

**SECTION 02485
SEEDING AND MULCHING**

PART 1 - GENERAL

1.01 SCOPE

- A. The Work covered by this Section consists of furnishing all labor, equipment, and material required to place topsoil, seed, commercial fertilizer, agricultural limestone, and mulch material, including seedbed preparation, harrowing, compacting, and other placement operations on graded earthen areas as described herein and/or shown on the Drawings. In general, seeding operations shall be conducted on all newly graded earthen areas not covered by structures, pavement, or sidewalks; all cleared or grubbed areas which are to remain as finish grade surfaces; and on all existing turf areas which are disturbed by construction operations and which are to remain as finish grade surfaces. Areas disturbed by borrow activities shall also be seeded according to these Specifications.

- B. The Work shall include temporary seeding operations to stabilize earthen surfaces during construction or inclement weather and to minimize stream siltation and erosion.

1.02 QUALITY ASSURANCE

- A. Prior to seeding operations, the CONTRACTOR shall furnish to the ENGINEER labels or certified laboratory reports from an accredited commercial seed laboratory or a state seed laboratory showing the analysis and germination of the seed to be furnished. Acceptance of the seed test reports shall not relieve the CONTRACTOR of any responsibility or liability for furnishing seed meeting the requirements of this section.

- B. Prior to topsoil operations, the Contractor shall obtain representative samples and furnish soil test certificates including textural, pH, and organic ignition analysis from the State University Agricultural Extension Service or other certified testing laboratory.

- C. All existing lawns encountered shall be replaced with topsoil and seeding of the same type and quality as that existing prior to construction and shall be restored to original condition or better.

PART 2 - PRODUCTS

2.01 TOPSOIL

- A. The CONTRACTOR shall place a minimum of 4 inches of topsoil over all graded earthen areas and over any other areas to be seeded. Sources of topsoil shall be approved by the ENGINEER prior to disturbance.

- B. Topsoil shall be a friable loam containing a large amount of humus and shall be original surface soil of good, rich, uniform quality, free from any material such as hard clods, stiff clay, hardpan, partially disintegrated stone, pebbles larger than 1/2 inch in diameter, lime, cement, bricks, ashes, cinders, slag, concrete, bitumen or its residue, boards, sticks, chips, or other undesirable material harmful or unnecessary to plant growth. Topsoil shall be reasonably free from perennial weeds and perennial weed seeds, and shall not contain objectionable plant material, toxic amounts of either acid or alkaline elements or vegetable debris undesirable or harmful to plant life.
- C. Topsoil shall be natural topsoil without admixture of subsoil material, and shall be classifiable as loam, silt loam, clay loam, sandy loam, or a combination thereof. The pH shall range from 5.5 to 7.0. Topsoil shall contain not less than 5 percent nor more than 20 percent, by weight, of organic matter as determined by loss on ignition of oven-dried samples to 65 degrees C. The ignition test shall be performed on samples which have been thoroughly oven-dried to constant weight at a temperature of 221 degrees F.

2.02 SEED

- A. Seed shall be delivered in new bags or bags that are sound and labeled in accordance with the U.S. Department of Agriculture Federal Seed Act.
- B. All seed shall be from the last crop available at time of purchase and shall not be moldy, wet, or otherwise damaged in transit or storage.
- C. Seed shall bear the growers analysis testing to 98% for purity and 90% for germination. At the discretion of the ENGINEER, samples of seed may be taken for check against the growers analysis.
- D. Species, rate of seeding, fertilization, and other requirements are shown in the Seeding Requirements Table.

2.03 FERTILIZER AND LIMING MATERIALS

- A. Fertilizer and liming materials shall comply with applicable state, local, and federal laws concerned with their production and use.
- B. Commercial fertilizer shall be a ready mixed material and shall be equivalent to the grade or grades specified in the Seeding Requirements Table. Container bags shall have the name and address of the manufacturer, the brand name, net weight, and chemical composition.

PERMANENT SEEDING REQUIREMENTS TABLE					
			Rates per 1,000 Square Feet		
Area	Sowing Season	Species	Seed	Fertilizer	Limestone
Flat to rolling terrain with slopes less than 3:1	3/1 to 6/1	Kentucky 31 Fescue Ladino White Clover*	4 lbs. 1/4 lb.	30 lbs. 6-12-12	100 lbs.
	8/1 to 11/1	Kentucky 31 Fescue Ladino White Clover* Annual Ryegrass	4 lbs. 1/4 lb. 2 lbs.	30 lbs. 6-12-12	100 lbs.
Embankments with slopes greater than 3:1	3/1 to 6/1	Hulled Sericea Lespedeza* Kentucky 31 Fescue Weeping Lovegrass	1 lb. 3 lbs. 1/4 lb.	30 lbs. 6-12-12	100 lbs.
	8/1 to 11/1	Unhulled Sericea Lespedeza* Kentucky 31 Fescue Annual Ryegrass	1 lb. 3 lbs. 2 lbs.	30 lbs. 6-12-12	100 lbs.

*Requires inoculation.

- C. Agricultural limestone shall be a pulverized limestone having a calcium carbonate content on not less than 85% by weight. Agricultural limestone shall be crushed so that at least 85% of the material will pass a No. 10 mesh screen and 50% will pass a No. 40 mesh screen.

2.04 MULCH MATERIAL

- A. All mulch materials shall be air dried and reasonably free of noxious weeds and weed seeds or other materials detrimental to plant growth.
- B. Mulch shall be composed of wood cellulose fiber, straw, or stalks, as specified herein. Mulch shall be suitable for spreading with standard mulch blowing equipment.
- C. Wood-cellulose fiber mulch shall be as manufactured by Weyer-Hauser Company, Conway Corporation, or equal.
- D. Straw mulch shall be partially decomposed stalks of wheat, rye, oats, or other approved grain crops.
- E. Stalks shall be the partially decomposed, shredded residue of corn, cane, sorghum, or other approved standing field crops.

2.05 MULCH BINDER

- A. Mulch on slopes exceeding 3 to 1 ratio shall be held in place by the use of an approved mulch binder. The mulch binder shall be non-toxic to plant life and shall be acceptable to the ENGINEER.
- B. Emulsified asphalt binder shall be Grade SS-1, ASTM D 977. Cut-back asphalt binder shall be Grade RC 70 or RC 250.

2.06 INNOCULANTS FOR LEGUMES

All leguminous seed shall be inoculated prior to seeding with a standard culture of nitrogen-fixing bacteria that is adapted to the particular seed involved.

2.07 WATER

Water shall be clean, clear water free from any objectionable or harmful chemical qualities or organisms and shall be furnished by the CONTRACTOR.

PART 3 - EXECUTION

3.01 SECURING AND PLACING TOPSOIL

- A. Topsoil shall be secured from areas from which topsoil has not been previously removed, either by erosion or mechanical methods. Topsoil shall not be removed to a depth in excess of the depth approved by the ENGINEER.
- B. The area or areas from which topsoil is secured shall possess such uniformity of soil depth, color, texture, drainage, and other characteristics as to offer assurance that, when removed the product will be homogeneous in nature and will conform to the requirements of these Specifications.
- C. All areas from which topsoil is to be secured, shall be cleaned of all sticks, boards, stones, lime, cement, ashes, cinders, slag, concrete, bitumen, or its residue, and any other refuse which will hinder or prevent growth.
- D. In securing topsoil from a designated pit or elsewhere, should strata or seams of material occur which do not come under the requirements for topsoil, such material shall be removed from the topsoil, or if required by the ENGINEER, the pit shall be abandoned.
- E. Before placing or depositing topsoil upon any areas, all improvement within the area shall be completed, unless otherwise approved by the ENGINEER.

3.02 SEEDBED PREPARATION

- A. Before fertilizing and seeding, the topsoil surfaces shall be trimmed and worked to true line free from unsightly variation, bumps, ridges and depressions, and all detrimental materials, roots, and stones larger than 1 inch in any dimension shall be removed from the soil.
- B. Not earlier than 24 hours before the seed is to be sown, the soil surface to be seeded shall be thoroughly cultivated to a depth of not less than 2 inches with a weighted disc, tiller, pulvimixer, or other equipment, until the surface is smooth and in a condition acceptable to the ENGINEER.
- C. If the prepared surface becomes eroded as a result of rain or for any other reason, or becomes crusted before the seed is sown, the surface shall again be placed in a condition suitable for seeding.

- D. Ground preparation operations shall be performed only when the ground is in a tillable and workable condition.

3.03 FERTILIZATION AND LIMING

- A. Following seedbed preparation, fertilizer shall be applied to all areas to be seeded so as to achieve the application rates shown in the Seeding Requirements Table. Copies of all weight tickets shall be furnished to the ENGINEER.
- B. Fertilizer shall be spread evenly over the seedbed and shall be lightly harrowed, raked, or otherwise incorporated into the soil for a depth of 1/2 inch.
- C. Fertilizer need not be incorporated in the soil as specified above when mixed with seed in water and applied with power sprayer equipment. The seed shall not remain in water containing fertilizer for more than 30 minutes when a hydraulic seeder is used.
- D. Agricultural limestone shall be thoroughly mixed into the soil according to the rates in the Seeding Requirements Table. The specified rate of application of limestone may be reduced by the ENGINEER if pH tests indicate this to be desirable. It is the responsibility of the CONTRACTOR to obtain such tests and submit the results to the ENGINEER for adjustment in rates.
- E. It is the responsibility of the Contractor to make one application of maintenance fertilizer according to the recommendations listed in the Seeding Requirements Table.

3.04 SEEDING

- A. Seed of the specified group shall be sown as soon as preparation of the seedbed has been completed. No seed shall be sown during high winds, nor until the surface is suitable for working and is in a proper condition. Seeding shall be performed during the dates shown in the Seeding Requirements Table unless otherwise approved by the ENGINEER. Seed mixtures may be sown together provided they are kept in a thoroughly mixed condition during the seeding operation. Copies of all weight tickets shall be furnished to the ENGINEER.
- B. Seeds shall be uniformly sown by any approved mechanical method to suite the slope and size of the areas to be seeded, preferably with a broadcast type seeder, windmill hand seeder, or approved mechanical power drawn seed drills. Hydro-seeding and hydro-mulching may be used on steep embankments, provided full coverage is obtained. Care shall be taken to adjust the seeder for seedings at the proper rate before seeding operations are started and to maintain their adjustment during seeding. Seed in hoppers shall be agitated to prevent segregation of the various seeds in a seeding mixture.
- C. Immediately after sowing, the seeds shall be covered and compacted to a depth of 1/8 to 3/8 inch by a cultipacker or suitable roller.

- D. Leguminous seeds shall be inoculated prior to seeding with an approved and compatible nitrogen-fixing inoculated in accordance with the manufacturer's mixing instructions.

3.05 MULCHING

- A. All seeded areas shall be uniformly mulched in a continuous blanket immediately after seeding. The mulch shall be applied so as to permit some sunlight to penetrate and the air to circulate and at the same time shade the ground, reduce erosion, and conserve soil moisture. Approximately 25 percent of the ground shall be visible through the mulch blanket.
- B. One of the following mulches shall be spread evenly over the seeded areas at the following application rates:
 - 1. Wood Cellulose Fiber 1,400 lbs./acre
 - 2. Straw 4,000 lbs./acre
 - 3. Stalks 4,000 lbs./acre

These rates may be adjusted at the discretion of the ENGINEER at no additional cost to the OWNER, depending on the texture and condition of the mulch material and the characteristics of the seeded area.

- C. Mulch on slopes greater than 3 to 1 ratio shall be held in place by the use of an approved mulch binder. Binder shall be thoroughly mixed and applied with the mulch. Emulsified asphalt or cutback asphalt shall be applied at the approximate rate of 5 gallons per 1,000 square feet as required to hold the mulch in place.
- D. The CONTRACTOR shall cover structures, poles, fence, and appurtenances if the mulch binder is applied in such a way that it would come in contact with or discolor the structures.
- E. Mulch and binder shall be applied by suitable blowing equipment at closely controlled application rates.

3.06 WATERING

- A. CONTRACTOR shall be responsible for maintaining the proper moisture content of the soil to insure adequate plant growth until a satisfactory stand is obtained. If necessary, watering shall be performed to maintain an adequate water content in the soil.
- B. Watering shall be accomplished by hoses, tank trucks, sprinklers in such a way to prevent erosion, excessive runoff, and overwatered spots.

3.07 MAINTENANCE

- A. Upon completion of seeding operations, the CONTRACTOR shall clear the area of all equipment, debris, and excess material and the premises shall be left in a neat and orderly condition.
- B. The CONTRACTOR shall maintain all seeded areas without additional payment until final acceptance of the work by the Owner. Seeding work shall be repeated on defective areas until a satisfactory uniform stand is accomplished. Damage resulting from erosion, gullies, washouts, or other causes shall be repaired by filling with topsoil, compacting, and repeating the seeding work at contractor's expense.

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**SECTION 02560
MANHOLES**

PART 1 - GENERAL

1.01 SCOPE

The work covered by this Section includes furnishing all labor, equipment and materials required to install cast-in-place, and/or precast concrete manholes, and concrete junction chambers as described herein and/or shown on the Drawings.

1.02 DESIGN CRITERIA

- A. Manholes shall be constructed of specified materials to the sizes, shapes, and dimensions and at the locations shown on the Drawings or as otherwise directed by the ENGINEER. The height or depth of the manhole will vary with the location, but unless shown otherwise on the Drawings shall be such that the top of the manhole frame will be at the finished grade of the pavement or ground surface and the invert will be at the designed elevations.
- B. Where the difference in the invert elevation of a sewer 18 inches in diameter or smaller and any other sewer intersecting in one manhole is 18 inches or more, a dropmanhole shall be constructed as shown on the Drawings. They shall be similar in construction to the standard manhole except that a drop connection of pipe and fittings of the proper size and material shall be constructed outside the manhole and be supported by Class B Concrete.

1.03 QUALITY ASSURANCE

- A. Prior to delivery all basic materials specified herein shall be tested and inspected by an approved independent commercial testing laboratory or, if approved by the ENGINEER, certified copies of test reports prepared by the manufacturer's testing laboratory will be acceptable. All materials which fail to conform to these specifications shall be rejected.
- B. After delivery to the site, any materials which have been damaged in transit or are otherwise unsuitable for use in the work shall be rejected and removed from the site.

1.04 SHOP DRAWINGS AND ENGINEERING DATA

Complete shop drawings and engineering data on frames, covers, steps, and precast manhole sections shall be submitted to the ENGINEER in accordance with the requirements of the section entitled "Submittals" of these Specifications.

1.05 GUARANTEE

Provide a guarantee against defective materials and workmanship in accordance with the requirements of the Section entitled "Guarantees and Warranties" of these Specifications.

PART 2 - PRODUCTS

2.01 CONCRETE AND REINFORCEMENT

- A. Concrete used in manhole and junction chamber construction shall be Class A concrete conforming to the requirements of the Section entitled "Cast-In-Place Concrete" of these Specifications.
- B. Steel reinforcement shall conform to the requirements of the Section entitled "Cast-In-Place Concrete Reinforcement" of these Specifications.

2.02 MORTAR

- A. Mortar for manhole construction shall be sand cement mortar composed of one part Portland Cement to two parts clean sand conforming to ASTM C 144. Twenty pounds of hydrated lime per sack of cement may be added. No retempered mortar shall be used.
- B. Non-shrink mortar shall be pre-mixed, Master Builders "Masterflow 713", Sonneborn "Ferrolith G-D.S. Redi-Mixed", or equal.

2.03 PRECAST CONCRETE MANHOLES

- A. Precast concrete manholes shall consist of precast reinforced concrete sections, a conical or flat slab top section, and a base section conforming with the typical manhole details as shown on the Drawings.
- B. Precast manhole sections shall be manufactured, tested, and marked in accordance with the latest provision of ASTM C 478.
- C. The minimum compressive strength of the concrete for all sections shall be 4,000 psi.
- D. The maximum allowable absorption of the concrete shall not exceed eight (8%) percent of the dry weight.
- E. The circumferential reinforcement in the riser sections, conical top sections, and base wall sections shall consist of one line of steel and shall be not less than 0.12 square inches per lineal foot.
- F. The ends of each reinforced concrete manhole riser section and the bottom end of the manhole top section shall be so formed that when the manhole risers and the top are assembled, they will make a continuous and uniform manhole.

- G. Joints of the manhole sections shall be tongue and groove. Sections shall be joined using either an O-ring gasket or a mastic sealant consisting of bitumen and inert mineral fibers. The sealant shall be applied in accordance with the manhole manufacturer's requirements. A sufficient amount of sealant should be used to fill the annular joint space with some squeeze out.
- H. Each section of the precast manhole shall have not more than two (2) holes for the purpose of handling and laying. These holes shall be tapered and shall be plugged with rubber stoppers or mortar after installation.
- I. Cast iron or reinforced plastic manhole steps shall be installed in each section of the manhole in accordance with the details on the Drawings.

2.04 FRAMES, COVERS, AND STEPS

- A. Cast iron manhole steps, toe pockets, frames, and covers shall be cast iron conforming to the minimum requirements of Federal Specifications WW-1-652 or to ASTM A 48, "Gray Iron Castings," for Class 35B. All castings shall be made accurately to the required dimensions, fully interchangeable, sound, smooth, clean, and free from blisters and/or other defects. All regular manhole frames and covers shall be the City's Standard as manufactured by Acheson Foundry A2024-81C weight of 350 pounds as shown on the drawings.

Defective castings which have been plugged or otherwise treated shall not be used. All castings shall be thoroughly cleaned and painted or coated with a bituminous paint.

- B. Reinforced plastic manhole steps shall conform to the minimum requirements of ASTM 2146-68 under Type II, Grade 16906 and ASTM C-478, Paragraph 11. The reinforcing bar shall be a Grade 60, deformed 1/2-inch reinforcing bar conforming to all the requirements of ASTM A-615.
- C. All manhole frames and covers shall be of the size and weight shown on the Drawings. All regular manhole frames and covers shall be the City's Standard as manufactured by Acheson Foundry A2024-81C weight of 350 pounds as shown on the drawings.
- D. Watertight manhole covers shall be furnished with a rubber gasket, stainless steel tightening bolt, machined bearing surfaces, channel iron locking bar, and concealed watertight pick hole, and shall weigh not less than 590 pounds, and shall be of the size and dimensions shown on the Drawings. Watertight manhole covers shall be equivalent to A2624-71C as manufactured by Acheson Foundry of Chattanooga, Tennessee.

- E. The contact surfaces of all manhole covers and the corresponding supporting rings in the frames shall be machined to provide full perimeter contact.
- F. All sanitary sewer manhole covers shall have the words "CITY OF CHATTANOOGA" and "SEWER" as designated by the Engineer cast on the top in letters two (2) inches high or other as directed.
- G. An adjusting ring equal to R1979 as manufactured by Neenah Foundry Company of Neenah, Wisconsin, shall be provided for each manhole in a street. Adjusting rings shall provide a minimum inside clear opening of 24 inches and shall be made to be capable of being bolted to the manhole frame.

PART 3 - EXECUTION

3.01 GENERAL MANHOLE CONSTRUCTION

- A. All manhole bases, including curved manhole bases, and inverts shall be constructed of Class A concrete in accordance with details on the Drawings and inverts shall be smooth and accurately shaped and have the same cross section as the invert of the sewers which they connect.

The manhole base and invert shall be carefully formed to the required size and grade by gradual and even changes in sections, care being exercised to form the incoming and outgoing sewer pipes into the wall of the manhole at the required elevations. Changes in direction of flow through the sewer shall be made to a true curve with as large a radius as the size of the manhole will permit.

- B. Pipe of all diameters shall be connected to manholes using an integrally cast A-lock elastomeric ring, a Kor-N-Seal rubber boot, or approved equal flexible connector and shall be installed as recommended by the manufacturer. Connections using mortar or other rigid materials will not be acceptable. Connections to existing manholes shall be cored. "Hammer taps" will not be acceptable.
- C. The manhole steps shall be inserted into the wall of the manhole at the proper locations and elevations and shall be securely embedded in the wall.
- D. Any adjustment necessary for manhole frame elevation shall be made with concrete "donut" sections. A maximum of three (3) sections shall be permitted.
- E. The cast iron frame for the manhole cover shall be set at the required elevation and properly anchored to the masonry. Where manholes are constructed in paved areas, the top surface of the frame and cover shall be tilted to conform to the exact slope, crown, and grade of the existing adjacent pavement.

- F. Masonry work shall be allowed to set for a period of not less than 24 hours. Outside forms, if any, shall then be removed and the manhole backfilled and compacted in the manner provided in the Section entitled "Earthwork" of these Specifications. All loose or waste material shall be removed from the interior of the manhole. The manhole cover then shall be placed and the surface in the vicinity of the work cleaned off and left in a neat and orderly condition.
- G. After backfilling has been completed, the excavated area if located in a street, alley, or sidewalk, shall be provided with a temporary surface, as directed by the ENGINEER.

3.02 CONSTRUCTION OF CAST-IN-PLACE CONCRETE MANHOLES

- A. Cast-in-place manholes, excluding curved manhole bases, shall be constructed in place with the base, barrel and conical section all monolithically cast using removable forms of a material and design approved by the ENGINEER
- B. The vertical forms, vertical and horizontal wall spacers steps and placing cone must be carefully positioned and firmly clamped in place before any placement is made. The wall spacers must be located 90 degrees from each other. The forms shall be firmly supported with bottom of forms at the proper elevation to permit the base to be deposited through the vertical forms.
- C. The manhole base shall be deposited down through the wall forms onto undisturbed earth or rock bearing. It shall be evenly distributed around the wall and vibrated both inside and outside the forms until there is a minimum slope of 60 degrees from the bottom of the forms to the bearing surface both inside and outside of the manhole. When this is complete and before additional concrete is added, the concrete must be carefully vibrated on each side of each sewer pipe.
- D. The base shall be concentric with the manhole and have a minimum diameter of 16 inches greater than the outside diameter of the manhole, and 10-inch minimum thickness under the lowest pipe. Minimum wall thickness shall be six (6) inches.
- E. Additional concrete must be deposited in evenly distributed layers of approximately 18 inches with each layer vibrated to bond it to the preceding layer. The wall spacers must be raised as the placements are made. The concrete in the area from which the spacer is withdrawn shall be carefully vibrated. Excessive vibration shall be avoided.
- F. Adjustment rings shall be provided between the conical section and the manhole frame. The rings shall be cast-in-place using building felt between pours to create a weakened joint or as directed by the ENGINEER. If adjustment of the lid elevation is called for, concrete "donut" sections shall be used.

- G. The invert and flow channel shall be constructed in accordance with the applicable requirements of Part 3.01 of this Section and shall be formed during or immediately after the placing of the concrete and brush-finished as soon as the concrete has sufficiently set.
- H. Form marks and offsets shall not exceed one (1) inch on the outside surface of the manhole. Form marks and offsets shall not exceed 1/2 inch inside of the manhole. All offsets on the inside surface of the manhole shall be smoothed and rubbed so there is no projection or irregularity capable of scratching a worker or catching and holding water or solid materials. Honeycombed areas shall be completely removed immediately upon removal of the forms and replaced with Class A concrete.
- I. Should circumstances make a cold joint necessary, a formed groove or reinforcing dowels shall be required in the top of the first placement for shear protection. Immediately before the second placement is made, the surface of the cold joint shall be thoroughly cleaned and wetted with a layer of mortar being deposited on the surface.
- J. Concrete setting time, backfilling, masonry work, setting frame and cover, temporary paving, etc., shall be in accordance with the applicable requirement of Part 3.01 of this Section.

3.03 CONSTRUCTION OF PRECAST CONCRETE MANHOLES

- A. The base and invert shall be constructed in accordance with the applicable requirements of Part 3.01 of this Section.
- B. After the base section has been allowed to set for a period of not less than 24 hours, the precast manhole sections shall be placed thereon, care being exercised to form the incoming and outgoing sewer pipes into the wall of the manhole at the required elevations.
- C. Manhole sections shall be set so that the manhole steps align vertically.
- D. Masonry work required to complete the precast concrete manhole shall be done in accordance with the provisions of Part 3.01 of this Section.
- E. Fill all joints, lifting holes, and other imperfections inside and outside with non-shrink mortar, overlapping the seam 2" on both sides, to form a neat, smooth finish. Manholes shall be completely waterproof.
- F. Concrete setting time, backfilling, setting frame and cover, temporary paving, etc., shall be in accordance with the applicable requirements of Part 3.01 of this section.

3.04 CONSTRUCTION OF PRECAST CONCRETE "TEE" MANHOLE BASES

- A. Precast concrete tee manhole bases and elbows shall conform to the requirements of the Section entitled "Concrete Pipe Sewers" of these Specifications. Class of pipe used shall be the same as that used in the line adjacent to the manhole and elbow. The tee section shall be carefully formed to the required size. The inside of the base shall be left smooth with no rough edges or protrusions.
- B. Elbows where required shall be fabricated to a true angle as shown on the drawings. Elbows shall be made smooth by hand troweling and the finished surface shall be equal to that in the rest of the pipe.
- C. All fabrication work on the manhole base and elbows shall be done by the manhole or pipe manufacturer at the plant. No field fabrication will be permitted without specific authorization of the ENGINEER.
- D. After the base section has been installed, the precast manhole sections shall be placed thereon.
- E. Masonry work required to complete the precast concrete manhole shall be done in accordance with the provisions in Part 3.01 of this Section.
- F. Concrete setting time, backfill, masonry work, setting frame and cover, temporary paving, etc., shall be in accordance with the applicable requirements of Part 3.01 of this Section.

3.05 CONSTRUCTION OF JUNCTION CHAMBERS

- A. Junction chamber toe pockets shall conform to the applicable requirements of Part 2.04 of this section and shall be placed as shown on the Drawings.
- B. The concrete shall be constructed in strict accordance with the Drawings and other applicable specifications and all lines inside the chamber shall be finished smooth with no protrusions to obstruct flow, all subject to the approval of the ENGINEER.
- C. During construction of the junction chambers, the existing sewage flow shall be maintained in a manner acceptable to the ENGINEER. Bypassing of sewage into streams or storm water drainage facilities will not be permitted. If the junction chamber is to be built on an existing sewer, the section of sewer within the junction chamber shall be removed before the base of the junction chamber is poured unless shown otherwise on the Drawings.
- D. All ground areas that are disturbed during construction of the junction chamber shall be prepared and grassed as called for elsewhere in these Specifications.

3.07 TESTING

Manholes installed in this contract shall be tested prior to backfilling for compliance with the infiltration limits specified for pipe used in this contract. The method shall be a vacuum test in which manholes are plugged, pumped to 5 psi vacuum, and held for a minimum of one (1) minute. The manhole shall be approved when it loses less than one (1) psi vacuum pressure during the 1 minute test period.

END OF SECTION

SECTION 02607
NEW AND REPLACEMENT PAVING AND SIDEWALKS

PART 1 - GENERAL

1.01 SCOPE

The work to be performed under this section shall include replacing existing sidewalks and pavement in paved streets, driveways, and parking areas where such sidewalks and pavement have been removed for constructing water pipelines, fire hydrants, sewers, manholes, and all other water and sewer appurtenances and structures. It shall also include temporary paving, and new sidewalks and pavements where applicable.

PART 2 - PRODUCTS

2.01 TYPES OF PAVEMENT

- A. All existing pavement in streets, driveways, or parking areas which is removed, destroyed, or damaged by construction of sewage or water works shall be replaced as specified below, as shown on the Drawings, or as called for in the Bid Schedule. Unless otherwise shown or specified, all paved surfaces shall be replaced using the applicable pavement replacement Type 1 thru 5 as shown on the Drawings. Pavement shown or specified to be replaced for the full width of the street shall be types 6, 7 or 8 as applicable and as shown on the Drawings. Materials, equipment, and construction methods used for paving work shall conform to the Specifications applicable to the particular type required for replacement, repair, or new pavements.
1. Type 1 portland cement concrete pavement shall be Class "A" concrete conforming to the section entitled "Cast-In-Place Concrete" of these Specifications, having minimum compressive strength of 3500 psi. The surface shall conform to the grade and elevation of the surrounding pavement. The slab shall be of a depth of eight (8) inches as shown on the drawings.
 2. Type 2 - not used.
 3. Type 3 asphaltic concrete pavement for heavy-duty use shall have a maximum thickness of three (3") inches placed in two equal layers. Type 3 pavement shall be composed of plant mix, asphaltic concrete Grading E conforming to "Asphaltic Concrete Surface (Hot Mix)," Section 411, Tennessee Department of Transportation, Standard Specifications for Road and Bridge Construction, latest edition. The pavement mixture shall not be spread until the designated surface has been previously cleaned and prepared, is intact, firm, properly cured, dry, and the tack coat has been applied.

4. Type 4 - not used.
 5. Type 5 bituminous penetration pavement shall conform to Section 404, "Double Bituminous Surface Treatment," Tennessee Department of Transportation, Standard Specification for Road and Bridge Construction, latest edition.
 6. Replacement of portland cement concrete driveways shall be Class "A" concrete conforming to the section entitled "Cast-In-Place Concrete" of these Specifications. The surface finish of the concrete pavement shall conform to that of the existing pavement. The slab shall be of depth equivalent to the existing concrete pavement, but in no case less than six (6) inches thick. Expansion joints removed shall be replaced.
 7. Replacement of portland cement concrete sidewalks shall be Class "A" concrete conforming to the section entitled "Cast-In-Place Concrete" of these Specifications. The surface finish of the concrete sidewalk shall conform to that of the existing sidewalk. The slab shall be of depth equivalent to the existing concrete sidewalk but in no case less than four (4) inches thick. Expansion joints removed shall be replaced.
 8. Where sewerage or water lines and appurtenances are constructed in or across unpaved, chert, or crushed stone surfaced streets, roadways, driveways, or parking areas, the surface removed or damaged shall be repaired or replaced with a minimum of six (6) inches of crushed stone in accordance with Section 401, "Mineral Aggregate Surface," of the Tennessee Department of Transportation, Standard Specifications for Road and Bridge Construction, latest edition.
 9. Unless permanent replacement can be made on the same day as the removal of the surface, and traffic is to be reinstated, temporary pavement repairs shall be made with two inches (2") of cold mix or hot bituminous seal coat. Permanent repair **MUST** be made within ten (10) working days from date of pavement cut.
- B. In no case shall paving repair be commenced without prior approval of the Engineer of the type pavement, the equipment to be used, and the method or procedure to be used.

PART 3 - EXECUTION

3.01 REPLACING PAVEMENT

- A. Pavements removed or damaged shall be replaced in accordance with the following procedures:
1. The existing street pavement or surface shall be removed along the line of the work for the allowable width specified for the trench or structure. All edges of the existing pavement shall be cut to a straight, vertical edge and care shall be used to get a smooth joint between the old and new pavement and to produce an even surface on the completed street. Cement concrete slabs, cement concrete base slabs and crushed stone bases, if required, shall be placed and the concrete allowed to cure for three (3) days before asphaltic concrete surface courses are applied. Expansion joints where applicable shall be replaced in a manner equal to the original joint.
 2. After the installation of the sewer or water lines, the trench shall be backfilled with thoroughly compacted crushed stone from the top of bedding to finished grade unless otherwise specified on the Drawings. Backfill shall be placed as specified in the section entitled "Earthwork," Paragraph 2.05, of these Specifications.
 3. Trench backfill along streets shall be covered with permanent paving or with a temporary paving as specified above. The temporary paving shall be applied level with the existing paved surface at a time directed by the engineer. Prior to the application of the temporary paving the crushed stone backfill shall be maintained carefully at grade and dust free. Additionally, immediately prior to application of permanent paving by Contractor or acceptance by the City, Contractor shall again compact the top of all trench backfill in the streets with a hydrotamper and add sufficient crushed stone to bring surface back to bottom of permanent paving as shown on Drawings.
 4. Unless otherwise shown or specified, all paved surfaces shall be replaced with pavement of like kind as specified in Paragraph 2.01. The pavement shall be either specified trench width or the full width of the street as shown in the Bid Schedule.
 5. Where pavement is specified for trench width only, the temporary surface or sub-base for permanent paving shall be compacted and finished to the base grade compatible with the type of pavement to be applied before pavement is placed. Additional width of pavement to be removed, if any, as shown on the drawings shall be done immediately prior to replacing the pavement. Any additional pavement or street surface removed or damaged beyond the limits shown on the Drawings shall be replaced or repaired by the Contractor at the Contractor's expense.

6. Where the pavement is for the complete width of the street, the following procedures shall be used;
 - a. After the crushed stone backfill and temporary surface have settled thoroughly, the entire width of the street to be paved shall be cleaned of loose materials as specified in Section 407, "Bituminous Plant Mix Pavements," Tennessee Department of Transportation, Standard Specifications for Road and Bridge Construction, latest edition. All areas which have settled shall be filled and leveled as described above in Paragraph 3. Manholes shall be raised to match finished grade using precast concrete rings. Before paving a tack coat shall be applied to the full width of the street, as specified in Section 403 "Tack Coat," Tennessee Department of Transportation, Standard Specifications for Road and Bridge Construction, latest edition.
 - b. During the time that the full width of the street is being paved, the Contractor shall extend the paving from the street into existing paved driveways in order to provide a smooth transition from the street to the existing driveway grade. This work shall be completed to the satisfaction of the Engineer with no separate payment being allowed.
7. Wherever sewer or water lines are constructed across state highways, the Contractor shall comply with all requirements and provisions of the Standard Method of the Tennessee Department of Transportation for opening trenches through highways and replacing pavements as shown on the Drawings and specified herein. All such work shall be subject to inspection and approval by the Tennessee Department of Transportation.
8. Contractor shall remove all surplus excavation materials and debris from the street surfaces and rights-of-way and shall restore street, roadway or sidewalk surfacing to its original condition. This work shall be considered as cleanup and no separate payment will be made for this item.

302. NEW PAVEMENTS

- A. Access roads, parking areas, and other roadways shall be surfaced as shown on the Contract Drawings. The material shall be placed sufficiently thick to produce, after compaction, a uniform surface with a minimum thickness as shown on the drawings and shall be shaped to the required line and grade. Materials, equipment and construction methods used for paving work shall conform to the Specifications for the particular surface required.
- B. Bituminous penetration pavement, Portland Cement Concrete base course or pavement and bituminous concrete pavement shall include a base course constructed in accordance with the requirements of Section 303, "Mineral Aggregate Base," Tennessee Department of Transportation, Standard Specifications for Road and Bridge Construction, latest edition. The completed

crushed stone road base shall be maintained by the Contractor in a smooth, first-class condition to required line, grade and cross section until the entire surface area has become stabilized and compacted. Roadway materials shall not be placed on soft, wet or frozen sub-grade.

- C. After the base has become stabilized, the entire surface shall be covered with the surface course called for on the Drawings. The surface course shall not be placed until all other items of work are completed.
- D. Portland Cement Concrete base course or pavement shall be placed as herein specified in this Section. Asphaltic concrete pavement shall be placed as herein specified in Paragraph 2.01. Bituminous penetration surface shall be constructed in accordance with Section 404, "Double Bituminous Surface Treatment," Tennessee Department of Transportation, Standard Specifications for Road and Bridge Construction, latest edition.
- E. Crushed stone surface shall be placed as herein specified in this section, Paragraph 2.01.

3.03 MAINTENANCE

The Contractor shall maintain the surfaces of roadways built and pavements replaced until the acceptance of the project. Maintenance shall include such dragging, reshaping, refilling, wetting, rerolling, and reapplication of the temporary paving surface as are necessary to prevent raveling of the road material, the preservation of reasonably smooth surface and repair of damaged or unsatisfactory surfaces to the satisfaction of the Engineer. Maintenance shall also include sprinkling as may be necessary to abate dust.

3.04 SIDEWALK REPLACEMENT

A. MATERIALS

1. All concrete sidewalks shall be built and/or replaced with Class "A" concrete which shall conform with requirements of the section entitled "Cast-in-Place Concrete" of these Specifications.
2. Preformed joints shall be 1/2-inch thick conforming to the latest edition of AASHTO Standard Specifications, M59, for preformed bituminous fiber joints.
3. Concrete forms shall be of wood or metal, shall be straight and free from warp, and shall be of sufficient strength when in place to hold the concrete true to line and grade without springing or distortion.

- B. When a section of sidewalk is removed, the existing sidewalk shall be cut to a neat line perpendicular to both the centerline and the surface of the concrete slab. Existing concrete shall be cut along the nearest existing contraction joints unless such joints do not exist in which case the cut shall be made at minimum distances shown on the Drawings.
- C. Existing concrete sidewalks that have been cut and removed for construction purposes shall be replaced with sidewalks of the same width and surface as the portion removed and shall have a minimum uniform thickness of four (4") inches. The new work shall be neatly joined to the old concrete so that the surface of the new work shall form an even unbroken plane with the old sidewalk.
- D. The subgrade for concrete sidewalks shall be formed by excavating to a depth equal to the thickness of the concrete plus two (2) inches. Subgrade shall be of such width as to permit the proper installation and bracing of the forms. Subgrade shall be compacted by hand tamping, or rolling. Soft, yielding, or unstable material shall be removed and backfilled with satisfactory material. Two (2") inches of porous compacted crushed stone shall be placed and shall be compacted thoroughly and finished to a smooth, unyielding surface at proper line, grade, and cross section.
- E. Expansion joints shall be required to replace any existing expansion joints that are removed with the sidewalk or in new construction wherever shown on the Drawings. Expansion joints shall be true and even, shall present a satisfactory appearance, and shall extend to within one-half (1/2") inch of the top of finished concrete surface.
- F. Concrete shall be suitably protected from freezing and excessive heat. It shall be kept covered with burlap or other suitable material and kept wet until cured.

3.05 REPLACING CURBS

- A. All existing curbs which are removed, damaged, or destroyed during construction of sewerage or water works shall be replaced in accordance with the following:
 - 1. Asphaltic concrete curbs shall be constructed with the same dimensions as the existing curb using asphaltic concrete pavement Grading E, conforming to the section entitled "Asphaltic Concrete Pavement." Prior to constructing curbs on pavement, the pavement shall be dry and cleaned of loose material and a tack coat of RS-2 asphalt shall be applied to the curb area of the pavement at the rate of 0.08 to 0.20 gallons per 15 linear feet of curb area
 - 2. Portland Cement Concrete curbs shall be constructed with the same dimensions as the existing curb using Class A concrete in accordance with the sections entitled "Cast-In-Place Concrete" and with Section 702, "Cement Concrete Curb," Tennessee Department of Transportation, Standard Specifications for Road and Bridge Construction, latest edition.