All other pipes shall be made of PVC Plastic having a cell classification of 12454 or 13364, as defined in ASTM D1784. The fittings shall be made of PVC plastic having a cell classification of 12454 or 13343.

ADD:

207-28 PERFORATED PVC PLASTIC PIPE.

207-28.1 **General.** Perforated PVC Plastic Pipe shall conform to Section 207-17, "PVC Plastic Pipe" of the Standard Specifications. The perforation shall be:

Hole Size:	3/8" min.
Center to Center Spacing:	5" max.
Row of Holes:	4 holes per each row. There shall be 2 holes on each side of the centerline of the pipe, 1 hole at 45^{o} from the centerline of pipe and 1 hole at 80^{o} from the centerline of the pipe as indicated on the drawings.

SECTION 212 - LANDSCAPE AND IRRIGATION MATERIALS

212-1.2.5 **Mulch.** ADD the following:

Mulch shall be free of sand, soil, debris and deleterious materials as certified by the supplier. Mulch shall consist of shredded hardwood which knits in a manner to minimize sloughing, floating or being kicked away. The mulch shall be stockpiled or stored for a minimum of 12 months.

212-4 BIORETENTION SOIL MEDIA (BSM).

212-4.1 **General.** Bioretention soil media shall arrive at the site fully mixed and placed in loose lifts no greater than 6 inches at a time. Soil shall be lightly tamped by hand at each lift to ensure proper compaction. All soil media should be analyzed for background levels of nutrients. The location of each type of bioretention soil media shall be as indicated on the drawings.

212-4.2 Bioretention Soil Media – Type A.

212-4.2.1 **General**. Bioretention Soil Media – Type A is mixed sand, consisting of natural or manufactured granular material, and compost. BSM consists of 70% washed sand and 30% compost on a volume basis. The BSM shall be mixed at the plant site prior to delivery.

212-4.2.2 **Sand for Bioretention Soil Media.** The sand shall comply with ASTM C33 and the gradation as shown in Table 212-4.2.2. The sand shall be thoroughly washed to remove fines, dust, and deleterious materials prior to delivery.

Table 212-4.2.2 Washed Sand (70%)

Sieve Size	Percent Passing
3/8 inch	100
No. 4	60 - 100
No.10	40 - 100
No. 40	15 - 50
No. 200	0 - 5

Coefficient of Uniformity (Cu = D60/D10) equal to or greater than 4

212-4.2.3 **Compost.** Compost shall make up no more than 30% of the bioretention soil media. Organic Matter (OM) should consist of recycled leafy greens, such as clean yard trimmings, be free of animal products, and shall comply with the following requirements:

a. Less than 1% inert material
b. OM shall be 30% to 40% by dry weight
c. pH shall be between 6.0 and 8.0
d. Maturity (seed emergence and seedling vigor): greater than 80%
e. Stability (Carbon Dioxide evolution rate): greater than 80%
f. Moisture: 30%-60% wet weight basis

Finished compost should be screened through a ½ inch mesh.

212-4.3 **Bioretention Soil Media - Type B.** consists of an increase the Organic Matter (OM) content of the stable compost to 40 to 60% dry weight.

212-4.4 **Bioretention soil media C.** BSM – Type C consists of 50 percent of the washed course sand specified in Table 212-4.2.2, 20 percent stable compost specified in section 212-4.2.2 and 30 percent Zelite as follows:

Thirty percent of the media shall consist of mineral grade and granular surface modified zeolite (SMZ).

The Contractor shall provide manufacturer data on the SMZ that demonstrates the material has been successful in removal of dissolved metals and pesticides in storm water. The SMZ shall have a grain size distribution falling between the 4 and 40 sieves and permeability greater than the sand mixture per the material requirements stated below.

212-4.5 **Samples and Submittals.** At least 30 days prior to ordering materials, the Contractor shall submit to the Engineers certificates, manufacturer's literature and certified tests for materials specified below. No materials shall be ordered until the required certificates; manufacturer's literature and test results have been reviewed and approved by the Engineer. All tests must have been performed within 120 day of delivery. Delivered materials shall closely match the approved samples. Approval shall not constitute final acceptance. The engineer reserves the right to reject, on or after delivery, any material that does not meet these specifications.

Submit soil test analysis reports for each sample of soil media from an approved soil-testing laboratory. The test results shall report the following:

1. Submit a bulk density of the sample and particle size analysis in accordance with ASTM D422.
2. Submit a chemical analysis, performed in accordance with current Association of Official Agricultural Chemists Standards, including the following:
   pH and Buffer pH.

Percent organic matter as determined by the loss of ignition of oven dried samples. Test samples shall be oven dried to a constant weight at a temperature of 230 degrees F, plus or minus 9 degrees.

Analysis for nutrient levels by parts per million including nitrogen, total phosphorus, potassium, copper, lead, and zinc. Nutrient test shall include the testing laboratory recommendations for supplemental additions to the soil as calculated by the amount of material to be added per volume of soil for the type of plants to be grown in the soil.

a. Total Phosphorus must be less than 15 ppm
b. Copper $\leq$ 750 ppm (mg/kg dry weight)
c. Lead $\leq$ 150 ppm (mg/kg dry weight)
d. Zinc $\leq$ 1400 ppm (mg/kg dry weight)

Analysis for Salinity, Chloride, Electrical Conductivity, Cation Exchange Capacity, and the Sodium Adsorption Rate:

a. Salinity must be less than 3 mho/cm
b. Chloride must be less than 150 ppm
c. ECE must be less than 4
d. CEC must be greater than 5 meq/100 grams of dry soil
   SAR must be less than 4

212-4.6 **Delivery, Storage and Handling.** Do not deliver or place soils in frozen, wet, or muddy conditions.

Protect soils and mixes from absorbing excess water and from erosion at all times. Do not store materials unprotected from large rainfall events. Do not allow excess water to enter site prior to compaction. If water is introduced into the material after grading, allow material to drain or aerate to optimum compaction moisture content.