City of Raleigh
Standard Details

Green Stormwater Infrastructure
TYPICAL BUMP-OUT BIORETENTION SECTION

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 CHOKE 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 WATERS 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 MONOLYTHICALLY 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 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.
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. GEOGRASS 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, INCLUDING VEGETATION, INTEGRATED INTO MEDIATE BIORETENTION SHALL MEET SIGHT DISTANCE REQUIREMENTS PER STREET DESIGN MANUAL AND RECOMMENDED PLANT SPECIES IN THE NCDOT 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.

CITY OF RALEIGH
STANDARD DETAIL

TYPICAL MEDIAN BIORETENTION SECTION
POSTED SPEED LIMIT OF 30 MPH AND LOWER

NOT TO SCALE

PROPOSED 30" CONCRETE CURB AND GUTTER PER CITY OF RALEIGH DETAIL T-10.26.1, MODIFIED AS SHOWN

#4 L-BAR @ 18" O.C. CENTERED IN GUTTER AND KEY, 2" CLR FROM ENDS

FINISH GRADE SIDES AND BOTTOM AS SHOWN ON PLAN. CUT SLOPE 1:1 OR STEEPER BASED ON GEOTECHNICAL ANALYSIS.

CHOKING LAYER
2" WASHED ASTM C-33 CONCRETE SAND OVER 2" WASHED NO. 8 STONE

30 MIL IMPERMEABLE LINER TO MINIMUM 3' DEPTH

AGGREGATE STORAGE LAYER, WASHED NO. 57 DRAINAGE STONE

BIORETENTION SOIL MEDIA (90% REL. COMPACATION) PER SPECIFICATIONS (SEE NOTE 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.

FINISHED GRADE SIDES AND BOTTOM AS SHOWN ON PLAN. CUT SLOPE 1:1 OR STEEPER BASED ON GEOTECHNICAL ANALYSIS.

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 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.
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. GEOGRASS 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, INCLUDING VEGETATION, INTEGRATED INTO MEDIATE BIORETENTION SHALL MEET SIGHT DISTANCE REQUIREMENTS PER STREET DESIGN MANUAL AND RECOMMENDED PLANT SPECIES IN THE NCDOT 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.

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS DATE 8/2020

MEDIAN BIORETENTION
(FOR 30 MPH AND BELOW)

GSI-02.1
TYPICAL MEDIAN BIORETENTION SECTION

POSTED SPEED LIMIT HIGHER THAN 30 MPH

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 CHOKING 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.
4. 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.
5. INSTALL BAR 3" INTO THE EXISTING CURB. USE CONCRETE ADHESIVE ON THE EXISTING CURB.
6. GRATE SHALL BE COMPLIANT WITH AMERICANS WITH DISABILITIES ACT (ADA) REQUIREMENTS.
7. 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. 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 NCDENR STORMWATER DESIGN MANUAL AND CITY OF RALEIGH DESIGN MANUAL.
6. ELEVATION GRADIENT BETWEEN THE CONCRETE GUTTER AND ADJACENT PICP SHALL NOT EXCEED 1:10, 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 INJOINT SIZE SPECIFIED BY MANUFACTURER.
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 PAVEMENT LAYERS 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 INSERT 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.

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS DATE: 8/2020 NOT TO SCALE

PERMEABLE CONCRETE SIDEWALK

GSI-05
CITY OF RALEIGH
STANDARD DETAIL

NOT TO SCALE

EXAMPLE CONFIGURATION
GREEN INFRASTRUCTURE

CORNER BUMP-OUT BIoretention
PERMEABLE PAVER PARKING LANE
MIN 8 FT

PARKING LANE
MIN 8 FT

CURB EXTENSIONS BUMP-OUT
CURB RAMPS, TYPE N-1

DRIVEWAY ACCESS AND OPTION

CITY OF RALEIGH
DRENES AL NO TIRE BASURA!
DRAINS TO NEUSE RIVER
NO DUMPING!

RIO NEUSE
DRAINS TO
NO DUMPING!

CURB-SIDE BIoreTENTION

MEDIAN BIORETENTION W/ SHARED INLET PROTECTION

BIORETENTION BUMP-OUT

BUS STOP

PLAN VIEW

GSI-06.1
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 RAILEIGH STORMWATER DESIGN MANUAL.

6. ROADWAY FEATURES AND PAVEMENT MARKINGS ARE FOR REFERENCE ONLY. ACTUAL DIMENSIONS AND MARKINGS SHALL CONFORM TO THE CITY OF RAILEIGH STREET DESIGN MANUAL.