in bedding as shown on the plans. Backfill under the haunches of the pipe shall be with bedding material as shown on the plan. Bedding

1. For water mains constructed parallel to sanitary sewers: material shall be thoroughly compacted by hand tamping or slicing with a shovel. E. Pipe shall not be laid on frozen ground

G. Installation shall conform to Section 725 of the Standard Specifications.

elevation that the bottom of the water main is at least eighteen (18) inches above the top of the sanitary sewer. 2. For water mains that cross a sanitary sewer H. Gaskets and bands shall be installed in conformance with the pipe manufactures installation instructions.

3.5 INSTALLING REINFORCED CONCRETE PIPE:

A. Provide the necessary mason's lines and supports or laser equipment to insure installation of the pipe to line and grade, as shown on the drawings. Facilities for lowering the pipe into the trench shall be such that neither the pipe nor the trench will be damaged or B. The Enaineer may, at his option, inspect all pipe before it is laid and reject any section that is damaged by handling or is found to be

defective to a degree which will materially affect the function and service of the pipe. C. The laying of the pipe in the finished trench shall be started at the lowest point and laid upgrade. When bell and spigot pipe is used, the bell shall be laid upgrade. If tongue and groove pipe is used, the groove end shall be laid upgrade.

D. The pipe shall be firmly and accurately set to the line and grade so that the invert will be smooth and uniform. E. The pipe shall be laid in bedding as shown on the plans.

F. When bell and spigot pipes are used, spaces for the pipe bells shall be dug in the pipe bedding to accommodate the bells. These spaces shall be deep enough to insure that the bells do not bear the load of the pipe; they shall not be excessively wide in relation to longitudinal direction of the trench. When the pipes are laid, the barrel of each section of pipe shall be in contact with the bedding throughout its full length, exclusive of the bell, to support the entire load of the pipe.

G. Pipe shall not be laid on frozen around.

3.6 JOINTS FOR PIPE: A. Joints for Concrete Pipe: All joints shall be sealed with an approved plastic compound. In sealing pipe joints with plastic join compound, trowel grade compound shall be applied to the mating surfaces of both the tongue and groove, or to the entire interior surface

of the bell and the upper portion of the spigot. Rope or tape type and trowel grade plastic compound shall be applied in accordance with B. Flushing: Upon completion of the water distribution system, test all valves to insure their full opening and flush out the system the manufacture's recommendations. The joints shall be forced together with excess compound extruding both inside and outside the joint. progressively by opening fire hydrants and permitting the flow to continue from each until the water runs clear. During such flushing Excess compound shall be removed from the interior surface where accessible.

B. Joints for Corrugated Steel Pipe: All joints for corrugated steel pipe shall be made with standard steel coupling bands as recommended by the pipe manufacturer unless otherwise required by the plans. All interior joints accessible with a gap between pipes of more than 3/4-inch shall be filled with trowel grade plastic compound. 3.7 CONNECTIONS TO EXISTING DRAINAGE SYSTEMS: Where the drawings call for ound connections to existing or proposed structures, these

connections shall be watertight and so made that a smooth uniform flow line will be obtained throughout the drainage system.

3.8 MAINTENANCE: If at any time before 12—months after the completion and acceptance of the work, there shall be any settlement of D. Re-sterilization: The Owner reserves the right to test the water again at any time prior to final acceptance of the work, and if found trenches requiring repairs to be made in any roadway, parking area or property along the line of the work, or should any defect appear in the work due to neglect, carelessness or improper construction on the part of the Contractor to rechlorinate the system until the water is proven equal to that supplied by the public system. make such repairs and remedy any defects. The Contractor shall, within 5 days after such notice, begin and carry out such repairs at no additional cost to the Owner.

END OF SECTION 2500

CHESTERFOREREDITER MADE... 6.3.0.0.5 DIVISION

SECTION 2550 - SITE UTILITIES (WATER MAIN) PART 1 - GENERAL

1.1 WORK INCLUDED IN THIS SECTION: The site utility work included in this section of the specifications shall include but not necessarily be limited to the following:

A. The General Conditions and Supplementary Conditions of these specifications shall form a part of and be included in this section of the

B. Asphalt pavement shall be constructed to the lines, grades, widths and thicknesses shown on the drawings.

BRINK MANNITE CONNECTED IN THE PROJECT AS Shown and noted on the drawings and as specified herein, including all materials, labor, equipment, supervision, excavation and backfill, and any and all other items necessary for the installation of the water main completely CONTON MEETED JANG PEOP TO THE MOVE THE PROPER AND CONTINUOUS SERVICE. 166502 BHUTES WORKFINE OLDER SIR OWNE RD. SUITE 100

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a. Provide a minimum vertical distance of eighteen (18) inches measured edge to edge. One full length of water main shall be located so limits from the approved job—mix formula both joints will be as far from the sanitary sewer as possible. Provide special structural supports for the water main if required D. Pipe Lavina and Jointina:

Jointing Push—on Rubber Ring Gasket Joints: Perform this work in full accordance with the pipe manufacturer's published directions or

Jointing Standardized Mechanical Joint Cast Iron Pipe: Perform this work in full accordance with the pipe manufacturer's published 3. Fittings and Branch Connections: Install proper fittings at all changes in direction, dead ends, and interconnections of lines.

4. Setting Valves: Before setting each valve. make sure the interior is clean and test opening and closing. Set valves and stops with 5. Blocking: Pour lean-mix concrete thrust blocks between the undisturbed trench face and plugged ends. bends, and tees to prevent

pipe movement at leaded and rubber gasket joints; where the soil is not firm, provide (in lieu of concrete) approved tie rods and clamps. The mixes will be tested according to ASTM D-1097 entitled "Method of Test of Bitumen Content of Paving Mixtures by Centrifuge," and painted with coal tar pitch varnish after placing. Where noted on the drawings and where required due to unstable soil conditions, both tie rods and clamps and concrete thrust blocks will be required to prevent "blow-outs." All concrete shall have a minimum compressive strength of 3000 psi

3.8 TESTING AND STERILIZATION: H. Pipe which is not true in alignment or which shows any settlement after laying shall be taken up and relaid without extra compensation. A. Testing: After the water main construction has been completed, the Contractor shall fill the piping with water, opening hydrants or providing other outlets as necessary for expelling air. Thereafter furnish the necessary pump, piping, and other apparatus and, under the supervision of the Owner's Representative, test the piping for leakage, for a period of at least 2 hours at a pressure of 150 psi. The Contractor shall locate and repair all leaks, and continue the tests until all leaks have been eliminated from the part of the system under

> operation, the Owner may test the flow from hydrants and, before final acceptance of the work, make further tests of hydrant flows to ascertain if the lines are clear C. Sterilization: After pressure testing has been completed and before the system is put into operation, the entire domestic water piping system shall be disinfected in accordance with AWWA C-651. The Contractor may use either the tablet or continuous feed method. If tablets are used, Contractor shall take special precautions that the line stays clean and dry. If the chlorine is diluted prior to testing,

> additional chlorine shall be added by an approved method. The line shall not be acceptable until the bacteriological tests results are positive and the chlorine residual is acceptable.

SECTION 2650 - MISCELLANEOUS ASPHALTIC CONCRETE PAVING

1.1 WORK INCLUDED IN THIS SECTION: A. Asphaltic concrete pavement required for work under this section is indicated on the drawings.

1.2 RELATED WORK IN OTHER SECTIONS: Excavating, Filling and Grading-----Section 2200

1.3 QUALITY ASSURANCE AND APPROVALS:

PART 1 - GENERAL

A. Qualifications of Workmen: Provide at least one person who shall be thoroughly trained and experienced in the skills required, who shall until all such discrepancies have been fully resolved. be completely familiar with the design and application of the work described for this section, and who shall be present at all times during progress of the work of this section and shall direct all work performed under this section.

2. That portion of the aggregate retained on the No. 10 sieve shall be composed of at least 95 percent by weight of crushed aggregate.

B. Job-Mix Formula: The laboratory will determine a job-mix formula within the limits specified above. During construction the variation a. Maintain at least a ten (10) foot horizontal separation between the water main and existing sanitary sewer, measured edge to edge: or from the job—mix formula shall be held within the permissible variation limits listed in the following table. F. Pipe which is not true in alignment or which shows any settlement after laying shall be taken up and relaid without extra compensation. b. Construct the water main in a separate trench or on an undisturbed earth shelf located on one side of the sanitary sewer at such an Should extraction test results show the mix to be outside the permissible variation limits as set forth below, the Contractor shall take measures required to bring the mix within the limits specified.

continuation of asphalt pavement operations without remedial action shall be just cause for the rejection of the pavement section or 'shutting down" of the work by the Engineer until corrective measures are taken to bring the asphalt mix within the permissible variations Permissible Variation - % by Weight of Total Mix

U.S. Standard Sieve Size Asphalt Concrete Base Course Surface Course No. 40 No. 200

Asphalt Cement

the recovered aggregate will be sieved in accordance with AASHTO T-30 "Method of Test for Mechanical Analysis of Extracted Aggregates." When recovered asphalt is required for further testing, it will be obtained according to ASTM D-762 "Method of Test for Hot Extraction of Asphaltic Materials and Recovery of Bitumen by the Modified Abson Procedure. 2.4 MIX DESIGN CRITERIA:

A. Testing of Specimens: Prior to approval of the paving mix, the laboratory test specimens combined in proportions of the job-mix formula shall be prepared and tested in accordance with the procedures set forth in ASTM D-1559, "Marshall Method of Mix Design." B. Requirements and Criteria: Test requirements and criteria for the paving mixes under these specifications shall be as follows:

Marshall Stability, all mixtures 500 minimum Number of Compaction Blows 50 Flow, all mixtures Percentage Air Voids:

Laboratory Specimen: Surface Mineral Aggregate: 1-1/2" maximum size 12 minimum ' maximum size 1 3 minimum 3/4" maximum size 14 minimum 1/2" maximum size 15 minimum 3/8" maximum size 16 minimum

2.5 ENGINEERING FABRIC: Fabric shall be a needle punched, non-woven polypropylene fabric, heat set on one side having the following minimum properties in the weakest principal direction: Minimum Value

Weight, oz/sq.yd. (1) (1) ASTM Method D-3776 3.6 Tensile Strength, Ibs. (2) (2) ASTM Method D-4632 Elongation at Break, % (2) (2) ASTM Method D-4632 Asphalt Retention, gals/sq.yd. (3) 0.20urf (3) Phillips Procedure (Task Force 25, Method8)

Fabric is to be installed per specific manufacturer's recommendations. PART 3 - INSTALLATION 3.1 SURFACE CONDITIONS:

A. Inspection: Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Verify that asphaltic concrete pavement may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards. B. Discrepancies: In the event of discrepancy, immediately notify the Engineer. Do not proceed with installation in areas of discrepancy

2. Rollers: Compacting equipment shall consist of steel—wheeled rollers and pneumatic—tired rollers with reversing mechanism , friction clutch and brakes of ample capacity to allow for smooth starting, stopping and reversing described as follows:

a. Steel-wheeled rollers may be of three types: 3-wheeled rollers, two-axle tandem roller, and 3-axle tandem rollers. These rollers shall be equipped with power units of not less than 4 cylinders and under working conditions shall develop pressures under compression rolls of 250 to 350 pounds per inch of width. Rollers shall be in good working condition. Rollers shall be equipped with adjustable scrapers to keep the wheel surfaces clean and with efficient means of keeping them wet to prevent mixes from sticking. These surfaces shall have no flat areas, openings or projections which will mar the surface of the pavement. The 3-axle tandem rollers shall be so constructed that, when locked in position for all treads to be in one plane, the roller wheels are held with such rigidity that, it either front or center wheel is unsupported, the other two wheels will not vary from the plane more than 1/4 inch.

b. Pneumatic—tired rollers shall be self—propelled. The rollers shall be equipped with pneumatic tires of equal size and diameter which are capable of exerting average contact pressures varying from 40 psi to 110 psi by adjusting the ballast and/or tire inflating pressures. The wheels of the roller shall be so spaced that one pass will accomplish one complete coverage equal to the rolling width of the machine. There shall be a minimum of 1/4 inch overlap of the tracking wheels. The wheels shall ascillate but not wabble. The roller shall be so constructed that the contact pressure of the several tires shall not vary more than ! psi. Pneumatic—tired rollers shall be constructed with enough ballast space to provide uniform wheel loadings as may be varied by order of the Engineer to obtain contact pressures that will result in the required density.

3. Haul Trucks: Vehicles used for the transportation of asphaltic concrete from the plant to the site of work shall have tight metal bottoms, and shall be free from dust, screenings, petroleum oils, volatiles or other mineral spirits which may affect the mix being hauled. Trucks shall be provided with covers of sufficient size and weight to protect the load and to prevent cooling of the upper surface. The Contractor shall provide haul trucks of such size, speed and condition to insure orderly and continuous operations

4. Hand Tools: Only lutes or rakes with covered teeth stall be used during the spreading operation and when finishing by land. Tamping irons used to Sampling and Testing Asphaltic Paving Mix shall be according to ASTM D-979 entitled "Standard Methods of Sampling Bituminous Paving consolidate the edges of the pavement courses shall be of sufficient weight to compact the edges to the same degree as the body of the pavement. Irons shall be designed to form an edge as nearly vertical as possible. Irons which seal the material by heat glone shall not be used. Tamping irons used to consolidate the material along curbs, gutters and structures inaccessible to the roller shall weigh not less than 25 pounds and shall have a bearing area not exceeding 48 square inches. Mechanical compaction equipment approved by the Engineer may be used instead of tamping irons. Straight edges 10 feet in

length shall be provided to test the finished surface. C. Transportation of the Mix: The mix shall be transported to the jobsite in vehicles cleaned of all foreign material which may affect the mix. The inside of the truck beds shall be lubricated with a thin oil to prevent the mix from adhering to the bed, but an excess of lubricant will not be permitted. The dispatching o the vehicles shall be so scheduled that all material delivered may be placed in daylight unless the Engineer approves work in artificial light. Delivery of the material to the paver shall be at a uniform rate and in an amount well within the capacity of the paving and compacting equipment.

D. Preparation of the Area to be Paved: The area to be paved shall be true—to—line and grade, and have a dry and properly prepared surface prior to the starting of paving operation. It shall be free from all loose screenings, and other loose or foreign material. 1. Leveling Course: Where a base is rough or uneven, a leveling course shall be placed by use of a paver or, if so directed by the Engineer, a motor grader, a shall be properly compacted the placing of subsequent courses. 2. Patching: When a leveling course is not required, all depressions and other irregularities shall be patched or corrected, and the work approved by the Engineer before the paving operation begins. All fatty and unsuitable patches, excess crack or joint filler, and all surplus bituminous material shall be removed from the

3. Tack Coat: A tack coat shall be applied between successive lifts of asphalt paving. It shall consist of an application of the specified asphalt material at the rate of 0.05 to 0.15 gallons per square yard as specified by the Engineer. In order to apply limited quantities uniformly, the asphalt emulsion may be diluted 1:1 to 1:3 parts emulsion to water. 4. Surface Coat: The surfaces of curbs, gutters, vertical, faces of existing pavements and all structures in actual contact with asphalt mixes shall be painted

area to be paved. Blotting of excessive deposits of asphalt with sand or stone will not be permitted.o con

with a thick complete coating of asphaltic material to provide a closely bonded, watertight joint. E. Spreading and Finishing: The spreading and finishing of each course shall be to the thickness and width indicated on the drawings. Spreading and finishing shall be conducted in the following manner:

1. Mechanical Pavers: The base and surface courses shall be spread and struck-off with a mechanical paving machine meeting the requirements of these specifications. The paying machine shall be operated so that the material does not accumulate and remain along sides of the receiving hopper. Equipment which leaves tracks or indented areas which cannot be corrected in normal operation, or which produces flushing or other permanent blemishes or fails to produce a satisfactory surface, shall not be used.

2. Longitudinal Joints and Edges shall be constructed to true line markings. The payer shall be positioned and operated to follow closely the established line. When using pavers in echelon, the first paver shall follow the marks or lines, and the second paver shall follow the edge of the material placed by the first paver. In order to assure a hot joint and obtain proper compaction, the pavers shall work as close together as possible, and in no case shall they be more than 100 feet apart. In backing trucks against the paver, care shall be taken not to jar it out of its proper alignment.

3. Texture of the Unrolled Surface: As soon as the first load of material has been spread, the texture of the unrolled surface shall be checked to determine its City No. uniformity. Segregation of materials shall not be permitted. If segregation occurs, the spreading operation shall be immediately suspended until the cause is determined and corrected. Transverse joints in succeeding courses shall be offset at least 2 feet. Longitudinal joints shall be offset at least 12 inches. Any irregularities in alignment left by the paver shall be corrected by trimming directly behind the machine. Immediately after trimming, the edges of the course shall be thoroughly compacted by tamping. Distortion of the pavement during this operation shall be avoided.

LEONARD J. MEERS PROFESSIONAL ENGINEER E-28288

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