) basis.

1200.6.1.4 Measurement and payment of illuminated arrow boards required by the OWNER, or required in the construction plans, shall be made per each on a per day (24-hour) basis.

1200.6.1.5 Measurement and payment of temporary wall barrier shall be made per lineal foot of wall barrier installed and removed at each location per project.

1200.6.1.6 Measurement and payment for temporary traffic signals required by the OWNER, or required in the construction plans, shall be made per each per project duration at each location.

SECTION 1502

SUBMITTALS

1502.1 GENERAL

The requirements of this section of the specifications consist of furnishing all manufacturer's data, shop drawings, samples, certifications, guarantees, reports, operation manuals, maintenance manuals, lubrication charts, spare parts lists, special tools and factory representative required for installation of special items, in strict accordance with the specifications and the applicable drawings, and subject to the terms and conditions of the contract.

1502.2 SUBMITTAL CHECK LIST

The Submittal Check List that will be part of the Supplemental Specifications on each project, lists items which will be required to construct the project for which submittals will be required by the ENGINEER. The list of submittals is for the convenience of the CONTRACTOR and supplier, and should not be considered as the complete and final requirements. Additional submittals and material may be required by the ENGINEER as project progresses.

1502.3 WHAT TO SUBMIT

1502.3.1 The following is an explanation of what to submit if indicated on the check list.

A. Manufacturer's Data: Any catalog type literature on the item.

B. Shop Drawings: Detail drawings with all dimensions and locations shown.

C. Samples: The item that will be supplied.

D. Certifications: Any certifications required by these specifications or standard specifications and/or requirements for that item, to cover raw materials and testing of the final product.

E. Guarantees: A copy of the guarantee to be given to the Owner on that item.

F. Lab Test Reports: Laboratory test reports required to show that the item meets all specified requirements.

G. Operation Manuals and Maintenance Manuals: The manufacturer's standard Operation and Maintenance Manuals on that item.

H. Special Tools: A list of special tools required to operate and maintain that item and the number of each tool the manufacturer will supply.

I. Lubrication Charts and Grease Specs: A list of all lubrication points on that item with frequency and type of lubricant to be used at each point.

J. Spare Parts List: A list of spare parts that the manufacturer recommends the Owner maintains.

K. Factor Representative: A factory representative will be required to be present for installation and/or start-up of that item of equipment.

L. Field Test Reports: The field test reports are reports and/or tests that have been conducted on the item in an existing installation over a period of time.

M. Pump and Blower Curves: Certified curves based on the test performance of each pump or blower to be installed on this project.

N. Load Design: Load design calculations shall show the maximum load the item can carry under the support conditions shown on the drawings for both uniform and concentrated loads. These calculations shall be under a New Mexico registered professional engineer's signature.

0. Additional literature, reports and/or tests may be required by the ENGINEER.

1502.3.2 When pumps of any type are part of the project, in addition to the other information required on pump submittals the CONTRACTOR shall submit the following data for each unit of pumping equipment.

A. Name of manufacturer
B. Type of pumps.
C. Number of stages and speed.
D. Diameter of impeller.
E. Type of bearings.
F. Size of suction and discharge piping and barrel.
G. Type of thrust bearing.
H. Shut-off pressure.
I. Impeller material.
J. Pump shaft material and diameter.
K. Capacity and head.
L. Make and type of motor.
M. Horsepower of motor with proper NEMA Standard insulation.
N. Type of motor bearings.
0. Net weight of complete unit.

P. Guaranteed KWH required to pump 1,000 gallons against the required head.
Q. Discharge column:
    Material
    Weight per foot
    Type of Joint
    Spacing of joints
    Inside diameter
R. Line shaft:
    Material
    Diameter
    Length of sections
S. Line Shaft Bearing:
    Length
    Spacing Type
    Material
T. Thrust Bearing:
    Complete computations on thrust conditions.
    Computed pump thrust at shut-off.
    Computed pump thrust at operating condition.
    Rated bearing capacity.
    Manufacturer.
    Method of cooling.
    Weight of bearing.
U. Combined overall efficiency of pump and motor when operating at rated condition.
V. Does equipment offered differ from specification requirement?
W. Do catalogs, descriptive literature, etc., covering all equipment accompany the bid?

SECTION 1502

SUBMITTAL CHECK LIST

SUBMITTALS FOR	Manufacturer's Data	Shop Drawings	Samples	Cerifications	Guarantees	Lab Test Reports	Operation Manuals	Maintenance Manuals	Special Tools	Lubrication Charts & Grease Specs.	Spare Parts List (Recommended)	Factory Representative Required for Install.	Field Test Reports
ITEM DESCRIPTION													

TECHNICAL SPECIFICATION 1503

MOBILIZATION

Revised 08/19/2025

1503.1 DESCRIPTION

This work shall consist of preparatory and final work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to and from the project site; for the establishment of all offices, buildings and other facilities necessary for work on the project; and, for all other work and operations which must be performed or costs incurred prior to beginning work on the project.

1503.2 ADMINISTRATION REQUIREMENTS

1503.2.1 DEFINITIONS

"Total Original Contract Amount" shall mean the total amount bid as compensation for the contract.
"Total Original Contract Amount Less Mobilization" shall mean the total amount bid as compensation for the contract less the amount bid for mobilization.

1503.2.2 GENERAL

It is the intent of this specification to provide for the contractor to receive 100% of the amount bid for Mobilization by the time the Contractor has performed 10% of the total original contract amount less Mobilization.

1503.2.3 PAYMENT PROCEDURES

The following will apply in effecting mobilization payments:

A. When the Contractor is eligible for payment of less than 5% of the total original contract amount bid less mobilization, the Contractor will be paid 25% of the amount bid for mobilization.
B. When the Contractor is eligible for payment of from 5% to less than 10% of the total original amount bid less mobilization, the Contractor will be paid 50% of the amount bid for mobilization minus any mobilization amount already paid.
C. When the Contractor is eligible for payment of 10% or more of the total original contract amount less mobilization, the Contractor will be paid 100% of the amount bid for mobilization minus any mobilization amount already paid.

1503.2.4 PAYMENT CALCULATION

PM = Mobilization Payment
M = Total amount bid for Mobilization
fM = Mobilization payment percentage factor (0.25, 0.50, or 1.0, as applicable)
PM = M x fM

EXAMPLE MOBILIZATION PAYMENT CALCULATION

Total Original Contract Amount Bid	$110,000
Amount Bid for Mobilization	$ 5,000
Total Original Contract Amount Less Mobilization	$105,000

Percent of Work Completed	Fm	M	PM
< 5% of $105,000	0.25	5,000	$1,250
> 5% to < 10% of $105,000	0.50	5,000	$2,500*
≥ 10% of $105,000	1.00	5,000	$5,000*

**minus previously paid amounts*

1503.3 METHOD OF MEASUREMENT

See example provided in 1503.2.4.

1503.4 BASIS OF PAYMENT

Mobilization will be paid for at the contract price provided in the Unit Cost Bid Proposal, in accordance with this specification.

No additional payments will be made for demobilization and remobilization due to shutdowns or suspensions of the work or for other mobilization and demobilization activities required to complete the contract.

END OF SECTION

TECHNICAL SPECIFICATION 1507

MATERIALS TESTING

Revised 08/19/2025

1507.1 DESCRIPTION

This specification includes materials testing and quality control measures required on this project. This specification is additional to requirements specified for testing and quality assurance in the construction plans.

Materials and equipment are subject to inspection, sampling, and testing before acceptance of the work.

1507.2 RELATED WORK

General and Supplemental General Conditions of the Contract.

1507.3 REFERENCES AND DEFINITIONS

1507.3.1 All materials and equipment shall be tested, by the CONTRACTOR, pursuant to their technical specification (unless otherwise specified herein) and the manufacturer's recommendations.

1507.3.2 "Structure" shall include but is not limited to: parking lots, pavement, sidewalk, curb and gutter, foundations, structural concrete, piping, wet-wells, manholes, retaining walls, junction boxes, and buildings.

1507.4 TESTING SUBMITTALS

1507.4.1 Test Reports from tests performed by independent testing firm: Submit for acceptance, complete test reports from approved independent testing laboratories certifying that product conforms to performance characteristics and testing requirements specified herein and in other supplemental/standard specifications. Independent firm to submit reports to the ENGINEER and CONTRACTOR, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

1507.4.2 Test Reports from tests performed by CONTRACTOR: Submit for acceptance, complete test reports from CONTRACTOR certifying that product conforms to performance characteristics and testing requirements specified herein and in other supplemental/standard specifications.

1507.5 QUALITY ASSURANCE

1507.5.1 Quality Assurance/Control of Installation – The CONTRACTOR shall:

A. Comply fully with manufacturers' instructions, including each step in sequence.
B. Request clarifications from ENGINEER before proceeding should manufacturers' instructions conflict with Contract Documents.
C. Request clarification from ENGINEER before proceeding if the specified reference standards conflict with Contract Documents. The contractual relationship of the parties

to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

D. Comply with specified standards as a minimum quality for the work except when more stringent specified tolerances, codes, or requirements indicate higher standards or more precise workmanship are required.
E. Make sure work is performed by qualified persons.
F. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1507.5.2 Testing Laboratory Services

A. Reports will be submitted by the independent firm to the ENGINEER and CONTRACTOR, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.

1507.6 TESTING METHODS

Testing methods shall comply with ASTM Standards and as specified in the technical specifications and construction plans for the project.

1507.7 EXECUTION

1507.7.1 Testing Laboratory Services

A. The CONTRACTOR will employ and pay for services of an independent testing firm to perform testing.
B. The independent firm will perform tests and other services specified in individual Specification Sections and as required by the OWNER.
C. CONTRACTOR shall:
    I. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage and assistance as requested.
    II. Notify ENGINEER and independent firm 8 hours prior to expected time for operations requiring services.
    III. Make arrangements with independent firm and pay for additional samples and tests required for CONTRACTOR's use.

1507.7.2 Retesting required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the ENGINEER. No additional payment will be made for re-testing due to failing tests.

1507.8 TESTING FREQUENCY & TYPES OF TESTING

Frequency and type of testing shall be per the requirements listed in the specifications for each type of Work. The ENGINEER may increase and/or add testing for any Work items. The Testing Allowance will be adjusted for increases in testing by Section 1507.9.

1507.9 MEASUREMENT & PAYMENT

1507.9.1 Testing shall be paid for as an ALLOWANCE. The CONTRACTOR may request percent of MATERIALS TESTING payments during construction, however, the CONTRACTOR shall provide

actual testing lab invoices as back-up for the percent complete that is being requested in a Pay Application.

1507.9.2 Testing Allowances are provided as part of the project. Invoices for testing will be paid for through this allowance.

1507.9.3 Costs included in testing price include:

A. Cost of engaging an independent testing firm, execution of tests by the testing firm, and reporting results by the testing firm.
B. Costs of incidental labor and facilities required to assist testing firm.
C. Costs of testing laboratory services used by CONTRACTOR separate from Contract Document requirements
D. Costs of re-testing due to failure of previous tests will be included in the cost for testing and no additional payment will be made for this work.

1507.9.4 The CONTRACTOR shall submit copies of the testing firm's invoice to OWNER with Pay Application. Reimbursement to the CONTRACTOR will be for actual invoiced costs and no mark-up will be added to this invoice. CONTRACTOR shall receive reimbursement for actual invoice of testing firm upon certification that payment has been made to the testing laboratory. Payment will be made at the next application for payment from OWNER.

END OF SECTION

TECHNICAL SPECIFICATION 1508

PROJECT RECORD DOCUMENTS

Revised 08/20/2025

1508.1 GENERAL

This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

1508.2 RECORD DRAWINGS

Record Prints: Maintain one set of red-lined prints of the Contract Drawings and Shop Drawings. These prints shall be updated no less frequently than once per week. These prints will be reviewed for verification of updates by the OWNER or OWNER's representative on a regular basis, depending on the length of the contract.

Immediately before inspection for Certificate of Substantial Completion, CONTRACTOR will review marked-up Record Prints with ENGINEER.

1508.2.1 Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Mark whichever drawing is most capable of showing field conditions fully. Require individual or entity who obtained record data, whether individual or entity is Installer, SUB-CONTRACTOR, or similar entity, to prepare the marked-up Record Prints.

a) Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b) Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

1508.2.2 Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-references on the Contract Drawings.

1508.2.3 Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

1508.2.4 Note Construction Change Directive numbers (field orders or Request for Information changes), alternate numbers, Change Order numbers, and similar identification, where applicable.

1508.2.5 Verification of current record prints status will be included in the monthly payment approval process that will be noted by the Construction Observer's field reports.

1508.3 RECORD SPECIFICATIONS

Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications. Give

particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

Note related Change Orders, field order notes, Request for Information (RFI) notes, Record Product Data, and Record Drawings where applicable.

1508.4 MISCELLANEOUS RECORD SUBMITTALS

Assemble Certifications, Lab Test Reports, and Field Test Reports required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

1508.5 SUBMITTALS

See New Mexico Standard Specifications For Public Works Construction Section 1502.

1508.6 RECORDING & MAINTENANCE

1508.6.1 Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur.

1508.6.2 Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. It is not advisable to use Project Record Documents for construction purposes. Provide access to Project Record Documents for ENGINEER's reference on the project site.

1508.7 MEASUREMENT & PAYMENT

The cost of project record documents shall be incidental to the Work and no separate payment shall be made for this effort. However, the Project Record Documents shall be reviewed per Section 1508.2.5 and they shall be updated prior to pay applications being processed.

END OF SECTION

TECHNICAL SPECIFICATION 1510

EXCAVATION, OVER-EXCAVATION, BORROW, AND FILL

Revised 08/20/2025

1510.1 GENERAL

1510.1.1 Excavation, over-excavation, borrow, and fill shall consist of all earthwork operations involved in grading and construction in accordance with the plans and specifications, except for: Excavation and backfill for structures, Excavation and backfill for trenching, and any other earthwork operations separately designated.

1510.2 REFERENCES

This section incorporates the following publications by reference:

- ASTM D-1557
- ASTM D-422
- ASTM D-4318
- ASTM D-6938

This publication:

- NM APWA Section 201
- SSCAFCA 1513
- SSCAFCA 1514

1510.3 MATERIAL CLASSIFICATIONS

1510.3.1 UNSUITABLE MATERIAL

Unsuitable materials shall include all material that contains debris, roots, organic matter, stones or boulders too large to be used in the intended construction, or other materials that are determined by the Engineer to be unsuitable. Otherwise suitable materials, which are unsuitable due to excess moisture content, will not be classified as unsuitable material unless it cannot be dried by manipulation, aeration or blending with other materials satisfactorily as determined by the Engineer.

Material that is unsuitable for the intended use shall be excavated and removed from the site or otherwise disposed of as approved by the Engineer. Unsuitable material shall be disposed of in accordance with environmental requirements and as approved by the Project Manager.

1510.3.2 FILL MATERIAL

All fill material shall be free of vegetation and debris. Clods or hard lumps of earth of 6 inches in greatest dimension shall be broken up. Fill materials shall be free of vegetation and debris and contain no rocks larger than 3 inches. All fill and backfill material, including selection and blending of material, shall be subject to approval by the Engineer. All fill material shall conform to the requirements for Structural Fill as outlined below.

1510.3.3 STRUCTURAL FILL AND BACKFILL

Structural fill and backfill shall consist of material excavated from on-site or Borrow Material that meets the requirements described in this section. The blended excavated site soils from within the area will be generally suitable for use as structural fill. Blending of soils shall be considered incidental to the Work and no separate payment will be made for this effort. Gradation of the fill material, as determined in accordance with ASTM D-422, shall be as follows:

Sieve Size (Square Openings)	Percent Passing (by Weight)
3 inch	100
No. 4	60-100
No. 200	5-40

All structural fill shall be blended as necessary to produce a homogeneous material. The plasticity index of the structural fill shall be no greater than 15 when tested in accordance with ASTM D-4318.

1510.3.4 BORROW MATERIAL

Borrow material is defined as material obtained from an approved borrow source to be used as structural fill material for construction. If borrow material is required, the Contractor shall identify a borrow site and obtain soils tests to verify compliance of the material with structural fill requirements per this specification. The Contractor shall not import any borrow material prior to verification that material meets the requirements contained herein and he has received approval to import the material by the Owner.

1510.3.5 SURPLUS MATERIAL

The Contractor shall make all arrangements for disposal of surplus material in accordance with environmental requirements and as approved by the Project Manager. If the material is disposed of on-site, the Contractor shall place material in locations as designated by the Owner. Do not remove materials from the project limits without the approval of the Owner. The Contractor shall satisfy themselves that there is sufficient material available for the completion all items requiring fill material before disposing of any indicated surplus material inside or outside of the project area. Any shortage of material caused by premature disposal of surplus material by the Contractor shall be replaced by the Contractor and no payment will be made for such replacement.

1510.4 CONSTRUCTION REQUIREMENTS

1510.4.1 GENERAL

Contractor shall perform necessary clearing, grubbing and stripping in accordance with Section 201 of the Specifications and Supplemental Technical Specification 201, "Clearing and Grubbing", prior to any excavation, grading, or other earthwork operations. Excavation, fill construction and backfill shall be finished to reasonably smooth and uniform surfaces.

All slopes and cuts should be made in accordance with CFR 29 Part 1926 Subpart P, and all other applicable regulations.

1510.4.2 EXCAVATION

Excavation shall consist of the removal of earth involved in grading and construction according to the plans, except other excavations separately designated.

Temporary construction excavations shall be made in accordance with CFR 29 Part 1926 Subpart P, and all other applicable regulations. Surface water shall be routed such that it does not flow down the face of the excavation slopes. Where insufficient space exists for open cut excavations, a shoring system will be required. All required shoring systems shall be considered incidental to the cost of excavation and no additional payment will be made for this item. All excavations shall comply with all applicable safety regulations.

1510.4.3 OVER-EXCAVATION

Over-excavation shall consist of removal and replacement (backfill) of earth to the limits and depths provided in the plans. Backfill of over-excavated areas shall be in accordance with 1510.3.2.

1510.4.4 FILL CONSTRUCTION

Fill construction shall consist of constructing embankments, the placing and compacting of approved material within areas where unsuitable material has been removed; and the placing and compacting of suitable materials in holes, pits, and other depressions.

1510.4.5 PLACING AND COMPACTING

Fill or backfill, consisting of soil approved by the Engineer and/or recommended in the project's Geotechnical Report, should be placed in controlled compacted layers not exceeding 8 inches (compacted) with approved compaction equipment. All fill material should be blended as necessary to produce a homogeneous fill.

The fill should be raised uniformly and should be benched into the native soils. All compaction should be accomplished to a minimum of 95 percent of maximum dry density. No lifts of high permeability material or material differing substantially from the lift below shall be permitted.

At locations where it would be impractical to use mobile power compacting equipment, fill layers shall be compacted to the specified requirements by any approved method that will obtain the specified compaction.

1510.5 TESTING

1510.5.1 Tests for degree of compaction should be determined in accordance with ASTM D-1556 or ASTM D-6938.

1510.5.2 A compaction test is required on every lift or every 500 SY, whichever is less.

1510.5.3 Continuous, full time observation and field tests should be conducted during fill and backfill placement by a representative of the Engineer to assist the contractor in evaluating the required degree of compaction. If less than the required compaction is obtained, additional compaction effort should be made with adjustment of the moisture content as necessary until 95 percent compaction is obtained.

1510.6 MEASUREMENT AND PAYMENT

1510.6.1 UNSUITABLE MATERIAL

The removal and disposal of unsuitable material will be paid for as "Excavation, Removal, and Disposal of Unsuitable Material" for the quantities involved. This item will be created via Change Order, if the situation arises.

1510.6.2 EXCAVATION

Payment will be made on the unit price per cubic yard for "Unclassified Excavation" as provided in the Unit Price Bid Proposal. Payment will include the cost for all excavation, removal, storage and disposal of unsuitable material, hauling of surplus material to the designated location(s), hauling of select material within the construction site, placement, and compaction.

No payment will be made for excavation of stockpiled materials, structural excavation of previously placed materials and over depth (over-excavation) cuts. No payment will be made for shrink or swell. Excavation beyond the limits shown in the plans will not be included in measurement or payment.

1510.6.3 OVER-EXCAVATION

Payment will be made on the unit price per cubic yard for "Over-Excavation" as provided in the Unit Price Bid Proposal. Payment will include the cost for all excavation, removal, storage and disposal of unsuitable material, hauling of select material within the construction site, placement, and compaction.

No payment will be made for excavation of stockpiled materials. No payment will be made for shrink or swell. Excavation beyond the authorized over-excavation limits shown in the plans will not be included in measurement or payment.

1510.6.4 BORROW

Borrow material will be measured by the cubic yard in-place after compaction. Field topographic surveys, as described in SSCAFCA Technical Specification 1513 or 1514 "Construction Staking", will be used to determine in-place quantities.

Payment will be made on the unit price per cubic yard for "Borrow" as provided in the Unit Price Bid Proposal. Payment will include excavation & haul from Borrow Area, moisture conditioning, required blending of soils, placement, compaction, and other related work.

END OF SECTION

TECHNICAL SPECIFICATION 1511

NPDES COMPLIANCE

Revised 08/21/2020

1511.1 SCOPE OF WORK

The work under this section includes compliance with the U.S. Environmental Protection Agency (EPA), National Pollutant Discharge Elimination System (NPDES) Regulations for Storm Water Discharges from construction sites. This work consists of implementing and maintaining a plan to control erosion, pollution, sediment and runoff during the construction of the project.

1511.2 MEASUREMENT AND PAYMENT

1511.2.1 UNIT PRICE BID PROPOSALS

For Unit Price Bid Proposals, NPDES Compliance shall be a Lump Sum (LS) item, paid for as follows:

1511.2.1.1 Fifteen (15) percent of the Lump Sum unit price amount shall be paid after the Contractor has completed an EPA Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity Under a NPDES General Permit, Form 3510-9, or a Low Erosivity Waiver (LEW) form, if applicable. A copy of the NOI or LEW form must be delivered to the Owner and the original filed with the EPA. All required erosion control measures sufficient to begin construction must also be in place. This will be defined in the plan specifications and/or the SWPPP.

1511.2.1.2 Payment for an additional sixty percent (60%) of the Lump Sum unit price amount shall be prorated based on the Actual Percent Complete on the

Application for Payment as approved by the Architect, Engineer or Landscape Architect. For example, if the Contractor is 20% complete, the contractor can take the 20% (0.2) and multiply it by 60% (0.6) of the Lump Sum unit price amount and receive that portion.

In order to receive payments, the field inspection forms must be sent in with the Application for Payment each month. If there are deficiencies maintaining or implementing the SWPPP and its Best Management Practices (BMPs), the payment will be withheld until the deficiencies are corrected.

1511.2.1.3 The remaining twenty-five (25) percent of the Lump Sum unit price amount will be based on the completion of an EPA Notice of Termination (NOT) of Coverage Under a NPDES General Permit for Storm Water Discharges Associated with Construction Activity and BMP removal. A copy of the NOT must be delivered to the Owner and the original filed with the EPA. BMPs must be removed as defined in the plan specifications or SWPPP. This is done in case there are some BMPs that must remain until final stabilization is met, and that there are no more NPDES concerns for the Contractor.

END OF SECTION

TECHNICAL SPECIFICATION 1512

CONTROL OF STORM WATER AND NUISANCE FLOW

Revised 08/19/2025

1512.1 DESCRIPTION

This specification covers the requirements to control storm water and nuisance flows through the project area during construction.

Two (2) types of flow can be expected;
1) Continuous or intermittent flow through existing flow paths;
2) Local sheet flow from adjacent properties or adjacent streets.

1512.2 CONSTRUCTION REQUIREMENTS

All permanent work shall be performed in areas free from storm water and/or nuisance flows.

The CONTRACTOR shall construct and maintain diversion methods necessary to divert storm water and/or nuisance flows away from work areas, or otherwise ensure work is not damaged from storm water or nuisance flows. Diversion methods may include the use of sandbag and/or diversion channels, sandbag and/or earthen berms, pumping and/or piping around, over, or through work areas, or any method or combination of methods required to control storm water and/or nuisance flows within the project area.

The CONTRACTOR shall furnish, install, maintain, and operate all necessary pumping and other dewatering equipment required for dewatering the affected work areas. This effort shall also include removal of ice and/or snow within the work area, if applicable. The cost of dewatering work, including labor, shall be included in the lump sum price for this bid item.

The CONTRACTOR shall be responsible for removal of any sediment deposited by storm and nuisance water. The cost of sediment removal work shall be included in the lump sum price for this bid item.

If the CONTRACTOR's diversion methods are unsuccessful, at no additional cost to SSCAFCA, the CONTRACTOR will be responsible for providing a plan within two working days to repair all damage, including damage to the existing arroyo and/or flood control facility and damage to new work within the project area. The plan shall be acceptable to SSCAFCA. The cost of implementing this plan shall be included in the lump sum price for this bid item.

1512.3 BASIS OF PAYMENT

Control of Storm Water and Nuisance Flow will be measured on a Lump Sum (LS) basis and payment of this item will be made as a percentage of the dollar amount of work completed to date, minus the Mobilization bid item.

Pay Item	Pay Unit
Control of Storm Water and Nuisance Flow	LS

END OF SECTION

TECHNICAL SPECIFICATION 1513

CONSTRUCTION SURVEY & STAKING

Revised 08/20/2025

1513.1 DESCRIPTION

This work consists of construction survey and construction staking lines, grades, and layouts by the CONTRACTOR in accordance with the plans and specifications and as directed by the ENGINEER for the control and completion of the project.

1513.2 MATERIALS

CONTRACTOR shall furnish all stakes, templates, straightedges, surveying equipment and other devices necessary for establishing, checking, marking, and maintaining points, including P.I.'s, P.C.'s, P.T.'s, and lines, grades and layouts. As directed by the OWNER and/or ENGINEER, points shall be referenced so that they may later be re-established.

1513.3 CONSTRUCTION REQUIREMENTS

CONTRACTOR shall be responsible for all control, slope stakes, cut stakes, offset stakes, benchmarks, blue tops or other staking necessary for proper execution of the work, or as requested by the OWNER and/or ENGINEER, to assure compliance with the plans. The OWNER and/or ENGINEER may request additional survey information at their discretion.

1513.4 CONSTRUCTION SURVEYS

CONTRACTOR shall obtain and pay for the services of a Professional Surveyor licensed in the State of New Mexico to perform surveys consisting of the following phases:

1513.4.1 *Phase 1 EG Survey*: A topographic survey, with a contour resolution of 1-foot or less, to accurately reflect the Project Site existing ground (EG) elevations. Unless otherwise directed by the OWNER and/or ENGINEER, Phase 1 Survey shall **not** occur before Clear & Grub and Removals bid items are completed. Phase 1 Survey shall include Borrow Area, if applicable.

Phase 1 Survey shall include development of an EG digital terrain model (DTM) of the Project Site, which will be used to determine earthwork quantities to be paid to CONTRACTOR. The Phase 1 Survey DTM shall be submitted to the ENGINEER for review and written acceptance prior to proceeding with any earthwork.

1513.4.2 *Phase 2 FG Survey:* An as-built topographic survey, with a contour resolution of 1-foot or less, to accurately reflect the Project Site finished ground (FG) elevations and to determine final earthwork quantities to be paid to CONTRACTOR. Phase 2 Survey shall include Borrow Area, if applicable.

Phase 2 survey shall have sufficient detail to demonstrate compliance with the design grades, structure elevations, inverts, alignments/profiles, etc. shown on the construction plans. It is the responsibility of the CONTRACTOR to coordinate with the surveyor on a regular basis to provide as-built information to incorporate in the Phase 2 survey, especially for project elements that will be buried in the FG condition.

Phase 2 survey shall be stamped, signed, and certified by a Licensed Professional Surveyor and provided in pdf format.

Phase 2 Survey also includes development of an FG DTM of the Project Site. The Phase 2 Survey DTM shall be submitted to the ENGINEER for review and written acceptance prior to final Pay Application. Earthwork volumes shall not include surfacing treatments such as rock, riprap, concrete, etc. Earthwork volume computations shall be performed by the surveyor based on the "average end area" computation.

Phase 2 Survey shall be such that methods and computations can be fully verified and are subject to approval by the OWNER and/or ENGINEER. The OWNER and/or ENGINEER may request additional survey information at their discretion.

1513.5 METHOD OF MEASUREMENT

Submit a construction-staking schedule of values as part of each Pay Application to the Project Manager for approval.

1513.6 BASIS OF PAYMENT

SSCAFCA will make partial payments in accordance with the approved construction-staking schedule of values.

Pay Item	Pay Unit
Construction Staking	Lump Sum

END OF SECTION

TECHNICAL SPECIFICATION 1515

REMOVAL OF STRUCTURES & OBSTRUCTIONS

Revised 11/16/2021

1515.1 DESCRIPTION

This work shall consist of removing and disposing of surface and subsurface features to clear the project site for construction. This includes concrete debris, fences, structures, pavements, curb and gutter, sidewalks, buried pipes, and any other items listed within the construction plans. All removal and salvage features included in these items will be designated in the contract.

1515.2 MATERIALS

Suitable materials are those materials which can be compacted to the required embankment densities and meet all other contract requirements for embankment materials. If applicable, the project Geotechnical Report would include this information.

1515.3 CONSTRUCTION REQUIREMENTS

1515.3.1 Suitable Materials

Suitable materials are those materials which can be compacted to the required embankment densities and meet all other contract requirements for embankment materials. If applicable, the project Geotechnical Report would include this information.

1515.3.1.1 Marking of Removal Limits

Prior to work on the site, the Contractor shall establish the right-of-way lines and construction limits confining the removal operations and will designate those surface and subsurface features for removal and those for preservation. The Owner or designee shall be offered the opportunity to review the removal limits before work commences.

1515.3.1.2 Temporary Erosion Control

Ensure all erosion control requirements and all necessary temporary sediment and erosion control protection devices (TESCP), if called for in the contract, are installed prior to initiating removal operations on the construction site. The TESCP items will be paid for under the SWPPP pay item.

1515.3.1.3 Protection of Site Features

The Contractor shall preserve and protect all existing improvements, adjacent property, utilities, and surface or subsurface features not to be removed from injury or damage resulting from their operations. This may require the Contractor to install temporary signing, temporary fencing, or other temporary features at their cost. Should any damage occur to these site features due to the Contractor's operations, the Owner or designee may withhold payment until the damage is remediated or
require the damaged items to be replaced at the Contractor's expense.

1515.3.2 Removal and Salvage Operations

Remove all surface features and subsurface features designated for removal in the contract and dispose of them at a properly permitted disposal site. Provide the Owner or designee with a copy of the written permission from the property owner and copies of any other necessary disposal permits or approvals.

Carefully remove and salvage all surface features and subsurface features designated for salvage in the contract and store and deliver these materials in accordance with the contract requirements. The Contractor shall repair any damage to salvageable items that occurs during their removal, storage, or delivery operations at no cost to the Owner.

Backfill holes created by structure or obstruction removals as per SSCAFCA Standard Specification 1510 with suitable materials, unless the area is within the area of new construction.

1515.3.2.1 Removal of Pavements, Sidewalks, Curb and Gutter

Pavements, sidewalks, and curb and gutter shall be removed to neat saw cut lines as identified in the Contract, and dispose of them off the project site.

1515.3.2.2 Removal of Culverts and Drainage Structures

The Contractor shall sequence the removal of existing culverts and drainage structures so drainage is maintained on the project. This may require installation of temporary drainage features at Contractor's sole cost.

1515.3.2.3 Removal of Sanitary Sewer and Water Utilities

The Contractor shall sequence the removal of existing sanitary sewer and water utilities to minimize the impacts to local businesses and residents. The sequencing of removals shall be coordinated with SSCAFCA prior to performing removal operations in the field.

1515.3.2.4 Removal of Bridges and Arroyo Features

If the Contract includes the removal of a bridge or feature in an arroyo, remove the existing structures down to the arroyo bottom elevation OR an elevation sufficient to allow for proposed grading, proposed over-excavation, or proposed installation of infrastructure, as shown in the Contract documents.

Remove existing structures outside the arroyo to one (1) foot below ground surface, unless otherwise directed in the Contract.

1515.3.2.5 Removal and/or Salvage of Fencing

If the contract includes removal of fencing materials, remove all fence materials, including posts and post foundations and backfill holes with suitable materials.

If the Contract includes salvaging of fencing materials, place barbed wire into single-strand rolls and minimize the damage to fence posts when pulling them.

1515.3.2.6 Hauling and Stockpiling Salvageable Material

If the Contract requires the Contractor to haul and stockpile salvageable material, load, haul, unload, and stockpile the materials in accordance with the Contract.

Place the salvageable material on blocks or other approved materials and maintain the stockpile area, as directed by the Owner or designee.

1515.3.2.7 Site Appearance

The site shall have a neat and finished appearance when removal operations are finished, except for areas where construction activities are planned.

1515.3.2.8 Disposal

Dispose of all removal items outside the project at a permitted location. If applicable, a disposal plan, including written permission from private property owners used for debris material disposal, shall be submitted to the Owner or designee prior to commencement of disposal activities.

1515.3.2.9 Burying

No burying of any removed debris will be allowed on the project site.

1515.3.2.10 Burning

No burning of any removed debris will be allowed on the project site. In addition, no accumulation of combustible materials shall be stored on the project site near property lines or areas where an unexpected fire could cause damage to existing site features.

1515.4 METHOD OF MEASUREMENT

No measurement will be made for lump sum removal of structures and obstructions.

No measurement of the removal of surfacing will be made if the lump sum basis of payment is used.

Removal of surfacing will be made by the Square Yard if Square Yard basis of payment is used.

1515.5 BASIS OF PAYMENT

Pay Item	Pay Unit
Surfacing	Square Yard

Additional payment for minor removals not specified in the Contract shall not be made.

Unknown buried features not identified in the Contract are not included in this item.

Payments shall be made based on percentage of the pay item completed at the date of monthly Pay Application submittal.

END OF SECTION