City of Raleigh

Standard Details

Green Stormwater Infrastructure
NOTES:
1. EXPANSION JOINTS AND DUMMY JOINTS SHALL BE PER STANDARD DETAIL T-10.26.1, CURB AND GUTTER.
2. REFER TO DESIGN PLANS FOR HORIZONTAL CONTROL INFORMATION.
3. BIORETENTION SIZING IS THE RESPONSIBILITY OF THE DESIGN ENGINEER. SIZING CALCULATIONS SHALL BE SUBMITTED TO THE CITY FOR REVIEW.
4. THE INCLUSION OF AN UNDERDRAIN SYSTEM WITH IMPERMEABLE LINER (INCLUDING BOTTOM LAYER) IS DEPENDENT UPON THE RECOMMENDATION OF GEOTECHNICAL INVESTIGATION CONSISTENT WITH THE GUIDANCE PROVIDED IN THE NCDEQ STORMWATER DESIGN MANUAL AND CITY OF RALEIGH DESIGN MANUAL. IMPERMEABLE LINER SHALL BE HDPE, PVC, OR LDPE AND SHOULD BE INSTALLED SO THAT LINER EXPOSURE TO SUNLIGHT IS MINIMIZED.
5. IF REQUIRED, REFER TO DESIGN PLANS FOR UNDERDRAIN INVERT ELEVATIONS.
6. REFER TO PLANS FOR UNDERDRAIN CLEANOUT LOCATIONS AND INSTALLATION DETAILS.
7. BOTH PIPE PENETRATIONS AND ATTACHMENT OF 30 MIL IMPERMEABLE LINER TO CONCRETE CURBS (USING CONCRETE ANCHORS SPACED AT MAXIMUM 18" O.C. AND BATTEN STRIPS) SHALL BE DONE IN ACCORDANCE WITH ASTM 6497.
8. GEOTEXTILE MAY BE UTILIZED IN-LIEU OF AGGREGATE CHOKING LAYER IF APPROVED BY ENGINEER.
9. BOTTOM OF STORAGE LAYER SHALL BE SCARIFIED TO PROMOTE INFILTRATION PRIOR TO BACKFILL.
10. ALL UNDERDRAINS, IF REQUIRED, SHALL CONNECT TO STORM DRAIN OR OTHER DRAINAGE FEATURE.
11. ALL FEATURES INTEGRATED INTO BUMP-OUT BIORETENTION, INCLUDING VEGETATION, SHALL MEET SIGHT DISTANCE REQUIREMENTS PER STREET DESIGN MANUAL AND RECOMMENDED PLANT SPECIES IN THE NCDEQ STORMWATER DESIGN MANUAL.
12. MINIMUM RADIUS FOR BUMP-OUT BIORETENTION SHALL MEET ENGINEERING SPECIFICATIONS IN STREET DESIGN MANUAL DEPENDING ON ROADWAY TYPE.
13. BIORETENTION MEDIA SHALL BE PLACED IN 8" LIFTS THAT ARE WALKED ON OR WATERED TO CONSOLIDATE AND ALLOW SHAPING OF THE MEDIA'S SURFACE. THE MEDIA SHALL NOT BE MECHANICALLY COMPACTED. REFER TO NCDEQ STORMWATER DESIGN MANUAL FOR BIORETENTION SOIL MEDIA SPECIFICATIONS.
14. CONCRETE CURB EXTENSIONS ARE RECOMMENDED WHERE PARKING IS IMMEDIATELY ADJACENT AND/OR WHERE SPEED LIMITS EXCEED 35 MPH. POUR 1' WIDE CONCRETE EXTENDED CURB MONOLITHICALLY WITH THE PROPOSED CURB AND GUTTER. OTHERWISE, ANCHOR CONCRETE STRIP TO EXISTING CURB WITH OILED OR GREASED BAR (1/2"X9") AT 24" O.C. INSTALL BAR 3" INTO THE EXISTING CURB. USE CONCRETE ADHESIVE ON THE EXISTING CURB.
15. THE SEASONAL HIGH WATER TABLE SHALL BE 2 FEET BELOW THE BOTTOM OF THE DRAINAGE STONE LAYER.
16. STABILIZE CONTRIBUTING DRAINAGE AREA PRIOR TO PLACEMENT OF UNDERDRAIN AND VARIOUS FILL MATERIALS.
17. ALL MATERIALS SPECIFIED AS WASHED SHALL BE WASHED AND FREE OF FINES.
NOTES:
1. REFER TO DESIGN PLANS FOR HORIZONTAL CONTROL INFORMATION.
2. BIORETENTION SIZING IS THE RESPONSIBILITY OF THE DESIGN ENGINEER. SIZING CALCULATIONS SHALL BE SUBMITTED TO THE CITY FOR REVIEW.
3. THE INCLUSION OF AN UNDERDRAIN SYSTEM WITH IMPERMEABLE LINER (INCLUDING BOTTOM LAYER) IS DEPENDENT UPON THE RECOMMENDATION OF GEOTECHNICAL INVESTIGATION CONSISTENT WITH THE GUIDANCE PROVIDED IN THE NCDEQ STORMWATER DESIGN MANUAL AND CITY OF RALEIGH DESIGN MANUAL. IMPERMEABLE LINER SHALL BE HDPE, PVC, OR LDPE AND SHOULD BE INSTALLED SO THAT LINER EXPOSURE TO SUNLIGHT IS MINIMIZED.
4. IF REQUIRED, REFER TO DESIGN PLANS FOR UNDERDRAIN INVERT ELEVATIONS.
5. THE SEASONAL HIGH WATER TABLE SHALL BE 2 FEET BELOW THE BOTTOM OF THE DRAINAGE STONE LAYER.
6. REFER TO PLANS FOR UNDERDRAIN CLEANOUT LOCATIONS AND INSTALLATION DETAILS.
7. BOTH PIPE PENETRATIONS, AND ATTACHMENT OF 30 MIL IMPERMEABLE LINER TO CONCRETE CURBS (USING CONCRETE ANCHORS SPACED AT MAXIMUM 18" O.C. AND BATTEN STRIPS), SHALL BE DONE IN ACCORDANCE WITH ASTM 6497.
8. GEOTEXTILE MAY BE UTILIZED IN-LIEU OF AGGREGATE CHOKING LAYER IF APPROVED BY ENGINEER.
9. BOTTOM OF STORAGE LAYER SHALL BE SCRAPERED TO PROMOTE INFILTRATION PRIOR TO BACKFILL.
10. ALL UNDERDRAINS, IF REQUIRED, SHALL CONNECT TO STORM DRAIN OR OTHER DRAINAGE FEATURE.
11. ALL FEATURES, INCLUDING VEGETATION, INTEGRATED INTO MEDIAN BIORETENTION SHALL MEET SIGHT DISTANCE REQUIREMENTS PER STREET DESIGN MANUAL AND RECOMMENDED PLANT SPECIES IN THE NCDEQ STORMWATER DESIGN MANUAL.
12. BIORETENTION MEDIA SHALL BE PLACED IN 8" LIFTS THAT ARE WALKED ON OR WATERED TO CONSOLIDATE AND ALLOW SHAPING OF THE MEDIA'S SURFACE. THE MEDIA SHALL NOT BE MECHANICALLY COMPACTED. REFER TO NCDEQ STORMWATER DESIGN MANUAL FOR BIORETENTION SOIL MEDIA SPECIFICATIONS.
13. STABILIZE CONTRIBUTING DRAINAGE AREA PRIOR TO PLACEMENT OF UNDERDRAIN AND VARIOUS FILL MATERIALS.
14. ALL MATERIALS SPECIFIED AS WASHED SHALL BE WASHED AND FREE OF FINES.
NOTES:
1. REFER TO DESIGN PLANS FOR HORIZONTAL CONTROL INFORMATION.
2. BIORETENTION SIZING IS THE RESPONSIBILITY OF THE DESIGN ENGINEER. SIZING CALCULATIONS SHALL BE SUBMITTED TO THE CITY FOR REVIEW.
3. THE INCLUSION OF AN UNDERDRAIN SYSTEM IS DEPENDENT UPON THE RECOMMENDATION OF GEOTECHNICAL INVESTIGATION CONSISTENT WITH THE GUIDANCE PROVIDED IN THE NCDEQ STORMWATER DESIGN MANUAL AND CITY OF RALEIGH DESIGN MANUAL. IMPERMEABLE LINER SHALL BE HDPE, PVC, OR LDPE AND SHOULD BE INSTALLED SO THAT EXPOSURE TO SUNLIGHT IS MINIMIZED.
4. IF UNDERDRAIN IS REQUIRED, REFER TO DESIGN PLANS FOR UNDERDRAIN INVERT ELEVATIONS.
5. THE SEASONAL HIGH WATER TABLE SHALL BE 2 FEET BELOW THE BOTTOM OF THE DRAINAGE STONE LAYER.
6. REFER TO PLANS FOR UNDERDRAIN CLEANSOUT LOCATIONS AND INSTALLATION DETAILS.
7. GEOTEXTILE MAY BE UTILIZED IN-LIEU OF AGGREGATE CHOKE LAYER IF APPROVED BY ENGINEER.
8. BOTTOM OF STORAGE LAYER SHALL BE SCARIFIED TO PROMOTE INFILTRATION PRIOR TO BACKFILL.
9. ALL UNDERDRAINS, IF REQUIRED, SHALL CONNECT TO STORM DRAIN OR OTHER DRAINAGE FEATURE.
10. VEGETATION MAY BE PLACED ON SIDE SLOPES TO ANCHOR MULCH IF DESIRED.
11. ALL FEATURES, INCLUDING VEGETATION, INTEGRATED INTO MEDIAN BIORETENTION SHALL MEET SIGHT DISTANCE REQUIREMENTS PER STREET DESIGN MANUAL AND RECOMMENDED PLANT SPECIES IN THE NCDEQ STORMWATER DESIGN MANUAL.
12. BIORETENTION MEDIA SHALL BE PLACED IN 8" LIFTS THAT ARE WALKED ON OR WATERED TO CONSOLIDATE AND ALLOW SHAPING OF THE MEDIA'S SURFACE. THE MEDIA SHALL NOT BE MECHANICALLY COMPACTED. REFER TO NCDEQ STORMWATER DESIGN MANUAL FOR BIORETENTION SOIL MEDIA SPECIFICATIONS.
13. STABILIZE CONTRIBUTING DRAINAGE AREA PRIOR TO PLACEMENT OF UNDERDRAIN AND VARIOUS FILL MATERIALS.
14. ALL MATERIALS SPECIFIED AS WASHED SHALL BE WASHED AND FREE OF FINES.
NOTES:

1. ENERGY DISSIPATION PAD PROVIDED AS STABILIZED ENTRANCE TO BIORETENTION SYSTEM. ROCK SHALL BE PLACED IN IRREGULAR PATTERN USING NON-UNIFORM SIZES TO PREVENT PREFERENTIAL FLOW PATHS, INCREASE ENERGY DISSIPATION, AND TO LIMIT THE SURFACE AREA OF EXPOSED MORTAR. ALTERNATIVE PRE-TREATMENT SOLUTIONS WILL BE CONSIDERED.

2. WHERE NECESSARY, EXTEND GUTTER TO 2.5' WIDTH TO ACCOMMODATE TRASH CONTAINER PLACEMENT.

3. ROCK AND MORTAR INLET PROTECTION SHALL EXTEND ACROSS BOTTOM OF BIORETENTION TO OPPOSITE TOE OF SLOPE, OR 2' MINIMUM. FINISH GRADE OF MORTARED BOTTOM SHALL BE AT LEAST 3" BELOW ADJACENT BIORETENTION BOTTOM ELEVATION TO PROVIDE SEDIMENT STORAGE.

4. ATTACHMENT OF 30 MIL IMPERMEABLE LINER TO CONCRETE CURBS (USING CONCRETE ANCHORS SPACED AT MAXIMUM 18" O.C. AND BATTEN STRIPS) SHALL BE DONE IN ACCORDANCE WITH ASTM 6497.
NOTES:
1. CURB CUT SHALL BE 18" WIDE WITH VERTICAL SIDES.
2. GRATE FRAME SHALL BE CAST INTO TOP EDGES OF CURB CUT SO GRATE IS FLUSH WITH TOP OF CURB AND PEDESTRIAN LANDING STRIP.
3. CONCRETE CURB EXTENSIONS ARE RECOMMENDED WHERE PARKING IS IMMEDIATELY ADJACENT AND/OR WHERE SPEED LIMITS EXCEED 35 MPH. POUR 1' WIDE CONCRETE EXTENDED CURB MONOLITHICALLY WITH THE PROPOSED CURB AND GUTTER. OTHERWISE, ANCHOR CONCRETE STRIP TO EXISTING CURB WITH OILED OR GREASED BAR (1/2"X 9") AT 24"O.C. INSTALL BAR 3" INTO THE EXISTING CURB. USE CONCRETE ADHESIVE ON THE EXISTING CURB.
4. GRATE SHALL BE COMPLIANT WITH AMERICANS WITH DISABILITIES ACT (ADA) REQUIREMENTS.
5. ATTACHMENT OF 30 MIL IMPERMEABLE LINER TO CONCRETE CURBS (USING CONCRETE ANCHORS SPACED AT MAXIMUM 18" O.C. AND BATTEN STRIPS) SHALL BE DONE IN ACCORDANCE WITH ASTM 6497

PEDESTRIAN OPTION

PLAN VIEW

PEDESTRIAN LANDING STRIP

EXISTING FL ELEVATION OR ELEVATION PER PLAN

DEPRESS FL BY 2" MIN. AT INLET

STREET OR PARKING AREA

30" CURB AND GUTTER PER T-10.26.1 (SEE NOTE 2, SHEET 1)

9" DOWELS, IF COLD JOINT (SEE NOTE 3)

ENERGY DISSIPATION PAD

6" THICK, 3" TO 6" RIVER ROCK, MORTAR IN PLACE

BIORETENTION AREA

AGGREGATE BASE

COMPACTED NATIVE SOIL

30 MIL IMPERMEABLE LINER

LAYER ATTACHMENT ANCHOR

(SEE NOTE 5)

APPLY CONCRETE BONDING AGENT (QUIKRETE CONCRETE BONDING ADHESIVE OR APPROVED EQUAL) TO BACK OF CURB

6" THICK, 3" TO 6" RIVER ROCK, MORTAR IN PLACE

(SEE NOTE 1, SHEET 1)

18"X18" TRAFFIC RATED CAST IRON GRATE FLUSH W/ TOP OF CURB

CURB-CUT INLET

GSI-03.2

NOT TO SCALE

CITY OF RALEIGH

STANDARD DETAIL

REVISIONS DATE 8/2020
1. All PICP shall conform to ASTM C936 and ADA design guidelines.
2. Slope of soil subgrade shall be 0.5% or less. Maximum PICP surface slope shall be 6%.
3. The seasonal high water table shall have a minimum 2 ft separation from the bottom of the aggregate subbase.
4. In HSG B, C, or D soils, the surface of the subgrade under infiltrating PICP systems should be scarified, ripped, or trenched immediately prior to aggregate subbase placement to maintain pre-construction subgrade infiltration rate.
5. The inclusion of an underdrain system with impermeable liner (including bottom layer) is dependent upon the results of the geotechnical investigation consistent with the guidance provided in the NCDOT Stormwater Design Manual and City of Raleigh Design Manual. Impermeable liner shall be HDPE, PVC, or LDPE and should be installed so that liner exposure to sunlight is minimized.
6. Elevation gradient between the concrete gutter and adjacent PICP shall not exceed 1/4%. Otherwise, provide 1:2 bevel on edge of gutter.
7. Open void fill media around PICP shall be larger of No. 8, No. 9, or No. 89 stone, washed and free of fines, suitable for placement in joint size specified by manufacturer.
8. Both pipe penetrations and attachment of 30 mil impermeable liner to concrete curbs (using concrete anchors spaced at maximum 18" O.C. and batten strips) shall be done in accordance with ASTM 6497.
9. All aggregate sized according to ASTM C136.
10. AASHTO layer coefficients for open-graded base and subbase shall range between 0.06 and 0.10.
11. AASHTO minimum layer coefficient of 0.3 for paver and bedding layers is recommended.
12. Locate underdrain as shown on the improvement plans. Horizontal location may vary within pavement section as long as minimum offset distances and bottom slopes are maintained.
13. Depth of perforated PVC pipe may be adjusted to tie into the adjacent drainage infrastructure as needed.
14. Alternate bottom profile omitting the inset trench may be used at direction of engineer so long as 1% min slope to underdrain is retained.
15. All materials specified as washed shall be washed and free of fines.
GRASSED UTILITY STRIP

MIN 4" THICK PERMEABLE CONCRETE, PER DESIGN PLAN

VEGETATED CONVEYANCE AND BERM IF PERMEABLE SURFACE DRAINING TO SIDEWALK (SEE NOTE 7)

MIN 4" THICK AGGREGATE BASE NO. 57 WASHED STONE, THICKNESS PER DESIGN PLAN

UNCOMPACTED SOIL SUBGRADE (SEE NOTE 4 & 5)

SECTION VIEW

NOTES:
1. MATERIALS AND CONSTRUCTION OF PERMEABLE CONCRETE (PC) SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS: MIX DESIGN (ACI 522.1); FRESH UNIT WEIGHTS AND VOIDS (ASTM C1688); FIELD INFILTRATION (ASTM C1701); RAVELING POTENTIAL (ASTM C1747); HARDENED UNIT WEIGHT AND VOID CONTENT (ASTM C1754).
2. RECOMMENDED VOIDS RATIO FOR PC IS 20% (15-25% ACCEPTABLE).
3. SLOPE OF SOIL SUBGRADE SHALL BE 0.5% OR LESS. MAXIMUM PC SURFACE SLOPE SHALL BE 6%.
4. THE SEASONAL HIGH WATER TABLE SHALL BE 2 FEET BELOW THE BOTTOM OF THE AGGREGATE BASE.
5. IN HSG B, C, OR D SOILS, THE SURFACE OF THE SUBGRADE SHOULD BE SCARIFIED, RIPPED, OR TRENCHED IMMEDIATELY PRIOR TO AGGREGATE SUBBASE PLACEMENT TO MAINTAIN PRE-CONSTRUCTION SUBGRADE INFILTRATION RATE.
6. THE INCLUSION OF AN UNDERDRAIN SYSTEM WITH IMPERMEABLE LINER (INCLUDING BOTTOM LAYER) IS DEPENDENT UPON THE RESULTS OF THE GEOTECHNICAL INVESTIGATION CONSISTENT WITH THE GUIDANCE PROVIDED IN THE NCDEQ STORMWATER DESIGN MANUAL AND CITY OF RALEIGH DESIGN MANUAL.
7. IF PERMEABLE RUNOFF DRAINS TO THE PC SIDEWALK, A VEGETATED CONVEYANCE DIVERSION SHALL BE INSTALLED UPGRADE AND Sized FOR SAFE CONVEYANCE OF THE 10-YR, 24-HR STORM. CONVEYANCE DIVERSION SHALL DISCHARGE TO STORM DRAINAGE SYSTEM AND NOT ON OR ACROSS PC SIDEWALK.
8. IMPERMEABLE RUNOFF IS ALLOWED TO DRAIN TO THE PC SIDEWALK IN ACCORDANCE WITH DESIGN CRITERIA PROVIDED IN CHAPTER 18 OF THE NCDEQ STORMWATER DESIGN MANUAL.
9. ALL AGGREGATE SIZED ACCORDING TO ASTM C136.
10. IF REQUIRED BASED ON SITE CONDITIONS, INCLUDING SIGNIFICANT IMPERVIOUS RUN-ON VOLUMES, LOCATE UNDERDRAIN AS SHOWN ON THE IMPROVEMENT PLANS. HORIZONTAL LOCATION MAY VARY WITHIN PAVEMENT SECTION AS LONG AS MINIMUM OFFSET DISTANCES AND BOTTOM SLOPES ARE MAINTAINED. DEPTH OF PERFORATED PVC PIPE MAY BE ADJUSTED TO TIE INTO THE ADJACENT DRAINAGE INFRASTRUCTURE AS NEEDED.
11. ALL MATERIAL SPECIFIED AS WASHED SHALL BE WASHED AND FREE OF FINES.
NOTES:

1. SELECTION OF BUMP-OUT BIORETENTION TYPE AND LOCATION DEPENDS ON ROADWAY DESIGN CONDITIONS AND ARE ASSUMED TO BE INSTALLED IN CONJUNCTION WITH RETROFIT/STREET IMPROVEMENT PROJECTS.

2. IN ALL CASES, BUMP-OUTS MUST MAINTAIN REQUIRED GUTTER SPREAD TO SAFELY PASS OVERFLOW FROM THE 2-YR STORM (I.E., PONDED WATER LESS THAN 1/2 LANE WIDTH FROM EDGE OF CURB).

3. WHERE NECESSARY, RISER STRUCTURES SIZED FOR THE 2-YR STORM SHALL BE LOCATED WITHIN BUMP-OUT BIORETENTION. ALL BIORETENTION BUMP-OUTS SHALL BE DESIGNED TO BYPASS STORMS LARGER THAN THE 2-YR EVENT.

4. ALL BIORETENTION AND PERMEABLE PAVEMENT UNDERDRAINS, IF REQUIRED, SHALL CONNECT TO STORM DRAIN OR OTHER DRAINAGE FEATURE ACCEPTABLE TO THE CITY ENGINEER.

5. ALL FEATURES, INCLUDING VEGETATION, INTEGRATED INTO BUMP-OUT BIORETENTION SHALL MEET SIGHT DISTANCE REQUIREMENTS PER STREET DESIGN MANUAL AND RECOMMENDED PLANT SPECIES IN THE NC DEQ STORMWATER BMP MANUAL AND CITY OF RALEIGH STORMWATER DESIGN MANUAL.

6. ROADWAY FEATURES AND PAVEMENT MARKINGS ARE FOR REFERENCE ONLY. ACTUAL DIMENSIONS AND MARKINGS SHALL CONFORM TO THE CITY OF RALEIGH STREET DESIGN MANUAL.
NOTES:
1. PLACEMENT OF THE UNDERDRAIN SHALL BE IN ACCORDANCE WITH THE APPROVED IMPROVEMENT PLANS, OR AS INDICATED BY THE CITY ENGINEER. HORIZONTAL LOCATION MAY VARY AS LONG AS MINIMUM OFFSET DISTANCES AND BOTTOM SLOPES ARE MAINTAINED.
2. PERFORATED PLASTIC PIPE SHALL BE SMOOTH-WALL PVC PLASTIC PIPE HAVING A CELL CLASSIFICATION OF 12454 OR 13364, AS DEFINED IN ASTM D1784.
3. PIPE, FITTING, AND JOINT DIMENSIONS SHALL BE COMPATIBLE AND MEASURED IN ACCORDANCE WITH ASTM D 2122. FITTING AND JOINT MATERIAL SHALL BE COMPATIBLE WITH THE PIPE MATERIAL. GLUE OR PRESS FIT ALL JOINTS PER MANUFACTURER'S SPECIFICATIONS.
4. PIPE PENETRATIONS THROUGH IMPERMEABLE BARRIER SHALL BE SEALED ACCORDING TO PLANS.
5. DEPTH OF UNDERDRAIN MAY BE ADJUSTED TO TIE INTO THE ADJACENT CONNECTION POINT OF THE DOWNSTREAM DRAINAGE INFRASTRUCTURE, AS NEEDED, PER CITY ENGINEER'S APPROVAL.
6. DIMENSIONS OF PERFORATED PVC PIPE, SOLID PVC PIPE, AND ALL FITTINGS SPECIFIED IN PLANS.

MIN. 4" PIPE I.D.

MIN. 24" PIPE O.D. PER PLANS.

MIN. 9" CONNECTION MAY BE THREADED.

UPTURNED UNDERDRAIN FOR INTERNAL WATER STORAGE.

BIORETENTION SYSTEM MEDIA PER PLANS.

PERFORATED PVC

UNDERDRAIN UPTURNED ELBOW

RECOMMENDED METHOD OF CUTTING HOLE IS DIAMOND BIT FOR CONCRETE.

NON-VERTICAL LINER ATTACHMENT (ALL SIDES)

(4) PERFORATED HOLES, \( \frac{3}{8} \)" MAX. @ 6" SPACING ALONG PIPE W/ STAGGERED HORIZ. ROWS

PERFORATED HOLE PLACEMENT

OUTLET STRUCTURE WALL

UPTURNED UNDERDRAIN FOR INTERNAL WATER STORAGE

SOLID PVC

MIN. 18" MIN. 12"

CONNECTION MAY BE THREADED

SOLID PVC TEE FITTING

CAPPED END WITH THREADED CLEAN OUT Plug FOR MAINTENANCE

SOLID PVC, MORTAR IN PLACE

BELL

PIPE O.D. PER PLANS, MIN. 4"

PIPE I.D.

RECOMMENDED METHOD OF CUTTING HOLE IS DIAMOND BIT FOR CONCRETE.
EXISTING INFRASTRUCTURE UNDERDRAIN CONNECTION TO GSI-07.2

EXISTING GRADE

SOLID PVC PIPE, SIZE ACCORDING TO PLANS, MIN. 4", MIN. 0.5% SLOPE

MORTAR IN PLACE

EXISTING DRAINAGE STRUCTURE

FLOW

MIN. 12"

RECOMMENDED METHOD OF CUTTING HOLE IS DIAMOND BIT FOR CONCRETE

EXISTING DRAINAGE PIPE

MIN. 45° BEND

MIN. 12"

EXISTING GRADE

SOLID PVC PIPE, SIZE ACCORDING TO PLANS, MIN. 4", MIN. 0.5% SLOPE

INSERTA TEE OR EQUIVALENT, SEE NOTE 1

RECOMMENDED METHOD OF CUTTING HOLE IS WITH HOLE SAW FOR PVC AND OTHER PLASTICS, AND DIAMOND BIT FOR CONCRETE

EXISTING DRAINAGE PIPE

NOTES

1. INSTALL INSERTA TEE PER MANUFACTURER’S SPECIFICATIONS.
1. The surface of the existing/proposed sidewalk or extended curb to which the geomembrane liner is to be attached should be constructed or formed to limit damage to the geomembrane by removing irregularities on the concrete surface to prevent stress points in the geomembrane.

2. If irregularities (i.e., sharp protrusions exceeding 1/2 inch from surface face) can not be removed from an existing saw-cut or formed structure, a protective geotextile layer should be placed between the surface and the geomembrane.

3. Ensure batten anchors are max distance of 6" from batten butt joints.

4. Where site conditions prohibit temporary soil saturation within the anchor trench, the liner shall be punctured along the bottom of the trench by drilling/punching 1 inch diameter seepage holes at 2 foot spacing.
ADDITIONAL PVC LINER MATERIAL. WRAP AROUND PIPE. OVERLAP MATERIAL BY HALF THE DIAMETER OF PENETRATING PIPE.

PLASTIC HOSE CLAMPS. SIZE PER SLEEVE PIPE. 2 TOTAL.

PROVIDE MANUFACTURER RECOMMENDED ADHESIVE TO JOIN LINER TO PIPE ALONG CIRCUMFERENCE OF PIPE (TYP.)

FIELD-WELD PER LINER MANUFACTURER’S RECOMMENDATIONS ALONG ENTIRE PERIMETER AS WELL AS WHERE THE ADDITIONAL LINER IS WRAPPED AROUND PENETRATING PIPE

NOTE:
1. CONTACT UTILITY OWNER FOR SLEEVE, COVERAGE, AND OTHER CROSSING REQUIREMENTS.
2. INCLUDE SLEEVE WITHIN PERVEROUS PAVEMENT SIMILAR TO THIS DETAIL.
3. CROSSING MAY PASS THROUGH SOIL MEDIA FILTER COURSE OR UNDERDRAIN GRAVEL LAYERS AND ARE NOT RESTRICTED TO THE SOIL AS SHOWN HEREIN.
NOTES

1. GRADED AGGREGATE FOR CHOKER LAYER SHALL BE WASHED AND CONFORM TO ASTM D-448.
2. SAND FOR THE CHOKER LAYER SHALL BE WASHED AND CONFORM TO ASTM C-33 CONCRETE SAND.
3. ALL MATERIALS SPECIFIED AS WASHED SHALL BE WASHED AND FREE OF FINES.
4. SAND AND NO. 8 STONE LAYERS SHALL BE SPREAD USING HAND TOOLS TO ENSURE A CONSISTENT THICKNESS AND PREVENT Voids.
5. AGGREGATE MATERIAL SHALL BE NO. 8 STONE OR 78M (NCDOT SPECIFICATIONS).
NOTES

1. MAXIMUM GRATE OPENING SHALL BE 4 INCHES. SIZE OF ATRIUM GRATE SHALL MATCH SIZE OF RISER SPECIFIED IN PLANS, SHALL BE REMOVABLE TO PROVIDE MAINTENANCE ACCESS, AND SHALL BE BOLTED IN PLACE OR OUTFITTED WITH APPROVED TAMPER-RESISTANT LOCKING MECHANISM.
2. MINIMUM STREAMBED COBBLE DIAMETER SHALL BE LARGER THAN MAXIMUM GRATE OPENING.
3. OVERFLOW UNDERDRAIN PIPES MUST BE EQUIPPED WITH CLEANOUTS PER GSI 7.1.
4. OVERFLOW RISER TO BE INSTALLED AS REQUIRED BY HYDRAULIC ANALYSIS.
1. REFER TO PLANS FOR HORIZONTAL AND VERTICAL CONTROL INFORMATION.
NOTES
1. CHECK DAMS TO BE USED UNDER PERMEABLE INTERLOCKING CONCRETE PAVERS WHERE INFILTRATION IS ALLOWED. IF THE SYSTEM IS FULLY LINED WITH NO INFILTRATION, CHECK DAMS ARE NOT NEEDED.
2. CONCRETE CHECK DAM EMBEDMENT PER GEOTECHNICAL ENGINEER’S RECOMMENDATIONS.
3. IF INCIDENTAL INFILTRATION IS ALLOWED ON POOR SOILS, OPTIONALLY INSTALL PERFORATED UNDERDRAIN PER GSI-07.1 AT ENGINEER’S DISCRETION.
4. CONCRETE SHALL BE 650-C-3250.

TYPICAL ELEVATION

SECTION A-A

EXISTING OR PROPOSED CURB PER PLANS

PROVIDE WATER TIGHT SEAL между CONCRETE AND IMPERMEABLE LINER

DEPTH PER PLANS

8" MINIMUM WIDTH

DEPTH, 6" MIN.

WATER STORAGE

6% MAX

SLOPE

PERMEABLE INTERLOCKING CONCRETE PAVERS (PER GSI-04)

DEPTH, 6" MIN.

PERMEABLE INTERLOCKING CONCRETE PAVERS (PER GSI-04)

WIDTH PER PLANS

DEPTH, 6" MIN.

PERMEABLE INTERLOCKING CONCRETE PAVERS (PER GSI-04)

DEPTH, 6" MIN.

PERMEABLE INTERLOCKING CONCRETE PAVERS (PER GSI-04)

DEPTH, 6" MIN.

PERMEABLE INTERLOCKING CONCRETE PAVERS (PER GSI-04)
NOTES:
1. ENERGY DISSIPATION PAD PROVIDED AS STABILIZED ENTRANCE TO BIORETENTION SYSTEM. ROCK SHALL BE PLACED IN IRREGULAR PATTERN USING NON-UNIFORM SIZES TO PREVENT PREFERENTIAL FLOW PATHS, INCREASE ENERGY DISSIPATION, AND TO LIMIT THE SURFACE AREA OF EXPOSED MORTAR. ALTERNATIVE PRE-TREATMENT SOLUTIONS WILL BE CONSIDERED.
2. ROCK AND MORTAR INLET PROTECTION SHALL EXTEND ACROSS BOTTOM OF BIORETENTION TO OPPOSITE TOE OF SLOPE, OR 2' MINIMUM. FINISH GRADE OF MORTARED BOTTOM SHALL BE AT LEAST 3" BELOW ADJACENT BIORETENTION BOTTOM ELEVATION TO PROVIDE SEDIMENT STORAGE.