SECTION 33 40 00
DEMOLITION

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section specifies installing storm sewers, roadway drains, roadway underdrains, ditch lining and slope protection.

B. Related Work Specified Elsewhere:
   1. Grading, excavating and backfilling: Section 31 23 00.
   2. Maintenance, support and restoration of utility facilities: Section 33 01 00.

1.02 SUBMITTALS:

Submit the following for approval in accordance with the General Requirements and with the additional requirements as specified for each:

A. Shop Drawings:
   1. Drawings for each size and configuration of precast manhole with details of accessories and joints.
   2. Diagrams showing dimensioned locations for openings in precast concrete manhole walls.

B. Documentation:
   1. Submit calculations for modified or special designs to demonstrate compliance with required load-bearing capacity, certified by a professional engineer registered in the jurisdiction where the work is to be installed.

C. Samples:
   1. Sewer brick: Ten.
   2. Manhole brick: Ten.
   3. Slope protection materials:
      a. Concrete blocks: Ten each.
      b. Paving bricks: Ten each.
      c. Riprap: 1.5 cubic yards.
      d. Gabions: Two each, complete.
   4. Geotextile filter fabric: Two, 12 inches long by 12 inches wide, minimum.

D. Certification.

1.03 QUALITY ASSURANCE:

A. Codes, Regulations, Reference Standards and Specifications:
   1. Comply with codes and regulations of the jurisdictional authorities.
   2. Building Stone Institute: Stone Catalog.
   3. CISPI: HSN 85.

4. AASHTO: H20, M33, M36, M153, M175, M176, M190, M252, M288, T85, T96, T104.
5. ACI: 318.
6. ASTM: A36, A48, A53, A74, A167, C14, C32, C33, C76, C144, C150, C207, C361, C425, C443, C478, C507, C700, D698, D1682, D3034, D5034. D5035.
7. MS: MIL-P-23236.
8. SSPC: SP-6.

B. Source Quality Control:
1. Ditch lining and slope protection materials:
a. After approval, do not change source.
b. Replace defective material.

C. Allowable Tolerances:
1. Subgrade: Plus-or-minus 1/2 inch of elevation shown.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Formwork: Section 03 10 0.

B. Reinforcing Steel: Section 03 20 0.

C. Portland Cement Concrete: Section 03 30 0, Class 4000, unless otherwise shown.

D. Aggregate for Subgrade Foundation: ASTM C33, coarse aggregate, No. 4. Where shown use layers of No. 4 and No. 67 in combinations and proportions determined by field conditions and as approved.

E. Aggregate for Pipe Cradle: ASTM C33, coarse aggregate No. 67.

F. Concrete Pipe:
1. 10-inch diameter and smaller:
a. ASTM C14, Class 2, nonreinforced concrete pipe.
b. Bell-and-spigot type.
c. Joints fabricated in accordance with ASTM C361. Physical characteristics for rubber gaskets in accordance with ASTM C443.
2. 12-inch diameter and larger:
a. ASTM C76, bell-and-spigot or tongue-and-groove, Class IV, unless otherwise shown.
b. Radius (bevel) pipe, with drop between two pipe sections not exceeding the common wall thickness.
c. Rubber gasket joints, when required, fabricated in accordance with ASTM C361. Physical characteristics for rubber gaskets in accordance with ASTM C443.
d. Acceptance tests as specified in ASTM C76 form basis of acceptance for concrete pipe in accordance with the following:
1) 72-inch diameter and smaller: Acceptance on the Basis of Plant Load Bearing Test, Material Tests and Inspection of Manufactured Pipe for Visual Defects and Imperfections.

2) Larger than 72 inches in diameter: Acceptance on the Basis of Material Tests and Inspection of Manufactured Pipe for Defects and Imperfections.

e. Minimum laying lengths: Four feet.

f. Rubber gaskets: ASTM C443.

g. Jointing mastic: Elastic, water-resistant, formulation of plastic bituminous materials, nonflammable solvent and inert fillers so combined that:

1) When applied to a vertical metal surface and heated to 120F, jointing mastic will neither slump nor lose plasticity.

2) When applied directly from container without further fixing, jointing mastic can be applied in even, adherent coat within temperature range of 20F to 100F.

h. Reinforced concrete elliptical pipe: ASTM C507.

3. Perforated nonreinforced concrete pipe: AASHTO M175, Type 1 or 2, bell-and-spigot or tongue-and-groove type.

4. Porous concrete pipe: AASHTO M176, tongue-and-groove.

G. Plastic Pipe:

1. Polyvinyl chloride (PVC) pipe: ASTM D3034, SDR-35.

2. Polyethylene corrugated pipe: AASHTO M252.

H. Bituminous-Coated Corrugated Metal Pipe: AASHTO M190, Type A or C, with connecting bands, AASHTO M36.

I. Vitrified Clay Pipe: ASTM C700; Joints, ASTM C425, using plastic materials.

J. Cast-Iron Soil Pipe and Fittings: ASTM A74, extra-heavy (XH), with hub and spigot ends so constructed that joints may be made with gaskets conforming to CISPI Designation HSN 85 and the requirements of the relevant plumbing codes.

K. Lubricant for Rubber Gasket Pipe Joints: Vegetable oil soap.

L. Mortar Materials:

1. Portland cement: ASTM C150, Type I.

2. Sand: ASTM C144, natural sand.

3. Lime: Pressure-hydrated, ASTM C207, Type S.

4. Water: Potable.

5. Pigment: As approved.

M. Brick: ASTM C32; solid brick; Grade MS for manhole brick, Grade SS for sewer brick; 2-1/4 inches by 3-3/4 inches by eight inches.

N. Precast Concrete Manholes:

1. Cylindrical, eccentrical and conical: ASTM C478.

2. Other configurations: ACI 318, AASHTO H20.

O. Manhole Steps:

1. Cast iron: ASTM A48 Class 30 A.

2. Rebar: No. 4 reinforcing bar with molded polypropelene or rubber encasement.

P. Manhole Frame and Cover; Inlet Frame and Grate; and Ballast Screen;

1. Authority manhole: Cast-iron, ASTM A48, Class 30, with METRO logo.
2. Rust-resistant cast iron or rust-resistant malleable cast iron.
3. True to pattern in form and dimensions, free from pouring faults, sponginess, cracks, blowholes and defects affecting strength.
4. Fillets at angles in casting with arises sharp and perfect.
5. Sandblasted to effectively remove scale and sand, presenting smooth, clean and uniform surfaces. Coated with bituminous coating.
6. Covers that receive paver tile:
   a. Omit bituminous coating.
   b. Provide positioning lug and lug receptor as a permanent part of the cover and frame rim so that the cover can only be installed (flush) in one position.

Q. Metal Water Seals for Basin Connections: Neenah Foundry Model No. R-3707 or equal.

R. Structural Steel Members: ASTM A36.

S. Steel Pipe: ASTM A53, black finish, extra strong wall class.

T. Stainless Steel Angle: ASTM A167, Type 304.

U. Jute for Caulking: Good quality jute, free from tar, oil, or grease and dry when installed.

V. Preformed Expansion Joint Fillers: AASHTO M153, Type I, Type II or Type III.

W. Bituminous Expansion Joint Filler: AASHTO M33.

X. NOT USED

Y. Ditch Lining and Slope Protection:
1. Riprap: Material meeting the following requirements:
   a. Hard, durable and free of fractures; angular in shape; weather-resistant; and free from overburden, spoil, shale and organic material.
   b. Size: Weight distribution of pieces provided in accordance with the following:
      1) Class I: From 50 to 150 pounds with 60-percent minimum weighing 100 pounds or more; approximately 10 percent may weigh 50 pounds or less.
      2) Class II: From 150 to 500 pounds with 50-percent minimum weighing more than 300 pounds; approximately 10 percent may weigh 150 pounds or less.
   c. Quality:
      1) Water absorption: 3.0-percent maximum when tested in accordance with AASHTO T85.
      2) Specific gravity: 2.5 minimum when tested in accordance with AASHTO T85.
      3) Resistance to abrasion: Grade B maximum when tested in accordance with AASHTO T96.
      4) Soundness: Loss 20-percent maximum when tested in accordance with AASHTO T104.
2. Aggregate filter:
   a. Coarse aggregate, ASTM C33, Size 357.

b. Use only tough, durable materials free of thin, flat, elongated or soft friable particles and free of organic matter.

3. Granite block facing: Type 4, quarry split finish on face and edges.
4. Sand cushion for concrete block: Section 03 30 0, fine aggregate.

Z. Geotextile Filter Fabric: AASHTO M288 and the following additional requirements:

1. Woven or non-woven pervious filter fabric weighing approximately 0.03 to 0.05 pounds per square foot; free of defects.
2. Fabric: Long chain synthetic polymer composed of at least 85 percent by weight of propylene, ethylene, ester, amide or vinyl-chloride and with stabilizers or inhibitors to make fabric resistant to deterioration due to ultraviolet and heat exposure.
3. Fabric formed or treated so that filaments retain their positions relative to each other.
4. Edges selvaged.
5. Physical strength:
   a. Tensile strength: 200-pound minimum in each direction, ASTM D1682.
   b. Elongation at failure: 10 to 30 percent, ASTM D5034 amd D5035.
   c. Puncture strength: 70-pound minimum, ASTM D5034 and D5035.
6. Percent of open area: Not less than five percent nor more than six percent.
7. Equivalent opening size (E.O.S.): 70-100 US Standard Sieve, CW-02215-77.
8. Securing Pins: As recommended by manufacturer of filter fabric.

AA. Gabions:

1. Wire mesh: Galvanized steel wire 0.105 minimum diameter, 60,000 pounds per square inch tensile strength, galvanized at rate of 0.80 ounces per square foot. Wires twisted to form nonraveling hexagonal openings of uniform size, not to exceed 4-1/2 inches in length nor eight square inches in area of mesh opening. Horizontal dimension uniform, not to exceed 36 inches. Gabion dimensions not to vary more than three percent from manufacturer's stated size.
2. Tie devices: Malleable iron or steel, producing frictional force of 160 pounds per foot of spacing. Sized to conform to requirements of jurisdictional agency.
3. Stone: Durable, free from cracks and seams, unweathered, weighing between four pounds (four-inch average diameter) and 30 pounds (eight-inch average diameter) except five percent may vary more or less and 50 percent to exceed 10 pounds.
   a. Stone size:

	Basket Thickness (Inches)	Size of Stones (Inches)
	6	3 to 5
	9, 12, 18	4 to 7
	36	4 to 12

BB. Coal-Tar Epoxy Coating:

1. Two-component.
2. Chemically cured.
3. Conforming to MS MIL-P-23236 (Ships), Type I, Class 2.

4. Thinner: As recommended by manufacturer of coating and as approved.

2.02 MORTAR AND GROUT MIXES:

A. General Requirements:
   1. Mix dry in specified proportions by volume. Control and maintain accurate measurement throughout progress of work.
   2. Add sufficient water as specified to produce approved consistency.
   3. Do not mix in amount exceeding that which can be used within one hour after introduction of water.
   4. Do not retemper mix that has begun to set nor use such mix in the work.
   5. Where shown, specified or directed, mix pigment into dry mix to attain color selected by the Engineer. Pigment not to exceed 10 percent of dry batch weight of cement.

B. Proportions:
   1. Mortar: One part portland cement, 2-1/2 parts sand and water sufficient to produce stiff workable mix.
   2. Grout: One part portland cement, 2-1/2 parts sand and water sufficient to produce plastic flowable mix.
   3. Mortar for setting and pointing granite: One part portland cement, four to five parts sand, one part lime and water sufficient to produce approved consistency.
   4. Mortar for setting granite paving and grouted granite blocks: One part portland cement, four parts sand, with water sufficient to produce approved consistency.

PART 3 - EXECUTION

3.01 EXCAVATION FOR SEWER AND DRAINAGE STRUCTURES:

A. Perform excavation for sewers and drainage structures to line and grade shown in accordance with Section 31 23 00 and the following additional requirements:
   1. Excavate test pits sufficiently in advance of construction of sewers and drainage structures so that reasonable changes in line and grade can be made where location of existing structures varies from that shown.
   2. Excavate below horizontal plane extending two feet above top of sewer or drainage structures to maximum width of trench pay width shown. Where dimensions are not shown, make maximum horizontal width of excavation 18 inches from outside of sewer or drainage structure and minimum six inches. Where approved, excavation above such plane may exceed specified dimensions.
   3. If excavation exceeds permissible dimensions, encase pipe or install pipe of higher strength.
   4. Where necessary to place backfill or embankment so that trench can be excavated, extend backfill or embankment full depth laterally at least 2-1/2 times diameter of pipe on each side measured from centerline of pipe.

3.02 GEOTEXTILE FILTER FABRIC:

A. Prepare surface to receive fabric to relatively smooth condition free of obstructions, depressions, debris and soft or low-density pockets of material.

1. Place fabric with long dimension parallel to centerline of trench and lay smooth and free of tension, stress, folds, wrinkles or creases with sufficient excess to allow for minimum overlap of 12 inches.
2. Place strips in trench to provide minimum width of 12 inches of overlap for each joint.
3. Insert securing pins with washers through both strips of overlapped fabric at not greater than 3-foot intervals along a line through the midpoint of overlap at joints.
4. Where this method of placement conflicts with manufacturer's instructions, the manufacturer's instructions prevail.

B. At time of installation fabric to be rejected if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation, storage or handling.

C. Place fabric in manner and at location shown.

3.03 PIPE CRADLE:

A. Place pipes on cradle of aggregate or concrete where shown.

B. Place aggregate so as to avoid segregation; compact to maximum practicable density so that pipe can be laid to required tolerances.

3.04 LAYING PIPE:

A. General Requirements:
1. Excavate to lines and grades shown in accordance with Sections 31 23 00 and herein. Excavate depressions for bells.
2. Protect pipe and fittings during handling to prevent damage.
3. Place, shape and compact bedding material to receive barrel of pipe. Type and thickness of bedding material as shown.
4. Start laying pipe at lowest point; lay true to line and grade shown.
5. Install pipe to bear on bedding material along entire length. Shape bedding material to fit bells and flanges.
6. Install perforated pipe with perforations downward.
7. Install pipe so that bells and grooves are on upstream end.
8. Align each section of pipe with adjoining section with uniform annular space between bell and spigot and so as to prevent sudden offsets in flow line.
9. As each section of pipe is laid, place sufficient backfill to hold it firmly in place.
10. Keep interior of sewer clean as work progresses. Where small pipe size makes cleaning difficult, keep suitable swab or drag in pipe and pull through each joint immediately after jointing is completed.
11. Keep trenches and excavations free of water during construction and until backfilled. Each day, excavate only as much trench as needed to lay pipe.
12. When work is not in progress, securely plug ends of pipe and fittings to prevent trench water or other substances from entering pipes and fittings.
13. Where length of stub is not shown, install four-foot length and seal free end with brick masonry bulkhead or approved stopper.
14. Have work approved prior to covering pipe.
15. Where shown, place additional aggregate filter around and over pipe in lifts not exceeding six inches loose. Compact each lift before placement of next lift.

16. Backfill in accordance with Section 31 23 00.
17. Accomplish compaction by method that will avoid damage to pipe and will not disturb its alignment and grade. The use of vibratory rollers is prohibited until compacted cover over pipe has reached three feet or half the pipe diameter, whichever is greater.
18. Where cathodic protection is shown, apply coal-tar epoxy coating.

B. Vitrified Clay Pipe:
1. Nonperforated pipe:
   a. Use pipe hoist, crane or other approved device when laying pipe greater than 18 inches diameter.
   b. Prevent damage to premolded joint rings or attached couplings.
   c. Clean joint contact surfaces immediately prior to jointing. To complete joint, use lubricants, primers or adhesives as recommended by pipe or joint manufacturer
2. Perforated pipe:
   a. Firmly position spigot in bell of preceding pipe. Saturate jute gasket in cement grout and caulk into annular space. Ensure that jute is long enough to reach entirely around pipe and is of such thickness to bring pipe sections to same grade.
   b. After pipe sections have been caulked and centered, fill annual space with cement mortar.
   c. After mortar joints have set, place additional aggregate filter material as specified.

C. Concrete Pipe:
1. Bell-and-spigot joints:
   a. Lay bell-and-spigot joint pipe as specified for vitrified clay pipe.
2. Tongue-and-groove joints:
   a. Clean groove end of preceding pipe with wet brush and apply soft mortar to lower 1/4 of groove. Clean tongue end of succeeding pipe with wet brush and position it. Remove mortar from interior surface if squeezed out of joint.
   b. Complete mortaring interior and exterior portions of joint for entire circumference, extending from previously placed mortar. Perform final exterior mortaring of joints three lengths of pipe behind laying.

D. Plastic Pipe:
1. Perforated pipe:
   a. Use sleeve couplings designed to hold pipe in alignment without use of sealing compound or gaskets.
   b. Place additional aggregate filter material as specified.
   c. Cap open ends of underdrains.
2. Nonperforated pipe:
   a. Join sections of pipe with couplings recommended by pipe manufacturer.

E. Corrugated Metal Pipe:
1. Perforated pipe:
   a. Place additional aggregate filter material as specified
2. Nonperforated pipe:
   a. When pipe is shown to be bituminous paved, place paved area on bottom.
3. Connections for corrugated metal pipe:

a. Join sections of pipe with coupling bands arranged to fit corrugations accurately.
b. Do not damage protective coating when tightening bolts.
c. After final tightening of connection bolts, apply brush coat of bituminous paint to bands and bolts.

F. Porous Concrete Pipe:
1. Fill joints with mortar as specified for tongue-and-groove joints of concrete pipe.
2. After pipe joints have been made, place additional filter material as specified.

3.05 BACKFILL:

A. Perform backfilling only after inspection and approval of pipe laying.

B. On completion of construction, backfill excavation in accordance with Section 31 23 00.

3.06 JOINTS FOR CONCRETE STORM SEWER:

A. Use cold-applied jointing mastic for joints of storm sewer.

B. Bell-and-Spigot Joints:
1. Clean interior surface of bell and fill lower portion with mastic of sufficient thickness to make inner surfaces of abutting sections flush.
2. Install spigot end of adjoining pipe into bell so that sections are closely fitted and aligned.
3. Apply sufficient jointing mastic to fill remaining void in joint.
4. Remove excess mastic from interior of pipe.

C. Tongue-and-Groove Joints:
1. Clean groove. Apply mastic to lower half of groove.
2. Clean tongue of next pipe and apply layer of mastic to upper half.
3. Fit tongue into groove until pipes are closely fitted and aligned and mastic covers inner and outer surfaces.
4. Remove excess mastic from interior of pipe.

3.07 NOT USED

3.08 JOINTS FOR VITRIFIED CLAY PIPE:

A. Immediately before joining vitrified pipe, liberally coat bell with lubricant and fit spigot with gasket.

B. Join pipes using equipment designed for purpose.

3.09 JOINTS FOR CAST-IRON SOIL PIPE AND FITTINGS:

A. Immediately before joining cast-iron soil pipe and fittings, liberally coat hub with lubricant and fit spigot with pipes using equipment designed for purpose.

3.10 CONNECTIONS WITH EXISTING SEWERS:

A. Make connections with existing public sewers in accordance with requirements of the jurisdictional authority.

B. Do not connect existing sewer to sewer under construction unless approved.

3.11 TUNNELING AND JACKING:

A. Perform tunneling and jacking by approved methods.

B. Where open cut is specified and the Engineer permits the work to be done by tunneling or jacking, perform such work as specified and as approved.

C. Cost of material substitutions required by change of methods will be borne by the Contractor.

D. Make horizontal borings necessary to lay pipe lines true to line and grade.

E. When sewers are laid in borings, completely fill void between outside barrel of pipe and boring with cement grout pumped into place.

F. When drainage pipes are laid in borings, completely fill void between pipe and boring with sand, using water pressure to ensure that voids are filled.

G. Methods of boring and filling of voids between pipe and boring are subject to approval.

3.12 CAST-IN-PLACE CONCRETE CONSTRUCTION:

A. Conform to applicable requirements of Sections 03 10 00, 03 20 00 and 03 30 00. Section designer to specify the type of cement to be used. The type of cement will vary depending upon the jurisdiction where the work is performed.

1. Cement - per Fairfax County Standards.

B. Construct concrete support systems where shown. Section designer to specify the type of mortar to be used. Mortar type will vary depending upon jurisdiction in which the work is performed.

1. Mortar and cement - per Fairfax County Standards.

3.13 NOT USED

3.14 MANHOLES:

A. Construct manholes of precast sections, cast-in-place concrete or brick as shown.

B. Provide base of precast or cast-in-place construction. Make watertight connection between base and risers.

C. Unless otherwise shown, place axes of manholes directly over centerlines of pipes.

D. Construct appropriate flow channels in bottom of manholes.

E. Where necessary, build connections for public and residential sewers into manholes. Cut pipe flush with inside wall of structure. Do not build pipe into wall; provide mortar joint between pipe and structure.

F. Install manhole steps and cast-iron frame and cover for each manhole; adjust frame and cover to proper grade by brick construction.

3.15 CATCH BASINS AND INLETS:

A. When grading has been substantially completed as approved, construct catch basins of cast-in-place concrete using Class 3500 concrete and steel reinforcement as shown, precast sections or brick as shown.

B. Cut pipe flush with inside wall of structure. Provide mortar joint between pipe and structure or install water seal as shown.

C. Install cast iron frame and grate or cover and adjust to proper grade.

3.16 DITCH LINING AND SLOPE PROTECTION:

A. Slope Preparation:
   1. Excavate or fill slopes to the required cross section, lines and grades.
   2. Compact earth slopes to not less than 95 percent of the maximum dry density for a depth of not less than 12 inches.
   3. Where lining or protection is to be applied to rock surfaces, clean off mud, debris and loose fragments.
   4. Construct toe or cut off walls where shown.
   5. Remove loose material and buried debris protruding from subgrade.
   6. Placement of aggregate filter:
      a. Place filter aggregate where shown to depth shown.
      b. Compact each layer of aggregate filter in accordance with ASTM D698, Method D, to 100 percent at plus-or-minus one percent of optimum moisture content.

B. Ungrouted Riprap:
   1. Place aggregate filter as specified.
   2. Place riprap by machine to full course thickness in one operation upward from bottom of slope. Prevent displacement of underlying materials. Dumping of riprap is prohibited.
   3. Fill spaces between larger stones to produce nearly even surface with minimum of voids. Manually supplement machine placement of stone to choke in voids.
   4. Rearrange individual stones as necessary to ensure that finished configuration conforms to lines, grades and thickness shown.

C. Bituminous Concrete Paving:
   1. Place bituminous concrete where shown to the lines, grades, thickness and shapes shown.
   2. Give base course prime coat of medium-curing, cutback asphalt and allow to cure before hot bituminous concrete is placed.
   3. Place hot-mix bituminous concrete by hand or by machine.
   4. When hand methods are used, place mixture by means of hot shovels or forks and spread with hot rakes to thickness required to obtain specified compacted thickness. Thoroughly rake loose material throughout its depth, to eliminate honeycombing. Use screed boards of width equal to required thickness of lining.
   5. After spreading, compact until specified compacted thickness is obtained.

6. Place mixture as continuously as practicable to eliminate joints. Where joints are required at end of a day's work or when the placing is discontinued for such period of time that material becomes chilled, form joints as specified.

D. Cast-in-Place Concrete:
1. Use Class 3500 concrete unless otherwise shown.
2. Use wood or steel forms.
3. Place reinforcing steel or wire mesh as shown.
4. Provide and install dowel bars where shown.
5. Locate expansion and contraction joints where shown.
6. Unless otherwise shown, give surface wood float finish.
7. Protect and cure concrete in accordance with Section 03 30 00.

E. Concrete Masonry Units:
1. Place two-inch layer of sand cushion on previously prepared slope.
2. Set units firmly by hand in sand cushion with long dimension parallel to base of slope so as to produce even surface.
3. Lay blocks with open 3/8-inch joints and with joints staggered as shown.
4. Completely fill joints with mortar.
5. Protect and cure newly laid blocks for seven days using wet cotton mats or wet burlap.
6. Lay blocks when the temperature is 40F or above.

F. Paving Brick:
1. On the previously prepared slope, place concrete base of thickness shown.
2. Give concrete smooth screed finish.
3. Clean base, dampen and lay one-inch thick mortar bed.
4. Lay bricks with long dimension parallel to base of slope, with open 3/8-inch joints and with joints staggered.
5. Bed bricks firmly in mortar bed so as to produce even surface free from depressions or high spots.
6. Fill joints completely with mortar.
7. Protect and cure newly laid brick for a period of seven days using wet cotton mats or wet burlap.

G. Sodding: Section 32 91 19.

H. Concrete Pavement:
1. Lay plastic pipe as shown.
2. Place aggregate filter as specified.
3. Place concrete base in accordance with specified requirements for cast-in-place concrete.

I. Concrete with Granite Block Facing:
1. Lay plastic pipe as shown.
2. Place aggregate filter as specified.
3. Place concrete base in accordance with specified requirements for cast-in-place portland cement concrete.

4. Installation of granite block facing:
   a. et granite blocks in bedding course, one-inch minimum depth with 3/4-inch joint width.
   b. Slope bedding to true surface parallel to finished surface of blocks; strike off bedding until true alignment is attained.
   c. After final sloping, do not disturb bedding prior to laying blocks.
   d. Lay blocks on bedding course in successive courses with quarry split finish up.
   e. Align each course, lay true and even and bring to true grade by use of wood mallets or similar tools.
   f. Lay blocks in continuous sequence.
   g. Lay no more mortar than can be covered with blocks before end of work day.
   h. Point voids in joints with preshrunk mortar. Do not point when ambient temperature is 50F and falling.After pointing, scrub surfaces with soap solution and remove stains. Rinse immediately with clean water. Leave work in first class condition, free from mortar stain and other defacement as approved.

J. Gabions:
   1. Prepare ground surface smooth and even where gabions will be installed.
   2. Assemble gabions and tie together in accordance with manufacturer's instructions.
   3. Fill gabions in lifts of 12 inches maximum. Install tie devices in all units with exposed faces, spaced in accordance with requirements of jurisdictional agency.
   4. Ensure stone fill is placed without voids larger than approximately smaller stones. Hand-place stones in exposed faces.

3.17 CONCRETE HEADWALLS AND WINGWALLS:

A. Excavation:
   1. Excavate for foundations and walls to lines and grades shown in accordance with Section 31 23 00.

B. Formwork and Reinforcement:
   1. Erect formwork and install reinforcement as shown and in accordance with Sections 03 10 00 and 03 20 00.

C. Concrete Work:
   1. Place concrete of class shown and protect and cure in accordance with Section 03 30 00.

D. Backfilling:
   1. Backfill and compact in accordance with Section 31 23 00.

3.18 COATING APPLICATION AND REPAIR:

A. Preparation of surface: Perform the following in order given:
   1. Clean surfaces contaminated with oil or grease using naphtha or xylol.
   2. Remove rust and mill scale from surfaces by dry abrasive blasting to commercial finish in accordance with SSPC SP-6.
   3. Coat surfaces within 24 hours and before dew point is reached.

4. Apply coating only to surfaces which are dry and free of contaminants. Whip blast surfaces not coated within specified time limit.
5. Application of coating:
   a. Mix coating in quantity which can be applied within its pot life if in accordance with manufacturer's recommendation. Thin only with approval.
   b. Apply coating to exterior surfaces of pipes and fittings in accordance with recommendations of coating manufacturer and as follows:
      1) Two coats of equal thickness.
      2) Total dry film thickness: 20 mils.
      3) Pretreat first coat as required prior to application of second coat.
      4) Apply second coat before first coat has dried tack-free but not later than 24 hours after application of first coat, unless otherwise recommended by coating manufacturer.
      5) Inspect coating prior to burial. Repair damages in accordance with recommendations for field corrections by coating manufacturer.

3.19 NOT USED

3.20 FIELD QUALITY CONTROL:

A. Maximum Surface Variation Tolerances:
   1. Grouted riprap: 1-1/4 inches in four feet from true plane.
   2. Bituminous concrete: Plus-or-minus 1/4 inch from specified grade in 25 feet.
   3. Cast-in-place concrete: Plus-or-minus 1/4 inch from specified grade in 15 feet.
   4. Precast concrete block: Plus-or-minus 1/2 inch from specified grade in 25 feet.
   5. Paving brick: Plus-or-minus 1/2 inch from specified grade in 25 feet.

B. Obstruction Tests:
   1. Perform field tests to verify that installed storm systems are free from obstructions.
   2. Remove obstructions by excavating at the apparent obstruction and repairing or replacing the defective pipe as directed by the Engineer.

END OF SECTION