

SECTION 02370 - TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.1 Description of Work

- A. The work of this section includes all temporary erosion and sediment control and related and incidental operations, including:
 - 1. Silt fence installation and maintenance
 - 2. Maintenance and repairs of erosion and sediment control measures
 - 3. Rock filters and sediment basins

1.2 Quality Assurance

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.
- B. Codes and Standards: Perform work in compliance with applicable requirements of governing authorities having jurisdiction. Construction operations shall be carried out in a manner such that soil erosion, air pollution, and water pollution is minimized. State, County, and Municipal laws concerning pollution abatement shall be followed.
- C. The recommendations and standards set forth in the New York State Department of Environmental Conservation, Standards and Specifications for Erosion and Sediment Control, August 2005 or latest edition.
- D. The Contractor shall take action to remedy unforeseen erosion conditions and to prevent damage to adjacent properties as a result of increased runoff and/or sediment displacement. Stockpiles of wood chips, hay bales, crushed stone, and other mulches shall be held in readiness to deal immediately with emergency problems of erosion. All erosion control checks and structures shall be inspected after heavy rainfalls, and if damaged, repaired or replaced.

PART 2 - PRODUCTS

- 2.1 All materials and products shall meet the approval of the engineer. Cut sheets for all items shall be submitted for review and approval prior to installation.
 - A. Silt Barrier Fence: Class 3 geotextile materials with 2"x2" anchoring pots
 - B. Flow Filter Bag (inlet protection): as specified in the New York State Department of Environmental Conservation, Standards and Specifications for Erosion and Sediment Control, August 2005 or latest edition.
 - C. Coarse Aggregate (inlet protection): AASHTO #57 or equivalent.
 - D. Sediment Filter Bag: as specified in the New York State Department of Environmental Conservation, Standards and Specifications for Erosion and Sediment Control, August 2005 or latest edition.
 - E. Hay or Straw Mulch

PART 3 - EXECUTION

3.1 General Requirements:

- A. All temporary erosion and sediment control measures indicated on the drawings and specified herein shall be in place before the beginning of any earthwork or site work phase. Refer to general plan notes and details for additional information.
- B. Erosion and sediment control measures shall be inspected weekly and after every precipitation event.
- C. Install erosion and sediment control products according to manufacturer's directions.
- D. Inspect silt barrier fence after every precipitation event.
- E. Remove sediment when it has reached ½ of the above ground height of the silt barrier fence.
- F. All graded or cleared areas shall receive temporary seeding if subject to erosion for a period of 72 hours or more.
- G. Provide adequate maintenance of erosion and sediment control measures conforming to requirements in the New York State Department of Environmental Conservation, Standards and Specifications for Erosion and Sediment Control, August 2005 or latest edition, and as indicated on the drawings.
- H. Remove sediment from inlet protections and asphalt roadways after each major storm event.

END OF SECTION

SECTION 02520 – PCC SIDEWALKS AND DRIVEWAYS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Under these items the Contractor shall construct or replace Portland Cement Concrete sidewalks and/or driveways as shown on the plans or as directed by the Engineer.
- B. The Contractor shall replace the entire PCC panel (concrete and topping courses) for any disturbed PCC area through adjacent panel expansion joint(s). Partial or piecemeal replacement will not be accepted.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. The requirements of the following sections of the current NYSDOT Standard Specifications, Construction and Materials, shall apply unless otherwise indicated in the contract documents:

Portland Cement	701-01
Coarse Aggregates	703-02
Concrete Sand	703-07
Welded Wire Fabric	709-02
Admixtures	711-08
Water	712-01

- B. Concrete for the lower course of two-course sidewalks and driveways shall comply with the requirements for Class A concrete, as defined in the aforementioned NYSDOT Standard Specifications, Table 501-3, "Concrete Mixtures". This concrete shall attain a minimum compressive strength of 3500 psi when tested at twenty-eight (28) days in accordance with ASTM C39-80. The air content of the freshly mixed concrete shall be six (6%), plus or minus one (1%) percent and the slump shall be three and one half (3 -1/2") inches plus or minus one half (1/2) inch.
- C. Non-woven geotextile (drainage filter fabric) shall conform to the following:
 - a. Minimum flow rate of 110 gal/min/ft² ASTM D-4491-99A
 - b. Grab tensile strength min 150 lb ASTM D-4632-91
 - c. Mullen Burst strength min 300 psi ASTM D-3786-87
 - d. Puncture strength min 90 lb ASTM D-4833-00
 - e. Apparent opening size 60-70 US Sieve ASTM D-4751-99A
 - f. Non-woven geotextile shall be Mirafi 160N, or approved equal.

PART 3 – EXECUTION

3.01 CONSTRUCTION DETAILS

A. ADA Compliance

1. Attention of Contractor is called to the following: The work in this contract shall comply with the requirements of the AMERICANS with DISABILITIES ACT of 1990 (ADA). The standard details included comply with the ADA. Sections of the ADA Accessibility Guidelines for Buildings and Facilities: Final Guidelines (ADA-AG), and ADA-AG Appendix should be consulted for further guidance.

B. Excavation

1. Existing deteriorated concrete shall be removed and disposed off the line of work to the satisfaction of the Engineer.

C. Subgrade

1. The subgrade shall be that portion of the ground surface directly beneath the sidewalk slab. Up to 3" of subgrade excavation shall be included in this payment item.
2. The subgrade shall be dressed to a plain surface containing no large stones, roots, sod or rubbish, and shall slope downward toward the roadway one-quarter (1/4") inch per foot laterally, and to such longitudinal grade as may be shown on the plans.
3. After the grading is completed, the surface shall be compacted and, if necessary, all soft or spongy areas shall be removed and replaced with suitable fill material. Fill material shall conform to the requirements of Granular Subbase, as specified in the NYSDOT Standard Specifications, Type 4 subbase or equal approved by the Engineer.

D. Formwork

1. Forms shall be of lumber with nominal thickness of two (2") inches, or of steel of equal rigidity and strength. No forms shall be less than five (5") inches in depth for sidewalks or seven (7") inches for driveways and corners. Flexible strips may be used on curves. The forms shall be staked or otherwise held to the established grade of walk. All forms shall be properly cleaned and wood forms shall be thoroughly wetted, and metal forms oiled, before depositing any material against them.
2. The total thickness of walks shall be five (5") inches and shall consist of a wearing surface course one (1") inch thick placed upon a base course four (4") inches thick. Driveways shall have a total depth of seven (7") inches and shall consist of a wearing course one (1") inch thick placed upon a base course six (6") inches thick.

3. Contraction (tooled) joints shall be placed between expansion joints at equal intervals not exceeding six (6') feet. These joints shall be formed either by the use of division plates (steel), one-eighth (1/8") inch thick, or by approved methods of cutting a groove in the surface of the finished concrete.
4. Where the sidewalk line intersects a building, walk, permanent structure or other location as designated by the Engineer, a one-half (1/2") inch, non-extruding pre-molded expansion joint shall be provided, and placed at intervals not exceeding twenty (20') feet in sidewalks.
5. Expansion joints shall be pre-molded strips of asphaltic felt of the required thickness, as wide as the thickness of the walk, and laid in one piece as long as the full length of the slab.
6. Expansion joints shall extend from the surface to the subgrade, be at right angles to the sidewalk surface and be constructed prior to placing the concrete.
7. Expansion joints shall be filled with a one-part, non-priming, self-leveling polyurethane sealant. Approved products include Sonneborn Sonolastic SL 1 or approved equal.

E. Placing

1. Concrete shall not be placed upon a dry or dusty subgrade. The subgrade shall be sprinkled or lightly wetted before placing the concrete. No concrete shall be placed on a frozen subgrade or when the temperature is or predicted to be within twenty-four (24) hours, less than forty (40°) degrees Fahrenheit, except with written permission of the Engineer.
2. After the concrete course has been brought to the established grade, it shall be struck off and worked with a float in a manner that will thoroughly consolidate it so that the surface has a true contour. The upper edges of the concrete shall be rounded to a radius of one-quarter (1/4") inch.
3. When wet spots occur, finishing operations should be delayed until the water either disappears or is removed with a squeegee. If a squeegee is used, cement should not be removed with the water. Under no conditions shall dry cement or sand be used to absorb this moisture or to hasten the hardening.

F. Curing

1. Concrete shall be allowed to cure for at least three (3) days before forms are removed. Forms shall be carefully removed from the sidewalk so no edge will be broken, and the area adjacent to the sidewalk shall be immediately refilled to the grade of the new sidewalk.
2. All walks shall be protected by suitable coverings and shielded from traffic and the

elements for at least three (3) days and shall not be open to traffic until the Engineer so directs.

3. All concrete walks, curbs, and driveways shall be sprayed with a white pigmented membrane curing compound immediately after finishing. Vapor-proof membranes used for curing will not require wetting. A list of approved membrane curing compounds is included in these contract documents.
4. The Contractor shall provide protection for all concrete placed in cold weather by covering with straw, tarpaulins, insulated blankets, or other approved material, and/or heated by salamanders, if needed to keep concrete temperatures above forty (40°) degrees Fahrenheit to obtain specified concrete strengths.

G. Testing

1. The Owner will employ a qualified third party testing laboratory to perform quality control testing of concrete and mortar used in the construction of sidewalks and driveways.
2. For each concrete placement of fifty (50) cubic yards or less, one series of compressive strength samples shall be fabricated. A series shall consist of three (3) test cylinders of base concrete and two (2) sets of test cubes of mortar topping. (Note that each set contains three (3) cubes.) One (1) concrete cylinder and one (1) set of mortar cubes shall be tested at seven (7) days, and two (2) cylinders and one (1) set of mortar cubes shall be tested at twenty-eight (28) days. Concrete cylinders shall be fabricated in accordance with ASTM C31-69 (1975), and tested in accordance with ASTM C39-80. Mortar cubes shall be fabricated and tested in accordance with ASTM C109-80. Copies of these tests results will be made available to the Engineer and Contractor.
3. Slump tests and air entrainment tests shall be taken on the concrete and mortar as directed by the Engineer in accordance with ACI and ASTM standards.
4. At the discretion of the Engineer, core samples may be taken for testing of thickness and compressive strength. The cost of coring and testing of cores shall be borne by the Owner, and copies of test results shall be made available to the Contractor.
5. If the average thickness of the concrete sidewalk as determined by the measurements of all cores taken on the work is deficient by more than one-quarter (1/4") inch, a deduction will be made from the contract price in the form of a change order. The amount of deduction shall be determined by the Engineer.
6. Any part of the concrete sidewalk or driveway which is deficient in depth by more than one-half (1/2") inch will not be accepted, and at the option of the Owner said sidewalk (or driveway) may be taken up and replaced according to the specification, at the Contractor's expense.

7. Sections of sidewalk for which core or cylinder or cube tests show the strength to be less than ninety (90%) percent of the compressive strength required will not be accepted and shall be replaced at the Contractor's expense.

3.02 NAME PLATE/CONTRACT NUMBER

- A. The Contractor, as required by City Ordinance, shall imprint the concrete work at the beginning, end, corners and every 250 feet, with the Contractor's (and sub-contractor's) name, year of construction, and the contract number under which the work is performed.
- B. The Contractor's imprint numbers shall not be less than two (2) inches nor more than three (3) inches tall. Letters shall be not less than one (1) inch nor more than two (2) inches tall.
- C. The Contractor shall be restricted from imprinting the Contractor's name promiscuously, and shall be guided as to the location of same by the Engineer or the Resident Engineer.

3.03 PROTECTION OF SURVEY MONUMENTS AND UTILITIES

- A. The Contractor shall comply with the requirements of the City's standard SUPPLEMENTAL CLAUSES OF GENERAL APPLICATION to protect City survey monuments and various utilities in or adjacent to the line of work.

3.04 PERIOD OF MAINTENANCE

- A. The Contractor shall remedy, without cost to the Owner, any defects which may occur during a period of two (2) years from the date of completion and acceptance of work performed under this contract, provided such defects are caused by defective or inferior material and/or workmanship.

END OF SECTION

SECTION 02521 - SIDEWALK/DRIVEWAY SEALANT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Under this payment item the Contractor shall install a one-part, non-priming, self-leveling polyurethane sealant to fill expansion joints in sidewalks, driveways or bus pads as directed by the Engineer.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. A one component, non-priming, urethane, self-leveling, (pour grade) sealant for use in contraction and expansion joints in sidewalks, pavements, decks or other concrete structures shall be used. Approved products include Sonneborn Sonolastic SL 1 or approved equal.
- B. The sealant material shall fully comply with:
 - 1. Federal Specification TT-S-00230C, Type 1 Class A
 - 2. ASTM C-920, Type S, Grade P, Class 25, Use T, M.
- C. The material used shall meet the following properties:

<u>Property</u>	<u>Test Method</u>	<u>Value (average)</u>
Tensile Strength	ASTM D412	350 Al
Elongation	ASTM D412	800%
Hardness-Shore A	Shore Durometer	43+/-2
Shrinkage		
Weatherability (1000 Hours)	Atlas 6500 Watt Xenon Arc	Excellent
Low Temperature Flexibility	ASTM D746	-40 degrees Fahrenheit
Service Temperature Range		-40 to 180 degrees Fahrenheit

PART 3 – EXECUTION

3.01 SURFACE PREPARATION

- A. Surfaces shall be prepared as directed by the Manufacturer's Instructions.

- B. Joints surfaces shall be structurally sound, clean, dry, and free of all loose aggregate, paint, oil, grease, asphalt, wax, mastic compounds, waterproofing compounds or form release materials prior to the application of the sealant.

3.02 APPLICATION PROCEDURE

- A. The joint sealant should be installed in accordance with Manufacturer's recommendations.
- B. Fresh concrete must be fully cured before installing the sealant material.
- C. Fill joints from the bottom; avoid bridging of the joint which may form air voids. Ideally, the temperature at the time of application should be the median between surface temperature extremes. Thus, the joint width would be at the mid-point of maximum and minimum opening, providing for maximum efficiency of sealant with subsequent joint movement.
- D. Protect joint from dirt and traffic until cured.

3.03 PERIOD OF MAINTENANCE

- A. The Contractor shall remedy, without cost to the Owner, any defects which may occur during a period of two (2) years from the date of completion and acceptance of work performed under this contract, provided such defects are caused by defective or inferior material and/or workmanship.

END OF SECTION

SECTION 02675 – POROUS BITUMINOUS ASPHALT PAVEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work of this Section includes asphalt treated permeable base course and porous bituminous (porous asphalt) top course.
- B. Related Sections:
 - 1. Section 02725 – Subsurface Infiltration Bed

1.2 SUBMITTALS

- A. All submittals and testing results shall be submitted to Engineer for review and approval a minimum of two weeks prior to pavement construction.
- B. Submit a list of materials proposed for work under this Section including the name and address of the materials producer and the location from which the materials are to be obtained.
- C. Submit certificates, signed by the materials producer and the paving subcontractor, stating that all materials meet or exceed the specified requirements.
- D. Submit samples of coarse aggregates for review and approval by the Engineer prior to installation.
- E. The Contractor shall provide results of all testing as required by this Section to Engineer, including, but not limited to:
 - 1. Draindown Test (ASTM Method D6390)
 - 2. Moisture Susceptibility Test using the modified Lottman Method (AASHTO T283) with the following:
 - a. Compact using 50 gyrations of Superpave gyratory compactor
 - b. Apply partial vacuum of 26 inches of Hg for 10 minutes to whatever saturation is achieved.
 - c. Keep specimens submerged in water during freeze cycle.
 - d. Required retained tensile strength (TSR) \geq 80%
 - e. If the moisture susceptibility test cannot be successfully run on the porous asphalt mix, a comparable dense-graded mix (with the same top size stone and the same material sources) can be tested in accordance with AASHTO T283.
 - 3. Air Voids Test (AASHTO T269/ASTM D3203)
- F. The Contractor shall submit certification of all materials as required by this Section to Engineer, including:
 - 1. Gradation of aggregate(s)
 - 2. Certification letter from polymer modified asphalt laboratory (if applicable).
 - 3. Test data, mix design, and Performance Grade classification of the neat asphalt.
 - 4. Certification and mixing recommendations for all asphalt additives including fibers, hydrated lime, and additives
 - 5. Recommended mixing and compaction temperatures based on testing results.

1.4 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this Section.
- B. Codes and Standards
 - 1. All materials, methods of construction and workmanship shall conform to applicable requirements of NYSDOT Standard Specifications and AASHTO Standards, unless otherwise specified.

1.5 PROJECT CONDITIONS

- A. Protection of Existing Site
 - 1. Protect adjacent work from splashing of paving materials. Remove all stains from exposed surfaces of paving, structures, and grounds. Remove all waste and spillage.
 - 2. Do not damage or disturb existing site features, utilities, or vegetation. Provide suitable protection where required before starting work and maintain protection throughout the course of the work.
 - 3. Restore damaged site features, including existing paving on or adjacent to the site that has been damaged as a result of construction work, to their original condition or repair as directed to the satisfaction of the Owner, and authority having jurisdiction at no additional cost.
- B. Safety and Traffic Control
 - 1. Notify and cooperate with local authorities and other organizations having jurisdiction (such as NYSDOT and/or City of Syracuse) when construction work will interfere with existing roads and traffic.
 - 2. Provide temporary barriers, signs, warning lights, flaggers, and other protections as required to assure the safety of persons and vehicles around the construction area and to organize the smooth flow of traffic.
- C. Weather Limitations
 - 1. Do not place porous bituminous paving mixtures when surfaces are wet or when the ambient temperature is 55 degrees Fahrenheit or lower (measured in the shade and away from artificial sources of heat).
- D. Erosion and Sediment Measures
 - 1. All erosion and sediment measures must be installed prior to infiltration bed construction and maintained throughout project construction.
 - 2. It is the contractor's responsibility to maintain job conditions to prevent the deposition of sediment on infiltration beds by wind-borne deposition, tracking, stormwater runoff, etc.
 - 3. If job conditions arise that adversely affect the infiltration bed, additional measures such as access control during construction, vacuuming of impervious and pervious surfaces, or additional site stabilization may be required.

1.6 REFERENCES

1. Annual Book of ASTM Standards, 2008 or latest edition; American Society for Testing and Materials, Philadelphia, PA.
2. New York State Department of Transportation Specifications.
3. Standard Specifications for Transportation and Methods of Sampling and Testing of the American Association of State Highway and Transportation Officials (AASHTO), 2007 or latest edition.
4. Standards of the American Association of State Highway and Transportation Officials (AASHTO), 19th edition 1998 or latest edition.
5. Contract Documents and Specifications for 2010 Annual Street Structures and Rehabilitation at Various Locations within Onondaga County and the City of Syracuse, March 2010.

PART 2 - PRODUCTS

A. MATERIALS

A. Infiltration Beds

1. Per Section 02725.

B. Asphalt Treated Permeable Base Course

1. Shall meet the requirements of Type 1 Permeable Base as per Table 401-1 Composition of Hot Mix Asphalt Mixtures in Section 401 of New York State Department of Transportation Standard Specifications of May 1, 2008.
2. Shall contain a binder meeting the requirements of PG 70-22 as specified in AASHTO MP-1.

C. Porous Bituminous Asphalt Surface Course

1. All aggregates in the porous bituminous asphalt mix shall meet the following:
 - a. LA Abrasion loss, 30% maximum (ASTM C131).
 - b. At least one mechanically fractured face on 100 percent of the material retained on a 1/4-inch sieve.
 - c. Flat and Elongated Particles, 5:1 – 10% maximum, 3:1 – 20% maximum (ASTM D4791)
2. Aggregate in the asphalt mix shall be 100% crushed and washed material and have a gradation of:

U.S. Standard Sieve Size	Percent Passing
½" (12.5mm)	100
3/8" (9.5mm)	92-98
4 (4.75mm)	32-38
8 (2.36mm)	12-18
16 (1.18mm)	7-13
30 (600 µm)	0-5
200 (75 µm)	0-3

3. Fibers are recommended (but not required) if necessary to meet draindown requirements. Fibers minimize draindown, increase film thickness, and improve strength and durability. If used, they shall consist of either cellulose fibers or mineral fibers which are to be treated with a cationic sizing agent to enhance dispersement of the fiber as well as increase cohesion of the fiber to the bitumen. Fiber is to be added at a dosage rate between 0.2% and 0.4% by weight of total mix.
 - a. Mineral fibers shall be from virgin, basalt, diabase, or slag with a maximum average fiber length of 6.35 mm and a maximum average fiber thickness of 0.005 mm.
 - b. Cellulose fiber – Fiber length shall be 6.35 mm (max), Ash Content 18% non-volatiles ($\pm 5\%$), pH 7.5 (± 1), Oil absorption (times fiber weight) 5.0 (± 1), Moisture Content 5.0% (max).
 4. Hydrated lime, if required as an anti-stripping agent, shall meet the requirements of AASHTO M 303 Type 1 and shall be blended with the damp aggregate at a rate of 1.0% by weight of the total dry aggregate. The additive must be able to prevent the separation of the asphalt binder from the aggregate and achieve a required tensile strength ratio (TSR) of at least 80% on the asphalt mix. Other anti-stripping agents can also be used if approved in advance by the Engineer.
 5. Asphalt binder shall meet the requirements of one of the following:
 - a. Asphalt binder or modified asphalt binder with an elastomeric polymer meeting the requirements of PG 70-22 as specified in AASHTO MP-1.
 - b. Rubberized asphalt binder, if shown on plans: The base asphalt for the binder material to be used for asphalt-rubber mix shall be PG 64-22 (or other binder used locally for conventional mixes) and shall be blended with ground tire rubber to meet the requirements of 5.a. above. Rubber shall be free of wire and other contaminants. Follow local state specification for asphalt rubber binder, if available, or ASTM D 6114, “Standard Specification for Asphalt-Rubber Binder.”
 6. The asphalt binder content shall be between 5.75% and 6.75% by total weight as determined by testing in Part 3.
 7. The Contractor shall submit a certification letter for the asphalt or asphalt-rubber supplier to the Engineer before the mix is placed on the project. The certification letter from the supplier will include the following:
 - a. Type and amount of modifier, if any.
 - b. Information on the storage and stability of the asphalt binder.
 - c. Manufacturer recommended mixing and compaction temperatures.
- D. Edge Restraints
1. Edge restraints (Asphalt Edge or equivalent) shall be used where the porous asphalt meets landscaped areas to provide a clean, durable edge for the pavement. Install according to manufacturer’s installation guidelines to achieve a durable, clean pavement edge. Color: Black.
- E. Riverstone (if used)
1. Clean, durable stone, free from slaty texture or cleavage planes. Crushed aggregate is not acceptable.
 2. Rounded and sub-rounded NYSDOT No. 2 stone.

PART 3 - MIX PRODUCTION

3.1 POROUS BITUMINOUS ASPHALT MIX DESIGN

- A. The asphalt content, use of fibers and/or anti-strip, and aggregate gradation should be adjusted within the ranges in this specification to produce a durable mix that meets the following criteria:
1. 18 to 22 percent air voids (compacted sample)
 2. Binder draindown (ASTM D 6390) not to exceed 0.3 percent
 3. The retained tensile strength (TSR) of the compacted specimens in the modified Lottman method must be 80 percent minimum (using ASTM D 7064 w/ 1 freeze-thaw cycle or a surrogate dense-graded mix according to AASHTO T283).

PART 4 - EXECUTION

4.1 INSTALLATION

A. Infiltration Beds

1. Install per Section 02725.

B. Porous Bituminous Asphalt

1. A full job mix formula with all applicable test results must be submitted to the Engineer for review and approval at least 2 weeks before paving is scheduled.
2. Transporting Material
 - a. Transporting of mix to the site shall be in vehicles with smooth, clean dump beds that have been sprayed with a non-petroleum release agent. Truck beds should be raised after spraying to drain any puddles of release agent.
 - b. The mix shall be covered during transport to control cooling.
 - c. Haul distances shall be limited to 35 miles unless approved in advance by the Engineer.
3. Porous bituminous asphalt shall be placed within 90 minutes of being loaded.
4. Asphalt Placement
 - a. The porous bituminous surface course shall be laid with a track paver in one lift directly over the storage bed and stone base course to a 0.5-1-inch finished thickness.
 - b. The optimal laying temperature of the bituminous mix should be determined by the results of the Draindown Test (ASTM D6390). The typical range is between 275 degrees Fahrenheit and 325 degrees Fahrenheit (as determined by the testing and recommendations of the asphalt supplier).
 - c. Installation shall take place when ambient temperatures are 55 degrees Fahrenheit or above, when measured in the shade away from artificial heat.
 - d. The use of a remixing material transfer device between the trucks and the paver is recommended to eliminate cold lumps in the mix.
 - e. Modified asphalt, if used, can be very difficult to rake and work by hand; a well-heated screed and other techniques should be used to minimize the need for hand work.
 - f. Compaction of the surface course shall take place when the surface is cool enough to resist an 8 to 10-ton roller (typically between 210 and 260 degrees F). One or two passes is all that is required for proper compaction. More rolling could cause aggregate

breakdown and/or a reduction in the surface porosity which is unacceptable. Additional rolling with a small roller to smooth seams and remove marks is acceptable.

5. After final rolling, no vehicular traffic of any kind shall be permitted on the surface until cooling and hardening has taken place, and in no case within the first 72 hours (7 days recommended). Provide barriers as necessary at no extra cost to the Owner to prevent vehicular use; remove at the discretion of the Owner.
6. Work shall be done expertly throughout, without staining or injury to other work. Transition to adjacent impervious bituminous paving shall be merged neatly with flush, clean line. Finished paving shall be even, without pockets, and graded to elevations shown on drawing.
7. Porous pavement beds shall not be used for equipment or materials storage during construction, and under no circumstances shall vehicles be allowed to deposit soil on paved porous surfaces.
8. Repair of Damaged Paving
 - a. Any existing paving on or adjacent to the site that has been damaged as a result of construction work shall be repaired to the satisfaction of the Owner without additional cost to the Owner.
9. Field Quality Control
 - a. The full permeability of the pavement surface shall be tested by application of clean water at the rate of at least 5 gpm, using a hose or other distribution device. Water used for the test shall be clean, free of suspended solids and deleterious liquids and will be provided at no extra cost to the Owner. All applied water shall infiltrate directly without ponding or surface runoff, and shall be observed by the Engineer/Owner. At least 3 random locations shall be tested, with at least 1 additional test per 10,000 SF of porous asphalt.
 - b. Testing and Inspection: Employ at Contractor's expense an inspection firm acceptable to the Engineer and Owner to perform soil inspection services, staking and layout control, and testing and inspection of site grading and pavement work. Inspection and list of tests shall be reviewed and approved in writing by the Engineer prior to starting construction. All test reports must be signed by a licensed Engineer.
 - c. Test in-place base and surface course for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable work as directed by the Owner.
 - d. Surface Smoothness: Test finished surface for smoothness and even drainage, using a ten-foot to centerline of paved area. Surface will not be accepted if gaps or ridges exceed 3/16 of an inch.
 - e. Contractor shall vacuum-sweep porous asphalt pavement once site stabilization has occurred if materials have accumulated on the surface.
10. Grade Control
 - a. Establish and maintain required lines and elevations. The Engineer shall be notified for review and approval of final stake lines for the work before construction work is to begin. Finished surfaces shall be true to grade and even, free of roller marks and free of low spots to form puddles. All areas must drain.
 - b. If, in the opinion of the Owner, based upon reports of the testing service and inspection, the quality of the work is below the standards which have been specified, additional work and testing will be required until satisfactory results are obtained.

END OF SECTION

SECTION 02720 – DRAINAGE UTILITIES

PART 1 – GENERAL

- A. Pilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.
- B. Codes and Standards: Perform work in compliance with applicable requirements of governing authorities having jurisdiction (such as NYSDOT and/or City of Syracuse).
- C. Materials and workmanship shall conform to applicable requirements of NYSDOT Specifications.
- D. References
 - 1. Annual Book of ASTM Standards, 2005, or latest edition; American Society for Testing and Materials, Philadelphia PA.
 - 2. New York State Department of Transportation Specifications.
 - 3. Standards of the American Association of State Highway and Transportation Officials (AASHTO), 19th edition 1998 or latest edition.
 - 4. Contract Documents and Specifications for 2010 Annual Street Structures and Rehabilitation at Various Locations within Onondaga County and the City of Syracuse, March 2010.

1.2 PROJECT CONDITIONS

- A. Conform to all conditions and restrictions included in other sections, including erosion and sediment control, protection of vegetation, existing improvements and utilities.
 - 1. All work shall be in accordance with the laws of New York State.
 - 2. The Contractor shall apply and pay for all necessary permits and fees required in the course of his work as required by the governing codes, including NYSDOT.
 - 3. The Contractor shall be responsible for coordinating his work with the work of other trades. Do no work that will damage, displace, or make unnecessarily difficult the installation of the work of other trades.
 - 4. The Contractor shall not cover any work until it has been inspected by the Engineer. Any work covered prior to inspection shall be opened to view by the Contractor at his expense.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. High Density Polyethylene (HDPE) Pipe and Fittings
 - 1. Solid and Perforated High Density Polyethylene Pipe (HDPE) shall conform to AASHTO M252, ASTM F-405, and ASTM F-667 for materials and fabrication, and shall be smooth lined (dual wall). Solid HDPE pipe joints shall be watertight joints.
 - 2. Continuously Perforated High Density Polyethylene Pipe (HDPE) shall have Class II perforations per AASHTO M252 (pipe diameters 3 through 10-inches) and AASHTO 294 (pipe diameters 12 inches and greater). Class II perforations shall be located in the outside valleys of the corrugations, be circular and/or slotted, and evenly spaced around the circumference and length of the pipe. The opening area shall be no less than 0.945

square inches per linear foot (pipe diameters 4 through 10-inches), 1.42 square inches per linear foot (pipe diameters 12 through 18-inches), and 1.89 square inches per linear foot (pipe diameters 24-inches and larger).

3. Manufacturers:
 - a. ADS
 - b. Or Approved Equal.

B. PVC Catch Basins

1. PVC catch basins (risers) with domed ductile iron (DI) grates, heavy duty H-25 covers, or H-10 pedestrian grates as noted on plans.
2. PVC catch basins utilizing heavy duty H-25 covers shall be installed per manufacturer's specifications and backfill requirements.
3. Where applicable, PVC catch basin weirs shall be custom manufactured stainless steel. The weirs shall be fabricated and mounted by the PVC catch basin manufacturer to the catch basin, and anchored on the bottom and sides with stainless steel anchor bolts. All seams with the PVC catch basin shall be water tight.
4. Where applicable, PVC catch basin filter baskets shall be Nyloplast "Catch-It" filter baskets or approved equal.
5. Manufacturers:
 - a. Nyloplast
 - b. Or Approved Equal

C. Anti-Seep Collars

1. Anti-seep collars shall be two-piece HDPE collars. Install anti-seep collars on storm pipes approximately one foot from the edge (outside) of the infiltration bed, or as indicated on the plans.
2. Manufacturers:
 - a. Lane Enterprises
 - b. Or Approved Equal

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions under which work is to be performed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

3.2 EXCAVATION, BACKFILLING, AND COMPACTION – DRAINAGE UTILITIES

- A. Grade trench bottom to a smooth, firm, stable and rock-free foundation. Remove unstable, soft, and unsuitable materials, as determined by the Engineer, and backfill with clean granular material to indicated level, per NYSDOT specifications.
- B. Backfilling includes all refilling of excavations and the tamping and rolling required for satisfactory compaction. Backfilling shall be done as promptly as possible without damage to pipe or structure in place. Backfilling will be done following inspection and approval of the work by the Engineer or Owner's representative, and only with permission of the Engineer or Owner's representative.
- C. No part of a pipeline or other structure that needs to be tested, located, or measured, shall be

filled over or around until required tests and measurements have been made or witnessed by the Engineer or Owner's representative, and their permission so given to backfill. Any backfilling without authorization shall be uncovered by the Contractor at his own expense.

- D. All pipes shall be laid on an even and uniform bedding surface. The bedding shall be installed from a depth of six inches (6") below the pipe barrel unless otherwise shown. Bell holes and depressions for joints of the pipes shall be dug after the bedding materials have been properly graded. The pipe shall then be laid to its true grade and alignment. The bedding materials shall then be shovel placed and hand tamped to fill all spaces under and adjacent to the pipe to hold the pipe in its true grade and alignment during the test. The lines, grades, and joints of the pipes will be inspected before any further backfilling above the pipe is commenced. After the inspection is completed, the backfilling shall be continued in layers not exceeding six inches (6") to a height twelve inches (12") above the top of the pipe. The materials shall be placed with hand shovels and shall be solidly rammed down. Stones smaller than one inch (1") shall be used around the pipe. Note: Perforated pipes will be installed directly within the infiltration trench stone as shown; no additional bedding is required.
- E. From twelve inches (12") above the top of the pipe, suitable backfill material, conforming to the requirements of these specifications may be used. The compaction shall be done for the full length of the pipe, and in such a manner as not to disturb or damage the pipe. Hand-operated mechanical tampers may be used for compaction. Such mechanical tampers shall have a rating of at least 300 feet/lb. of energy per blow.
- F. From one foot (1') above the top of the pipe, machine backfilling and compaction may be used. Above this level, except for the last two feet (2'), small stones not larger than six inches (6") in their greatest dimension will be permitted, but this should not be in excess of 15% of the total volume of the backfill materials in the entire depth. Such stones shall be evenly distributed throughout the entire mass.
- G. The excavated material removed from the trenches can be used for backfilling purposes provided it meets the material classifications. In the areas where the conditions require the removal of the excavated materials, all the backfilling shall be done using crushed stone backfill. The backfilling materials should compact readily by the usual methods of tamping and puddling. Unsuitable materials, such as clay that will crumble under light pressure by hand, frozen materials, ashes, cinders, tree stumps and other organic and unsuitable materials shall not be used for backfilling. Organic soil will not be permitted as backfill.
- H. The materials backfilled in trenches shall be deposited in layers not exceeding six inches (6"). All backfill shall be properly moistened or dried to within 2% of the optimum moisture content as determined by ASTM D-1557. Each lift shall be compacted to 95% maximum density. The degree of compaction shall be checked by a state-certified testing agency, and each successive lift shall not be placed or compacted until the previous lift is inspected and approved by the Owner's Representative. The fill shall be compacted to elevations and limits indicated on the plans.
- I. The compaction shall be continued to the desired elevations. The trenches shall be molded to a height of one foot (1') after compaction with suitable materials. All the backfilling and compaction shall be continued without interruption to completion. The areas shall be properly cleaned and all the excess material shall be properly disposed of from the work area.

3.3 PIPE LAYING

- A. All pipes shall be unloaded, handled, and stored in conformance with the manufacturer's recommendations.

- B. Bedding and laying of pipe shall be in accordance with the pipe manufacturer's recommendations. Pipe joints shall be made in accordance with joint manufacturer's recommendations.
- C. All pipe shall be laid on a minimum six inch (6") thickness of NYSDOT No. 2 aggregate, unless otherwise noted on the plans or approved by Engineer.
- D. Pipe placement and alignment shall be accomplished only in the presence of the Owner or their authorized representative. Adequate and suitable equipment and appliances for safe and convenient handling and laying of pipes shall be used. The Contractor shall give two (2) days notice of the time scheduled for the pipe laying and inspection.
- E. Prior to being lowered into the trench, each pipe and fitting shall be carefully inspected, and those not meeting specifications or are otherwise defective shall be rejected and removed from the project.
- F. If, in the opinion of the Engineer or Owner's representative, the materials furnished or the methods of installation are not in accordance with the Specifications or generally accepted practices for that type of work, such work may be stopped by the Engineer.
- G. Pipes shall be laid true to the grades shown on the plans. Each section of pipe shall rest upon the pipe bed for the full length of its barrel, with recesses excavated to accommodate bells and joints. Any pipe which has its grade or joints disturbed after laying shall be taken up and relaid. The pipe sections shall be inspected, and the interior and ends of all pipe will be cleaned before lowering into the trench. During construction, the Contractor shall use all precautions to keep the trench clean and clear of deposits and free from injury until finally inspected and accepted.
- H. Pipe shall be laid so that when completed, the interior bore will conform accurately to grades and alignment indicated by the contract documents or directed by the Engineer or Owner's representative.
- I. Before joints are made, each pipe shall be well bedded, and no pipe shall be brought into position until the preceding length has been thoroughly secured in place. Coupling or bell holes shall be dug sufficiently large to insure the making of a proper joint.
- J. The excavation into which the pipe is being laid shall be kept free from water, and no joints shall be made under water. Water shall not be allowed to rise in excavation until joint is complete. Care shall be used to secure water tightness and to prevent damage to joints during backfilling. All pipe joints shall be watertight within allowances established by these Specifications.
- K. No pipe shall be laid upon a foundation into which frost has penetrated, nor anytime when the Engineer or Owner's representative shall deem that there is a danger of formation of ice or penetration of frost at the bottom of excavation. Where the foundation is unstable or consists of rock, a stone or gravel foundation shall be placed and tamped to form an acceptable bed for the pipe.

3.4 INSTALLATION OF STRUCTURES

- A. The Contractor shall provide an excavation of sufficient size to accommodate the outside dimensions of the structure as shown on the plans. Prior to setting the unit, the Contractor shall prepare a 6-inch minimum leveling course of compacted NYSDOT No. 1A aggregate suitable for receiving the structure. The base material shall be compacted and leveled to the elevations shown on the plans.
- B. The Contractor shall provide sufficient labor and equipment to unload and place the units.

Should rental of a crane be required for unloading and setting the unit, it shall be coordinated by the Contractor with the manufacturer's dispatch office in sufficient time to acquire the equipment.

- C. The completed installation shall be neat and watertight.
- D. Install PVC catch basins, Nyloplast or approved equal, as per the manufacturer's specifications.

END OF SECTION

SECTION 02725 – SUBSURFACE INFILTRATION BED

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work of this Section includes subgrade preparation and installation of a subsurface infiltration bed.

1.2 SUBMITTALS

- A. Submit a list of materials proposed to be provided for work under this Section including the name and address of the materials producer and the location from which the materials are to be obtained.
- B. Submit certificates, signed by the materials producer, stating that materials meet or exceed the specified requirements.

1.3 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work in this Section.
- B. Codes and Standards
 - 1. All materials, methods of construction and workmanship shall conform to applicable requirements of NYSDOT Standard Specifications and AASHTO Standards, unless otherwise specified.

1.4 PROJECT CONDITIONS

- A. Protection of Existing Site
 - 1. Do not damage or disturb existing site features, utilities, or vegetation. Provide suitable protection where required before starting work and maintain protection throughout the course of the work.
 - 2. Restore damaged site features, including existing paving on or adjacent to the site that has been damaged as a result of construction work, to their original condition or repair as directed to the satisfaction of the Owner, and authority having jurisdiction at no additional cost.
- B. Safety and Traffic Control
 - 1. Notify and cooperate with local authorities and other organizations having jurisdiction (such as NYSDOT and/or City of Syracuse) when construction work will interfere with existing roads and traffic.
 - 2. Provide temporary barriers, signs, warning lights, flagmen, and other protections as required to assure the safety of persons and vehicles around the construction area and to organize the smooth flow of traffic.

C. Erosion and Sediment Control Measures

1. All erosion and sediment measures must be installed prior to infiltration bed construction and maintained throughout project construction.
2. It is the contractor's responsibility to maintain job conditions to prevent the deposition of sediment on infiltration beds by wind-borne deposition, tracking, stormwater runoff, etc.
3. If job conditions arise that adversely affect the infiltration bed, additional measures such as access control during construction, vacuuming of impervious and pervious surfaces, or additional site stabilization may be required.

D. REFERENCES

1. Annual Book of ASTM Standards, 2005, or latest edition; American Society for Testing and Materials, Philadelphia PA.
2. New York State Department of Transportation Specifications.
3. Standards of the American Association of State Highway and Transportation Officials (AASHTO), 19th edition 1998 or latest edition.
4. Contract Documents and Specifications for 2010 Annual Street Structures and Rehabilitation at Various Locations within Onondaga County and the City of Syracuse, March 2010.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aggregates within infiltration bed shall be clean and thoroughly washed and shall meet the following:
4. Maximum Wash Loss of 0.5% (ASTM C117)
 5. Minimum Durability Index of 35 (ASTM D3744)
 6. L.A. abrasion loss, 30% maximum. (ASTM C131 and C535)
 7. Aggregate shall be 100% crushed material.
 8. Fractured Faces, 1 side 95% minimum, 2 sides 90% minimum (ASTM D5821).
- B. Unless otherwise noted on the plans or approved by the Engineer, coarse aggregate for the infiltration bed shall be uniformly graded, crushed and washed No. 3A stone as specified in the NYSDOT Standard Specifications 703-02, size designation from Table 703-4.
- C. Unless otherwise noted on the plans or approved by the Engineer, choker base course aggregate for infiltration beds beneath pavements shall be a uniformly graded, crushed blend of 40 percent No.1 and 60 percent No.2 stone as specified in the NYSDOT Standard Specifications 703-02, size designations from Table 703-4.
- D. Unless otherwise noted on the plans or approved by the Engineer, NYSDOT Select Granular Subgrade for infiltration beds shall be as specified in the NYSDOT Standard Specifications 203-2, size designations from Part 203-2.02.C.1.
- E. Non-woven geotextile (drainage filter fabric) shall conform to the following:
1. Minimum flow rate of 110 gal/min/ft² ASTM D-4491-99A
 2. Grab tensile strength min 150 lb ASTM D-4632-91
 3. Mullen Burst strength min 300 psi ASTM D-3786-87
 4. Puncture strength min 90 lb ASTM D-4833-00
 5. Apparent opening size 60-70 US Sieve ASTM D-4751-99A
 6. Non-woven geotextile shall be Mirafi 160N, or approved equal.

- F. Where noted on the plans, impervious liners between infiltration bed and adjacent surfaces shall be Solmax 230 (30 mil), or approved equal. Install per manufacturer's recommendations.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Owner's Representative and Engineer shall be notified at least 24 hours prior to all infiltration bed work.
- B. Subgrade preparation
 - 1. Existing subgrade under bed area shall NOT be compacted or subject to excessive construction equipment traffic prior to installation of geotextile and aggregate.
 - 2. Where erosion of subgrade has caused accumulation of fine materials and/or surface ponding, this material shall be removed with light equipment and the underlying soils scarified to a minimum depth of 6 inches with a York rake or equivalent and light tractor.
 - 3. Bring subgrade of bed to line, grade, and elevations indicated on plan. Fill and lightly regrade any areas damaged by erosion, ponding, or traffic compaction before the placing infiltration bed media. Infiltration bed bottom to be kept at level grade, unless otherwise noted on plans.
- C. Infiltration Bed Installation
 - 1. Upon completion of subgrade work, the Engineer shall be notified and shall inspect at his discretion before proceeding with infiltration bed installation.
 - 2. Geotextile and bed media shall be placed immediately after approval of subgrade preparation. Any accumulation of debris or sediment which has taken place after approval of subgrade shall be removed prior to installation of geotextile at no extra cost to the Owner.
 - 3. Place geotextile in accordance with manufacturer's standards and recommendations. Adjacent strips of geotextile shall overlap a minimum of sixteen inches (16"). Secure geotextile at least four feet (4') outside of bed and take steps necessary to prevent any runoff or sediment from entering the bed. This geotextile edge strip shall remain in place until all bare soils contiguous to infiltration bed have been stabilized. When the site is fully stabilized, excess geotextile along bed edges can be cut back to gravel edge.
 - 4. Where noted, install impervious liner as indicated between infiltration bed and adjacent pavement subbase.
 - 5. Install infiltration bed media to grades indicated on the drawings. Install coarse aggregate in 8 inch maximum lifts. Lightly compact each layer with equipment, keeping equipment movement over storage bed subgrades to a minimum. Install stormwater utilities as indicated in Section 02720 and as indicated on plan.
- D. Work in Related Sections
 - 1. Where applicable install planting soils and plantings as indicated on the plans and as specified in Section 02941 - Planting Soils and Section 02930 - Exterior Plants.
 - 2. Where applicable install pavement courses and porous bituminous asphalt courses as noted in Section 02725 - Porous Bituminous Asphalt Pavement.

END OF SECTION 02725