The standard detail drawings contained in this manual will apply to all new infrastructure construction plans submitted on or after August 1, 2018. They are intended to be used as a guide in the preparation and submittal of plans for private development and city contract projects within the City of Raleigh and the city’s extra-territorial jurisdiction.

The City of Raleigh will use these standards and specifications as well as sound engineering principles to review detailed engineering drawings submitted for the above type of projects. All engineers are encouraged to take these specifications into consideration in the preliminary layout of the project so changes can be held to a minimum when construction drawings are reviewed.

If a required detail is not included in this document, the NCDOT Roadway Standard Drawings shall apply. All construction shall conform to either City of Raleigh specifications or to the latest edition of the NCDOT Standard Specifications for Roads and Structures. If there are questions or conflicts between two drawings or specifications, the coordinating representative listed below shall be notified for resolution.

The Standard Details within this manual may be downloaded from the City’s website at www.raleighnc.gov.

If there are questions regarding details, you may contact the individual division coordinators listed below.

Bicycle Facilities: Transportation Planning Manager 919-996-2161
GSI: Assistant Director of Engineering Services 919-996-3940
Stormwater: Assistant Director of Engineering Services 919-996-3940
Transit: Assistant Director of Transportation - Transit 919-996-3030
Transportation: Assistant Director of Transportation 919-996-6446
Tree Protection and Planting: Capital Projects Superintendent 919-996-4115
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**PLACEMENT & SPACING**

Place bike lane markings at the beginning of each bike lane segment - i.e. after every intersection and major driveway and where bike lanes end.

Consider additional bike lane markings as needed to clearly delineate the bike lane on a case-by-case basis. Desired spacing is 250' in downtown Raleigh and 500' elsewhere.

**BIKE LANE WIDTH, W₁**

Where adjacent to the edge of pavement, the bike lane width (excluding the gutter pan) should be: 5' desired 4' minimum

**BIKE LANE SIGN**

Where the bike lane ends at mid-block locations, place "BIKE LANE ENDS" signage at the beginning of the bike lane mini-skips.

**BIKE LANE MINI-SKIPS**

Use 2' dashed with 6' gaps to end bike lanes and indicate conflict zones, e.g. at bus stops.

**MEDIAN TRANSITIONS**

End bike lane and place shared lane markings in the center of the travel lane through a median area.

**PARKING LANE WIDTH, W₃**

The parking lane width (including the gutter pan) should be: 8' desired 7.5' minimum

**BIKE LANE WIDTH, W₂**

Where adjacent to a parking lane, the bike lane width should be: 5' minimum, 6' desired 2' striped buffer desired

**CITY OF RALEIGH**

**STANDARD DETAIL**

**REVISIONS**

**DATE 8/1/18**

**NOT TO SCALE**

**BIKE LANE SIGNS AND MARKINGS**

**B-10.01**
BUFFER TRANSITION
TAPER THE START OF A BIKE LANE BUFFER BY NARROWING THE TRAVEL LANE.
A TAPER IS NOT REQUIRED AT THE END OF A BIKE LANE BUFFER UNLESS THE END OCCURS ON A HORIZONTAL CURVE.
TAPERS ARE NOT REQUIRED WHEN TRANSITION TO MINI-SKIPS AT CONFLICT ZONES I.E. BUS STOPs AND MAJOR DRIVEWAYS.

BUFFER WIDTH
WHERE PAVEMENT WIDTH ALLOWS FOR A BUFFER, THE BUFFER WIDTH SHOULD BE: 3' DESIRED 2' MINIMUM
USE DIAGONAL CROSS-HATCHING IN BUFFERS.

BIKE LANE MINI-SKIPS
USE 2' DASHED WITH 6' GAPS TO END BIKE LANES AND INDICATE CONFLICT ZONES, E.G. AT BUS STOPS.

PLACEMENT OF BUFFER FOR BIKE LANES ADJACENT TO PARKING LANES
WHERE THE BIKE LANE IS ADJACENT TO A PARKING LANE WITH LOW TURN OVER, PLACE THE BUFFER BETWEEN THE BIKE LANE AND THE TRAVEL LANE.
WHERE THE BIKE LANE IS ADJACENT TO A PARKING LANE WITH HIGH TURN OVER, PLACE THE BUFFER BETWEEN THE BIKE LANE AND THE PARKING LANE.
COMBINED LANE
WHERE PAVEMENT WIDTH DOES
NOT ALLOW FOR BOTH A DEDICATED
BIKE LANE AND DEDICATED RIGHT
TURN LANE APPROACHING THE STOP
BAR, USE OF A COMBINED BIKE
LANE/RIGHT-TURN LANE IS PERMITTED.

PLACE SHARED LANE MARKINGS AT
THE BEGINNING AND END ON THE
LEFT SIDE OF THE COMBINED LANE.

COMBINED BIKE LANE/RIGHT-
TURN LANE WIDTH, W₂
THE WIDTH OF THE COMBINED BIKE
LANE/RIGHT-TURN LANE SHOULD BE:
9' MINIMUM
13' MAXIMUM

PLACE "EXCEPT BIKES" SUPPLEMENTAL
PLACARD TO ANY* RIGHT TURN ONLY* 
SIGNAGE.

ADJACENT TO RIGHT-TURN LANE
USE BIKE LANE MINI-SKIPS
THROUGH THE RIGHT-TURN LANE
TAPER. THE BIKE LANE SHOULD
CONTINUE TO THE LEFT OF THE RIGHT
TURN LANE APPROACHING THE
INTERSECTION.

PLACE "BEGIN RIGHT TURN YIELD
TO BIKES" SIGNAGE AT BEGINNING
OF RIGHT-TURN TAPER.

BIKE LANE WIDTH, W₁
WHERE ADJACENT TO A RIGHT TURN
LANE, THE BIKE LANE WIDTH
SHOULD BE: 6' DESIRED
4' MINIMUM

REFER TO NCDOT STANDARDS 1205.06,
SHEET 1of 5, FOR FOR TURN ARROW
AND TEXT SPACING

THRU LANE TRANSITION TO
RIGHT-TURN LANE
USE MINI-SKIPS TO END THE BIKE
LANE AT THE RIGHT-TURN LANE
TRANSITION AND THEN CONTINUE
BIKE LANE TO THE LEFT OF THE
RIGHT-TURN LANE APPROACHING
THE INTERSECTION.

BIKE LANE MINI-SKIPS
USE 2' DASHED WITH 6' GAPS TO
END BIKE LAKES AND INDICATE
CONFLICT ZONES.
INTERSECTIONS
DISCONTINUE BIKE LANE MARKINGS THROUGH SIGNALIZED AND UNSIGNALIZED INTERSECTIONS.

WHERE CONDITIONS WARRANT (LONG CROSSING DISTANCES, TRAVEL LANE OFFSETS, HIGH RIGHT-TURN VOLUMES, ETC.), MINI-SKIPS AND BIKE LANE MARKINGS MAY BE USED THROUGH THE INTERSECTION.

AT T-INTERSECTIONS, A BIKE LANE AT THE "TOP" OF THE "T" SHOULD BE STRIPED SOLID THROUGH THE INTERSECTION.

MAJOR DRIVEWAYS
USE BIKE LANE MINI-SKIPS AT HIGH-VOLUME DRIVEWAYS, E.G. RETAIL CENTERS, APARTMENTS, ETC.

MINOR DRIVEWAYS
USE SOLID BIKE LANE STRIPING AT LOW-VOLUME DRIVEWAYS, E.G. SINGLE-FAMILY HOMES, FARMS, ETC.
**PLACEMENT AND SPACING**

PLACE SHARED LANE MARKINGS AFTER EVERY INTERSECTION AND MAJOR HIGHWAYS.

ADDITIONALLY, PLACE SHARED LANE MARKINGS EVERY 150’ IN DOWNTOWN RALEIGH AND 250’ ELSEWHERE.

**WIDE LANES**

WHERE THE TRAVEL LANE WIDTH IS 13’, PLACE SHARED LANE MARKINGS 4’ FROM THE EDGE OF PAVEMENT (MEASURED FROM THE APEX OF THE CHEVRON), EXCLUDING THE GUTTER PAN.

WHERE THE TRAVEL LANE WIDTH IS 14’ OR WIDER, INSTALL BIKE LANE MARKINGS.

**NARROW LANES OR ADJACENT TO PARKING LANES**

WHERE THE TRAVEL LANE WIDTH IS LESS THAN 13’ OR WHERE ADJACENT TO PARKING LANES, PLACE SHARED LANE MARKINGS IN THE CENTER OF THE TRAVEL LANE.

**STREET CRITERIA**

SHARED LANE MARKINGS DO NOT ESTABLISH A BICYCLE FACILITY AND SHOULD ONLY BE USED WHEN ONE OR MORE OF THE CONDITIONS APPLY:

- THE POSTED SPEED LIMIT OR PREVAILING SPEED IS 25 MPH OR LESS.
- THE AVERAGE DAILY TRAFFIC VOLUME IS 4,000 VEHICLES OR LESS.
- PLACEMENT THROUGH MEDIAN AREAS OR COMBINED BIKE LANE/RIGHT-TURN LANE.
- INSTALLATION PAIRED WITH TRAFFIC CALMING MEASURES, WAYFINDING SIGNAGE, AND INTERSECTION TREATMENTS TO ESTABLISH A NEIGHBORHOOD BIKEWAY.
BIKE RACK TO BE CENTERED WITH EXISTING INFRASTRUCTURE BUT NO LESS THAN 24" FROM BACK OF CURB

PEDESTRIAN CLEARANCE
min 72"

48" min

96" min

min 36"

min 24"

48" min

min 48"

TREE GRATE

BIKE RACK

STREET

CURB

CITY OF RALEIGH
STANDARD DETAIL

BIKE RACK PLACEMENT

B-20.01
1. Wheel stops to be equipped with retroreflective markings.
2. Angled racks may also be used.
BIKE RACK INSTALLATION:

SURFACE MOUNT - WHEN INSTALLED ON CONCRETE SURFACE, USE 3/8" ANCHORS TO PLATE MOUNT. SHIM AS NECESSARY TO ENSURE VERTICAL PLACEMENT.

IN-GROUND MOUNT - WHEN INSTALLED ON PAVERS OR OTHER NON-STABLE SURFACES, EMBED INTO BASE. CORE HOLES NO LESS THAN 3" IN DIAMETER AND 10" DEEP.
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.
5. IF REQUIRED, REFER TO DESIGN PLANS FOR UNDERDRAIN ELEVATIONS.
6. REFER TO PLANS FOR UNDERDRAIN CLEANOUT LOCATIONS AND INSTALLATION DETAILS.
7. BOTH PIPE PENETRATIONS AND ATTACHMENT OF 30 MIL HDPE 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. FOR BIORETENTION SYSTEMS THAT DO NOT REQUIRE AN IMPERMEABLE LINER, A MAXIMUM OFFSET OF 6 INCHES IS REQUIRED BETWEEN THE INVERT OF THE UNDERDRAIN AND BOTTOM OF DRAINAGE LAYER.
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 DEPENDING ON ROADWAY TYPE.
12. MINIMUM RADII FOR BUMP-OUT BIORETENTION SHALL MEET ENGINEERING SPECIFICATIONS IN STREET DESIGN MANUAL DEPENDING ON ROADWAY TYPE.
13. BIORETENTION MEDIA SHALL BE PLACED IN 6" 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.

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS
DATE 8/1/18
NOT TO SCALE

CURB-SIDE AND BUMP-OUT BIORETENTION
GSI-01
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.
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 AGGREGATE STORAGE LAYER.
6. REFER TO PLANS FOR UNDERDRAIN CLEANOUT LOCATIONS AND INSTALLATION DETAILS.
7. BOTH PIPE PENETRATIONS, AND ATTACHMENT OF 30 MIL HDPE 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. FOR BIORETENTION SYSTEMS THAT DO NOT REQUIRE AN IMPERMEABLE LINER, A MAXIMUM OFFSET OF 6 INCHES IS REQUIRED BETWEEN THE INVERT OF THE UNDERDRAIN AND BOTTOM OF STORAGE LAYER. 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 BUMP-OUT 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.

CITY OF RALEIGH
STANDARD DETAIL

MEDIAN BIORENTENTION
(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.
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 AGGREGATE STORAGE LAYER.
6. REFER TO PLANS FOR UNDERDRAIN CLEANOUT LOCATIONS AND INSTALLATION DETAILS.
7. GEOTEXILE MAY BE UTILIZED IN-LIEU OF AGGREGATE CHOKING LAYER IF APPROVED BY ENGINEER.
8. A MAXIMUM OFFSET OF 6 INCHES IS REQUIRED BETWEEN THE INVERT OF THE UNDERDRAIN AND BOTTOM OF STORAGE LAYER.
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. VEGETATION MAY BE PLACED ON SIDE SLOPES TO ANCHOR MULCH IF DESIRED.
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.
NOTES:
1. ENERGY DISSIPATION PAD PROVIDED AS STABILIZED ENTRANCE TO BIOTRETENTION 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 PRE-TREATMENT SOLUTIONS WILL BE CONSIDERED.
3. ROCK AND MORTAR INLET PROTECTION SHALL EXTEND ACROSS BOTTOM OF BIOTRETENTION TO OPPOSITE TOE OF SLOPE, OR 2' MINIMUM. FINISH GRADE OF MORTARED BOTTOM SHALL BE AT LEAST 3' BELOW ADJACENT BIOTRETENTION BOTTOM ELEVATION TO PROVIDE SEDIMENT STORAGE.

CITY OF RALEIGH
STANDARD DETAIL
REVISIONS
DATE: 8/1/18
NOT TO SCALE
CURB-CUT INLET
(TAPERED STREET RELIEF)
GSI-03.1
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.
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 SUBBASE AGGREGATE STORAGE LAYER.
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 GEO TECHNICAL INVESTIGATION.
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 NO. 8, NO. 9, OR NO. 89 WASHED DRAINAGE STONE DEPENDING ON JOINT SIZE.
8. BOTH PIPE PENETRATIONS AND ATTACHMENT OF 30 MIL HDPE 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 MINIMUM LAYER COEFFICIENT OF 0.3 FOR PAVER AND BEDDING LAYERS IS RECOMMENDED.
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.
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 SUBBASE AGGREGATE STORAGE LAYER.
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.
7. IF PERMEABLE RUNOFF DRAINS TO THE PC SIDEWALK, A VEGETATED CONVEYANCE DIVERSION SHALL BE INSTALLED UPGRADIENT AND SIZED FOR SAFE CONVEYANCE OF THE 10-YR, 24-HR STORM.
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, AASHTO LAYER COEFFICIENTS FOR OPEN-GRADED BASE AND SUBBASE SHALL RANGE BETWEEN 0.06 AND 0.10.
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.
NOTES:

1. SELECTION OF BUMP-OUT BIORETFENTION TYPE AND LOCATION DEPENDS ON EXISTING 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 BIORETFENTION. ALL BIORETFENTION BUMP-OUTS SHALL BE DESIGNED TO BYPASS STORMS LARGER THAN THE 2-YR EVENT.

4. ALL BIORETFENTION AND PERMEABLE PAVEMENT UNDERDRAINS, IF REQUIRED, SHALL CONNECT TO STORM DRAIN OR OTHER DRAINAGE FEATURE.

5. ALL FEATURES, INCLUDING VEGETATION, INTEGRATED INTO BUMP-OUT BIORETFENTION SHALL MEET SIGHT DISTANCE REQUIREMENTS PER STREET DESIGN MANUAL AND RECOMMENDED PLANT SPECIES IN THE NC DEQ STORMWATER BMP 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.
City of Raleigh
Standard Details

Stormwater
NOTES:
1. THE SLOPE OF THE GUTTER TO THE CATCH BASIN ON THE UPHILL SIDE SHALL BEGIN 10' FROM THE CATCH BASIN. THE SLOPE OF THE GUTTER TO THE CATCH BASIN ON THE DOWNHILL SIDE, SHALL BEGIN 10' FROM THE CATCH BASIN.
2. STEPS SHALL BE INSTALLED IN ALL CATCH BASINS OVER 3' IN DEPTH. DEPTH SHALL BE MEASURED FROM THE TOP OF CURB TO THE INVERT OF THE CATCH BASIN.
3. SOLID CONCRETE BRICKS MAY BE USED IN 4X4X8 OR 4X8X16 SIZES.
4. NCDOT APPROVED PRECAST CONCRETE BOXES ACCEPTABLE USING STANDARD 5' CASTINGS.
5. DOMESTIC CASTING REQUIRED WITHIN STREET RIGHT OF WAY.
6. 1" MAXIMUM EXTENSION OF PIPE INTO THE STORM BOX.
NOTES:
1. THE SLOPE OF THE GUTTER TO THE CATCH BASIN ON THE UPHILL SIDE SHALL BEGIN 10' FROM THE CATCH BASIN. THE SLOPE OF THE GUTTER TO THE CATCH BASIN ON THE DOWNHILL SIDE, SHALL BEGIN 10' FROM THE CATCH BASIN.

2. STEPS SHALL BE INSTALLED IN ALL CATCH BASINS OVER 3' IN DEPTH. DEPTH SHALL BE MEASURED FROM THE TOP OF CURB TO THE INVERT OF THE CATCH BASIN.

3. SOLID CONCRETE BRICKS MAY BE USED IN 4" X 4" X 16" OR 4" X 8" X 16" SIZES.

4. NCDOT APPROVED PRECAST CONCRETE BOXES ACCEPTABLE, USING STANDARD 5' CASTINGS.

5. DOMESTIC CASTING REQUIRED WITHIN STREET RIGHT OF WAY.

CITY OF RALEIGH
STANDARD DETAIL

SW-10.02
1. FOR 24" RCP & LARGER USE PIPE DIAMETER PLUS 12" FOR MINIMUM INSIDE DIMENSION.

2. 24" X 24" CASTING WITH 12", 15" & 18" PIPE, 24" X 36" CASTING USED WITH 24" PIPE OR LARGER. IF PLACED WITHIN PUBLIC R/W CASTING MUST BE TRAFFIC BEARING TYPE PER NCDOT STANDARDS.

3. USE 4" X 4" X 8" OR 4" X 8" X 16" SOLID CONCRETE BLOCK. CAST IN PLACE OR PRECAST CONCRETE TO MEET N.C.D.O.T. STANDARDS ACCEPTABLE.

4. STEPS SHALL BE INSTALLED IN ALL DROP INLETS OVER 3' IN DEPTH. DEPTH SHALL BE MEASURED FROM THE TOP OF GRATE TO THE INVERT OF THE DROP INLET.
NOTES:
1. FOR 24" PIPE & LARGER USE PIPE DIAMETER PLUS 12" FOR MINIMUM INSIDE DIMENSION.
2. USE 4" X 4" X 8" OR 4" X 8" X 16" SOLID CONCRETE BLOCK. CAST IN PLACE OR PRECAST CONCRETE TO MEET NCDOT STANDARDS ACCEPTABLE.
3. FOR STEP REQUIREMENTS, SEE NOTE 4 ON STANDARD DETAIL SW-10.03.
TYPICAL MH FOR STORM SEWER

<table>
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<tr>
<th>PIPE SIZE</th>
<th>MH DIAMETER</th>
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<tbody>
<tr>
<td>12-24”</td>
<td>4'-0&quot;</td>
</tr>
<tr>
<td>30-42&quot;</td>
<td>5'-0&quot;</td>
</tr>
<tr>
<td>48&quot;</td>
<td>6'-0&quot;</td>
</tr>
<tr>
<td>54&quot;</td>
<td>8'-0&quot;</td>
</tr>
</tbody>
</table>

NOTES:
1. DEPTH MEASURED FROM TOP OF CASTING TO INVERT OF MANHOLE.
2. PRECAST MANHOLE COMPONENTS SHALL MEET ASTM-C-478 REQUIREMENTS.
3. SEE STANDARD, SW-10.10 FOR MANHOLE COVER DETAIL.
4. DOMESTIC CASTINGS REQUIRED WITHIN STREET RIGHT-OF-WAY.
SIDE ELEVATION

SECTION A-A

SECTION B-B

TOP VIEW

DETAIL OF HANDLE

END ELEVATION

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS
DATE 8/1/18
NOT TO SCALE

CATCH BASIN
CASTINGS

SW-10.06.1

SHEET 1 OF 2
NO DUMPING! NO TIRE BASURA!

CITY OF RALEIGH

DRAINS TO
NEUSE RIVER

CITY OF RALEIGH

DRENES AL RIO NEUSE

NOT TO SCALE

CITY OF RALEIGH

NO DUMPING!

DRAINS TO
NEUSE RIVER

CITY OF RALEIGH

NO TIRE BASURA!

DRENES AL RIO NEUSE

USE EAST JORDAN IRON WORKS, INC. V-4095-2 OR APPROVED EQUAL

NOTE:
USE GRADE 8 BOLTS ONLY FOR BOLTING TOGETHER

BACK SIDE OF ASSEMBLY

(3) 7/8"-14 3/4" LG HEX HD BOLTS, NUTS (GRADE 8) WITH LOCK WASHERS
1/2" Ø STAINLESS STEEL DROP HANDLES

NOTES:
PAINT WITH RUST INHIBITING BLACK PAINT.

DETAIL OF pb1 PLATES

<table>
<thead>
<tr>
<th>BILL OF MATERIAL</th>
<th>MATERIAL LIST FOR ONE UNIT - MAKE ( ) UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C15 X 33.9# CHANNEL 62 1/2&quot;</td>
</tr>
<tr>
<td>4</td>
<td>1/8&quot; X 1&quot; H.R. FLAT BAR 3&quot;</td>
</tr>
<tr>
<td>2</td>
<td>3/8&quot; X 3&quot; H.R. FLAT BAR 10&quot;</td>
</tr>
<tr>
<td>2</td>
<td>1/2&quot; STAINLESS STEEL ROUND ROD 18&quot;</td>
</tr>
<tr>
<td>8</td>
<td>1/2&quot; STAINLESS STEEL HEX NUTS</td>
</tr>
<tr>
<td>4</td>
<td>1/2&quot; STAINLESS STEEL FLAT WASHERS</td>
</tr>
</tbody>
</table>

CITY OF RALEIGH
STANDARD DETAIL

DATE: 8/1/18
REVISIONS
NOT TO SCALE

SW-10.07

CATCH BASIN
STEEL TOP
SECTION B-B

SECTION A-A

STANDARD 24" X 24" DROP INLET CASTING

CITY OF RALEIGH
STANDARD DETAIL

DATE: 8/1/18

NOT TO SCALE

REVISIONS

DROP INLET
CASTING

SW-10.08
STANDARD 24" X 36"
DROP INLET CASTING
NOTES:
1. ALL MANHOLE FRAMES SHALL BE DOMESTICALLY CAST.
2. FRAME SHALL BE A MINIMUM WEIGHT OF 182 LBS. WITHIN PUBLIC ROW AND 160 LBS. WITHIN EASEMENTS.
3. COVER SHALL WEIGH A MINIMUM OF 120 LBS.
4. ALL MANHOLE FRAMES OUTSIDE OF PAVED SURFACE SHALL BE BOLTED TO THE CONE SECTION OR RING WITH A MINIMUM OF 4 BOLTS PER FRAME.

5/8"X3" LAGSHEILD IN HOLE DRILLED INTO CONE OR RING WITH ANCHOR SUNK TO DESIGN DEPTH, AND 5/8"X3" HOT DIPPED GALVANIZED LAG BOLT AND WASHER.

BUTYL-NEK OR APPROVED SEALANT BETWEEN FRAME AND COVER
NOTES:
ALL PIPE UNDERDRAINS ARE TO EXIT INTO DRAINAGE STRUCTURES SUCH AS CATCH BASINS OR JUNCTION BOXES. IF STRUCTURE IS NOT AVAILABLE, SPECIAL EXIT REQUIREMENTS WILL APPLY IN ACCORDANCE WITH THE DIRECTION OF ENGINEERING SERVICES DIRECTOR OR HIS/HER DESIGNEE.
CUT EXISTING DOWNSPOUT OR DOWNSPOUT SHOE TO DRAIN INTO SLUICE BOX AS SHOWN

USE U.S. FOUNDRY 4600 ANGLE TYPE FRAME AND 6110 GRATE OR APPROVED EQUAL.

4" POURED CONCRETE BASIN SLAB
3000 PSI @ 28 DAYS

CONCRETE SIDEWALK 3000 PSI @ 28 DAYS
6" X 6" 14 GAUGE WWM CENTERED
8" X 2" STRUCTURAL STEEL TUBING
GALVANIZED, SEAL JUNCTION BOX WITH ASPHALT MASTIC

4" POURED CONCRETE BASIN SLAB
3000 PSI @ 28 DAYS

4" POURED CONCRETE BASIN SLAB
3000 PSI @ 28 DAYS

6" X 6" 14 GAUGE WWM CENTERED
8" X 2" STRUCTURAL STEEL TUBING
GALVANIZED, SEAL JUNCTION BOX WITH ASPHALT MASTIC

FINISH GRADE

INSTALL CHANNEL FLUSH WITH FACE OF CURB
CURB AND GUTTER

COMPACTED ABC GRAVEL

FINISH GRADE

INSTALL CHANNEL FLUSH WITH FACE OF CURB
CURB AND GUTTER
NOTES:
1. IF STRUCTURE IS LESS THAN 5' IN DEPTH, BOX MUST BE REBUILT BEGINNING AT ORIGINAL FOOTING ELEVATION.

2. IF STRUCTURE IS GREATER THAN 5' IN DEPTH, THE ELEVATED FOOTING DESIGN AS INDICATED ABOVE MAY BE USED.

3. DOMESTIC CASTING REQUIRED WITHIN STREET RIGHT-OF-WAY.

4. FOR STEP REQUIREMENTS, SEE NOTE 4 ON STANDARD DETAIL SW-10.03.
NOTES:
1. FLOW SHALL NOT RUN PARALLEL WITH THE FENCE
2. END OF SILT FENCE NEEDS TO BE TURNED UPHILL
3. SEE REG SEGMENT DESIGN MANUAL FOR CONSTRUCTION SPECIFICATIONS, WHERE PRACTICE APPLIES AND PLANNING CONSIDERATIONS
4. SILT FENCE SHOULD NOT BE USED ALONE BELOW GRADED SLOPES GREATER THAN 10' IN HEIGHT.

M A I N T E N A N C E: C L E A N  O U T  A T  5 0 %  C A P A C IT Y
L I F E  O F  F E N C I N G: 6 -9 M O N T H S
1. Use No. 5 or No. 57 Stone for Sediment Control Stone.

2. Provide stabilized outlet to stream bank.

3. Wood pallets may be used in lieu of stone and geotextile as directed. A sufficient number of pallets must be provided to elevate the entire special stilling basin above natural ground.

4. The size and number of silt bags should be based on the dewatering pump and manufacturer recommendations.

5. Tightly secure the pump discharge to the silt bag sleeve with a strap or similar device to prevent water/sediment from leaking without treatment.

6. Control pumping rate to prevent excessive pressure within the silt bag in accordance with the manufacturer recommendations. As the bag fills within sediment, reduce the pump rate.

7. Replace the silt bag when one half (1/2) full of sediment.

8. Silt bag device must be ≥ 50ft from the top of the stream bank and water must be discharged in a diffuse manner.
TEMPORARY SEDIMENT TRAP

CITY OF RALEIGH
STANDARD DETAIL

BAFFLE (TYP.)

INLET FLOW

SUPPORT ROPE TO WIRE TO PREVENT SAGGING

MIN. LENGTH:WIDTH RATIO - 2:1

NOTES:
1. 3 BAFFLES (MIN) BETWEEN INLET & OUTLET.
2. SEE N.C. DEQ EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL FOR CONDITIONS WHERE PRACTICE APPLIES; PLANNING CONSIDERATION & DESIGN CRITERIA.
3. LOCATE SEDIMENT INFLOW TO THE BASIN AWAY FROM THE DAM TO PREVENT SHORT CIRCUITS FROM INLETS TO OUTLETS.
4. AT A MINIMUM, SEED, STRAW & TACK APPLICATION REQUIRED FOR SITE INSPECTION APPROVAL.
5. TRAPS MUST BE STABILIZED IMMEDIATELY UPON CONSTRUCTION AND PRIOR TO SITE INSPECTION APPROVAL.

INLET

OUTLET

SUPPORT POST 24" INTO BOTTOM OR SIDES

STAKE TO SUPPORT WIRE

4'MAX

3'min

COIR MESH OR JUTE, TRENCHED INTO BOTTOM AND SIDE

DESIGN LIFE OF FABRIC IS 6-12 MONTHS

OUTLET, SEE DETAIL 20.05.2

EARTHEMBEDMENT

5'CREST WIDTH

MAINTENANCE:
REPAIR/REPLACE BAFFLES WHEN THEY COLLAPSE, TEAR OR DECOMPOSE.
REMOVE SEDIMENT WHEN CELL IS 1/2 FULL.

PERSPECTIVE VIEW

INLET ZONE
25% OF SURFACE AREA

FIRST CHAMBER
25% OF SURFACE AREA

SECOND CHAMBER
25% OF SURFACE AREA

OUTLET ZONE
25% OF SURFACE AREA

INLET ZONE
25% OF SURFACE AREA

FIRST CHAMBER
25% OF SURFACE AREA

SECOND CHAMBER
25% OF SURFACE AREA

OUTLET ZONE
25% OF SURFACE AREA

EXTEND BAFFLES UP SIDES AS TO NOT ALLOW FLOW AROUND THE ENDS.

TOP VIEW

STABLE TRANSITION REQUIRED TO THE BASE OF THE SLOPE

MAX. 2:1 SIDE SLOPES

Baffle Detail

SW-20.05.1
**DESIGN CRITERIA**

**SUMMARY:**
- PRIMARY SPILLWAY: STONE SPILLWAY
- MAXIMUM DRAINAGE AREA: 3600 CU FT PER ACRE OF DISTURBED AREA
- MINIMUM VOLUME: 435 SQ FT PER CFS OF Q25 PEAK FLOW
- MINIMUM LAW RATIO: 2:1
- MINIMUM DEPTH: 3.5 FEET, 1.5 FEET EXCAVATED BELOW GRADE
- MAXIMUM HEIGHT: 2 YARDS, 1 YARD ABOVE GRADE
- DEWATERING MECHANISM: STONE SPILLWAY
- MINIMUM DEWATERING TIME: N/A
- BAFFLES REQUIRED: 3 MINIMUM (COR OR JUTE) MESH 10" IN LENGTH
- DESIGN: 21" MIN.
- SETTLED TOP: 10 FT MIN.
- MAX FILL: 5 FT
- 2" MIN TO 3.5" MAX
- SIDE SLOPE MAX: 2:1 SIDE SLOPE MAX
- FILTER FABRIC

**NOTES:**
- SEE N.C. DEQ EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL FOR CONDITIONS WHERE PRACTICE APPLIES
- PLANNING CONSIDERATION & DESIGN CRITERIA. BASINS LESS THAN 20' IN LENGTH MAY USE BAFFLES.
- STONE SPILLWAY
- 12" MIN. N.C.D.O.T. #5 OR #57 WASHED STONE
- MIN. 1.5' FREE BOARD
- 5 FT MIN
- 1.5 FT
- 9-14" STONE
- FILTER FABRIC
- OVERFILL 6" FOR SETTLEMENT
- EMERGENCY BYPASS 6" BELOW SETTLED TOP OF DAM
- NATURAL GROUND
- FILTER FABRIC
- 12" MIN. N.C.D.O.T. #5 OR #57 WASHED STONE
- MIN. 1.5' FREE BOARD
- 5 FT MIN
- 1.5 FT
- 9-14" STONE
- FILTER FABRIC
- OVERFILL 6" FOR SETTLEMENT
- EMERGENCY BYPASS 6" BELOW SETTLED TOP OF DAM
- NATURAL GROUND
- FILTER FABRIC
- 12" MIN. N.C.D.O.T. #5 OR #57 WASHED STONE
- MIN. 1.5' FREE BOARD
- 5 FT MIN
- 1.5 FT
- 9-14" STONE
- FILTER FABRIC
- OVERFILL 6" FOR SETTLEMENT
- EMERGENCY BYPASS 6" BELOW SETTLED TOP OF DAM
- NATURAL GROUND
- FILTER FABRIC

**PLAN VIEW**

**STRUCTURE LIFE LIMITED
TO 2 YEARS**

**MAINTENANCE:**
- REMOVE SEDIMENT AND RESTORE TRAP TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO ONE-HALF THE DESIGN DEPTH OF THE TRAP. PLACE THE SEDIMENT THAT IS REMOVED IN A DESIGNATED DISPOSAL AREA AND REPLACE THE CONTAMINATED PART OF THE GRAVEL FACING.
- CHECK THE STRUCTURE FOR DAMAGE FROM EROSION OR PIPING. PERIODICALLY CHECK THE DEPTH OF THE SPILLWAY TO ENSURE IT IS A MINIMUM OF 1.5 FT BELOW THE LOW POINT OF THE EMBANKMENT. IMMEDIATELY FILL ANY SETTLEMENT OF THE EMBANKMENT TO SLIGHTLY ABOVE DESIGN GRADE.

**ANY RIP RAP DISPLACED FROM THE SPILLWAY MUST BE REPLACED IMMEDIATELY.
MATERIALS:

- Class 1 Rip Rap / Headwall
- #57 Washed Stone
- 1" thick x 3" high max.
- Natural ground
- Filter fabric
- Minimum 3" from road shoulder

REVISIONS:

- NOT TO SCALE
- SW-20.06

NOTES:

- Class 1 Rip-Rap Placement:
  - Rip-Rap displacement from Stone Horse-Seat must be replaced immediately.

- Maintenance:
  - Remove & restore the sediment storage area at original design dimension.
  -任意 Rip-Rap displaced from the stone horse-seat must be replaced immediately.

- Design:
  - Rip-Rap Headwall 1' min. height
  - Minimum 3" from road shoulder
  - Max. Dr. Pipe is 36" in diameter

- Rock Pipe Inlet Protection:
  - #57 Washed Stone 1" thick x 3" high max.

- City of Raleigh
- Standard Detail
- SW-20.06
NOTES:

1. AT END OF PROJECT, CATCH BASIN CAN BE RAISED AS NEEDED PLUGGING OPEN COURSE OF BLOCK WITH MORTAR.

2. RISER CAN BE BUILT AS A STANDARD CATCH BASIN/jUNCTION BOX (WITH WEEP HOLES) IN RECEIVING WALL AND BE UTILIZED AS SUCH WHEN PROJECT IS STABLE.

3. IF DRAINAGE AREA IS < 1 ACRE THEN THIS STRUCTURE NEEDS TO BE TREATED AS A RISER STRUCTURE AND ALL RELATED INFORMATION NEEDS TO BE SUPPLIED. (TRASH RACK, ELEVATIONS, AND ANTI-FLOATABLE)

4. IF THIS DEVICE IS TREATED AS A SEDIMENT TRAP THEN IT SHALL MEET THE SPECIFICATION AS OUTLINED IN SW-20.05.1 AND SW-20.05.2.
PURPOSE: TO REDUCE EROSION IN A CHANNEL BY REDUCING THE VELOCITY OF FLOW.

DO NOT USE CHECK DAM IN INTERMITTENT OR PERENNIAL STREAMS.

CHECK DAM


SEE N.C. DEQ EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL FOR CONDITIONS WHERE PRACTICE APPLIES.

PLANNING CONSIDERATION & DESIGN CRITERIA.

NOTE: 1. ENSURE THAT CULVERT ENTRANCES BELOW CHECK DAMS ARE NOT SUBJECT TO DAMAGE OR BLOCKAGE FROM DISPLACED STONES.

2. THE DRAINAGE AREA IS LIMITED TO ONE HALF ACRE.

3. KEY THE STONE INTO THE DITCH BANKS AND EXTEND IT BEYOND THE ABUTMENTS A MINIMUM OF 1.5 FEET TO AVOID WASHOUT FROM OVERFLOW AROUND THE DAM.

1.5' MIN (SEE NOTE 3)

9' MIN

12" OF NC DOT #5 OR #57 WASHED STONE

CLASS "B"

A

B

A AND B ARE OF EQUAL ELEVATION

L = THE DISTANCE SUCH THAT POINTS A AND B ARE OF EQUAL ELEVATION

2' MAX AT CENTER

1.5'

4' TO 6'

NOTE: 1. DRRAINAGE AREA IS LIMITED TO ONE HALF ACRE.

2. KEY THE STONE INTO THE DITCH BANKS AND EXTEND IT BEYOND THE ABUTMENTS A MINIMUM OF 1.5 FEET TO AVOID WASHOUT FROM OVERFLOW AROUND THE DAM.

3. ENSURE THAT CULVERT ENTRANCES BELOW CHECK DAMS ARE NOT SUBJECT TO DAMAGE OR BLOCKAGE FROM DISPLACED STONES.

NOTES:

1. THE DRAINAGE AREA IS LIMITED TO ONE HALF ACRE.

2. KEY THE STONE INTO THE DITCH BANKS AND EXTEND IT BEYOND THE ABUTMENTS A MINIMUM OF 1.5 FEET TO AVOID WASHOUT FROM OVERFLOW AROUND THE DAM.

3. ENSURE THAT CULVERT ENTRANCES BELOW CHECK DAMS ARE NOT SUBJECT TO DAMAGE OR BLOCKAGE FROM DISPLACED STONES.
**EXISTING ROADWAY**

50' MIN. AND SUFFICIENT TO KEEP SEDIMENT ON SITE

3" - 4" STONE TO BE USED (SURGE STONE OR RAILROAD BALAST)

25' OR FULL WIDTH OF PROPOSED STREET OR ENTRANCE, WHICHEVER IS GREATER.

NOTES:
1. SILT FENCE SHOULD BE INSTALLED TO ENSURE CONSTRUCTION ENTRANCE IS USED.
2. IF MUD IS NOT REMOVED FROM THE VEHICLE TRAVELING OVER THE STONE, THEN THE TIRES OF THE VEHICLE MUST BE WASHED BEFORE ENTERING THE PUBLIC ROAD OR THE LENGTH OF THE CONSTRUCTION ENTRANCE EXTENDED.

**NOTES:**
- **SILT FENCE (SEE NOTE 1)**
- **EXISTING ROADWAY**
- **NEW CONSTRUCTION**
- **PLAN**

**CITY OF RALEIGH STANDARD DETAIL**

**CROSS SECTION**

MAINTENANCE:
ADD ADDITIONAL STONE AND "FLUFF" TOP DRESSING WITH 2" STONE.

SEE N.C. DEQ EROSION and SEDIMENT CONTROL PLANNING and DESIGN MANUAL FOR CONDITIONS WHERE PRACTICE APPLIES;
PLANNING CONSIDERATION & DESIGN CRITERIA.
NOTES:
1. THIS DETAIL APPLIES ONLY TO ENTRANCES OF INDIVIDUAL SINGLE FAMILY RESIDENTIAL UNITS
2. SILT FENCE SHOULD BE INSTALLED TO ENSURE CONSTRUCTION ENTRANCE IS USED.
NOTES:
1. STABILIZE IMMEDIATELY UPON CONSTRUCTION AND PRIOR TO SITE INSPECTION APPROVAL.
2. STABILIZE DIVERSION DITCH BASED ON DESIGN VELOCITY, IF DESIGN VELOCITIES (V) IN BARE EARTH CONDITIONS EXCEEDS 2 FT/S, A TEMPORARY LINER IS REQUIRED.
3. MAXIMUM 5 ACRE DRAINAGE AREA TO TEMPORARY DIVERSION.

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS
DATE 8/1/18
NOT TO SCALE

DIVERSION DITCH

SW-20.11
TOP OF BANK

MINIMUM

TOP OF BANK

FLOW

STREAM CHANNEL

MINIMUM

TOP OF BANK

CLASS "B"

CLASS "B"

STREET CROSSING

CITY OF RALEIGH

STANDARD DETAIL

REVISIONS

DATE: 8/1/18

NOT TO SCALE

TEMPORARY

STREAM CROSSING

SW-20.13
CONSTRUCTION SPECIFICATIONS

1. Lay one block on each side of the structure on its side in the bottom row to allow pool drainage. Place the bottom row of blocks against the edge of the storm drain for lateral support and to avoid washouts when overflow occurs.

2. Carefully fit hardware cloth or comparable wire mesh with 1/2-inch openings over all block openings to hold gravel in place. Use clean gravel, placed 2 inches below the top of the block on a 2:1 slope or flatter and smoothed to an even grade. Do not use washed stone.

3. Use clean gravel, placed 2 inches below the top of the block on a 2:1 slope or flatter and smoothed to an even grade. Do not use washed stone.

4. Not to be used for sediment storage or on roadways open to public traffic.

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS
DATE 8/1/18
NOT TO SCALE

SW-20.14

BLOCK AND GRAVEL
DROP INLET PROTECTION
GALVANIZED HARDWARE WIRE EXTENDS TO THE TOP OF BOX.

(19 GAUGE, 1/4" MESH OPENINGS.)

#5 WASHED STONE PLACED AGAINST HARDWARE WIRE TO A HEIGHT OF 1'-16" MIN. ABOVE TOP OF BOX.

DRAINAGE AREA = < 1 ACRE (MAXIMUM).

SECTION VIEW

#57 WASHED STONE PLACED AGAINST HARDWARE (19 GAUGE, 1/4" MESH OPENINGS.)

REVISIONS

NOT TO SCALE

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS
DATE 8/1/18
NOT TO SCALE

STANDARD CATCH BASIN
YARD INLET PROTECTION

SW-20.15
TEMPORARY SILT DITCH

FILL S

LO

E

SEEDED & MULCHED AFTER CONSTRUCTION OF DITCH

2:1 MAX

COMPACT EXCAVATED MATERIAL, SEED & MULCH AFTER CONSTRUCTION OF DITCH

LINER

M A I N T E N A N C E:
1. REMOVE SILT WHEN DITCH IS 1/2 FULL.
2. STABILIZE IMMEDIATELY UPON CONSTRUCTION AND PRIOR TO SITE INSPECTION APPROVAL.

CITY OF RALEIGH
STANDARD DETAIL

NOTES:
DIMENSIONS d & w AND LINER TO BE DETERMINED BY ENGINEER.

CROSS SECTIONAL VIEW

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS
DATE: 8/1/18
NOT TO SCALE

TEMPORARY SILT DITCH

SW-20.16
NOTES:
1. STRIPES ON BARRICADE RAILS SLOPE AT AN ANGLE OF 45 DEGREES IN THE DIRECTION TRAFFIC IS TO PASS.
2. BARRICADE RAIL STRIPE SHALL BE 6 INCHES.
3. THE SIDES OF THE BARRICADE FACING TRAFFIC SHALL HAVE RETROREFLECTIVE RAIL PLATES.

CITY OF RALEIGH
STANDARD DETAIL

STANDARD TEMPORARY BARRICADE

SW-20.17
**DESIGN NOTES:**

1. MAXIMUM DRAINAGE AREA WHEN UTILIZING RISER IS 100 ACRES.
2. DAM HEIGHT BEHIND RISER IS 15 FEET OR LESS FROM TOP OF DAM TO LOW POINT OF DOWNSTREAM TOE.
3. MAY OR MAY NOT BE "FLASHBOARD" RISER

**FLASHBOARD RISER**

- TRASH GUARD
- WATER LEVEL
- REMOVABLE BOARDS OR STOP LOGS
- CROSS SECTIONAL VIEW

**CITY OF RALEIGH**

- FILL HEIGHT
  - LESS THAN 10 FT: 8.0 FT
  - 10 FT TO 15 FT: 10.00 FT

**SEES N.C. DEQ EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL FOR CONDITIONS WHERE PRACTICE APPLIES; PLANNING CONSIDERATION & DESIGN CRITERIA.**
**DESIGN CRITERIA**

**SUMMARY:**
- PRIMARY SPILLWAY: STONE SPILLWAY
- MAXIMUM DRAINAGE AREA: <1 ACRE.
- MINIMUM SEDIMENT STORAGE VOLUME: 3600 CUBIC FEET PER ACRE OF DISTURBED AREA.
- MINIMUM SURFACE AREA: 435 SQUARE FEET PER CFS OF Q₁₀ PEAK INFLOW
- MINIMUM L/W RATIO: 2:1
- MINIMUM DEPTH: 3.5 FEET, 1.5 FEET EXCAVATION BELOW GRADE
- MAXIMUM HEIGHT: WEIR ELEVATION 6 FEET ABOVE GRADE
- STONE SPILLWAY
- N/A
- 3 MINIMUM
- 3 YEARS OR LESS
- LIMITED TO 8 FEET.

**SPILLWAY DETAILS**

- TOP OF ROCK ABUTMENT
- SLOPE FOUNDATION
- FABRIC FILTER
- SPILLWAY

**CROSS-SECTION VIEW**

**NOTE:** DEVICE SHOULD NOT BE LOCATED IN ANY INTERMITTENT OR PERENNIAL STREAM.
NOTES:

1. WARNING SIGNS TO BE MADE OF DURABLE, WEATHERPROOF MATERIAL.
2. LETTERS TO BE 3" HIGH MINIMUM, CLEARLY LEGIBLE AND SPACED AS DETAILED.
3. SIGNS SHALL BE PLACED AT 50' MAXIMUM INTERVALS.
4. FOR WATERCOURSE BUFFER PROTECTION AREAS LESS THAN 200' IN PERIMETER, PROVIDE NO LESS THAN ONE SIGN PER PROTECTION AREA.
5. ATTACH SIGNS SECURELY TO FENCE POSTS AND FABRIC.
6. MAINTAIN WATERCOURSE BUFFER PROTECTION FENCE THROUGHOUT DURATION OF PROJECT.
7. ADDITIONAL SIGNS MAY BE REQUIRED BY CITY OF RALEIGH BASED ON ACTUAL FIELD CONDITIONS.
8. PLACE A SIGN AT EACH END OF LINEAR WATERCOURSE BUFFER PROTECTION AND 50' ON CENTER THEREAFTER.
9. END OF SILT FENCE SHALL BE TURNED UPHILL.
10. SEE N.C. STATE DENR PRACTICE & SPECIFICATION SEDIMENTS FENCE SECTION
    FOR CONDITIONS WHERE PRACTICE APPLIES AND PLANNING CONSIDERATIONS.
NOTES:

1. Wattles shall be filled with straw or other approved material.
2. Spacing for wattles shall be determined by the Site Engineer. Wattles may be used for protection of catch basins and drop inlets with approval by the Stormwater Program Manager or Designee.
3. For use of wattle in a ditch, grade of ditch must be < 2.5%.
4. Spacing for wattles shall be determined by the SITE ENGINEER.

CITY OF RALEIGH
STANDARD DETAIL

WATTLE / INLET PROTECTION DETAIL

REVISIONS DATE

SW-20.23
NOTES:
1. REMOVE SEDIMENT WHEN HALF OF STONE OUTLET IS COVERED.
2. REPLACE STONE AS NEEDED TO ENSURE DRAINAGE.
NOTES:
1. ACTUAL LAYOUT TO BE DETERMINED IN THE FIELD.
2. A CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30’ OF THE TEMPORARY CONCRETE WASHOUT FACILITY.
3. MATERIALS USED TO CONSTRUCT TEMPORARY CONCRETE WASHOUT FACILITIES SHALL BE REMOVED FROM THE SITE OF THE WORK AND DISPOSED OF OR RECYCLED.
4. HOLES, DEPRESSIONS OR OTHER GROUND DISTURBANCE CAUSED BY THE REMOVAL OF THE TEMPORARY CONCRETE WASHOUT FACILITIES SHALL BE BACKFILLED, REPAIRED, AND STABILIZED TO PREVENT EROSION.
5. MUST BE LOCATED >50 FT AWAY FROM INLETS/WATERWAYS UNLESS THERE IS NO OTHER PRACTICAL ALTERNATIVE.
NOTES:

1. TWO CONCRETE BLOCKS SHALL BE PLACED ON THEIR SIDES ABUTTING THE CURB AT EITHER SIDE OF THE INLET OPENING, A 2" X 4" STUD SHALL BE CUT AND PLACED THROUGH THE OUTER HOLES OF THE SPACER BLOCKS TO BRACE THE FRONT BLOCKS. FRONT BLOCKS ARE PLACED ON THEIR SIDES ACROSS THE INLET AND ABUTTING THE SPACER BLOCKS.

2. WIRE MESH OR HARDWARE CLOTH WITH 1/4" - 1/2" OPENINGS SHALL BE PLACED OVER THE OUTSIDE VERTICAL FACE (WEBBING) OF THE BLOCKS, TO PREVENT STONE FROM BEING WASHED THROUGH THE HOLES IN THE BLOCKS.

3. STONE SHALL BE PILED AGAINST THE WIRE TO THE TOP OF THE BLOCK. (NO. 57 WASHED STONE)

4. CHECK DEVICE AFTER EACH RAIN AND REPLACE WASHED STONE IF IT CLOGS WITH SEDIMENT.
**DESIGN CRITERIA**

**SUMMARY:**
- **SKIMMER SEDIMENT BASIN**
- **TRAPEZOIDAL SPILLWAY WITH IMPERMEABLE MEMBRANE**

- **MAXIMUM DRAINAGE AREA:** 10 ACRES
- **MINIMUM VOLUME:** 1600 CUBIC FEET PER ACRE OF DISTURBED AREA
- **MINIMUM SURFACE AREA:** 325 SQUARE FEET PER CFS OF Q25 PEAK INFLOW
- **MINIMUM W/R RATIO:** 2:1
- **MAXIMUM W/R RATIO:** 6:1
- **MINIMUM DEPTH:** 2 FEET
- **DEWATERING MECHANISM:** SKIMMER
- **MINIMUM DEWATERING TIME:** 2 DAYS
- **DESIGN BASIN LIFE:** 3 YEARS OR LESS
- **DAM HEIGHT:** 5 FEET MAXIMUM
- **BAFFLES REQUIRED:** *3 BAFFLES*

SEE NC EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL.

*NOTE: BASINS LESS THAN 20' IN LENGTH MAY USE 2 BAFFLES.*

**DESIGN CRITERIA**

- **PRIMARY SPILLWAY:** TRAPEZOIDAL SPILLWAY WITH IMPERMEABLE MEMBRANE
- **SUMMARY:**
- **MAXIMUM DRAINAGE AREA:** 10 ACRES
- **MINIMUM VOLUME:** 1600 CUBIC FEET PER ACRE OF DISTURBED AREA
- **MINIMUM SURFACE AREA:** 325 SQUARE FEET PER CFS OF Q25 PEAK INFLOW
- **MINIMUM W/R RATIO:** 2:1
- **MAXIMUM W/R RATIO:** 6:1
- **MINIMUM DEPTH:** 2 FEET
- **DEWATERING MECHANISM:** SKIMMER
- **MINIMUM DEWATERING TIME:** 2 DAYS
- **DESIGN BASIN LIFE:** 3 YEARS OR LESS
- **DAM HEIGHT:** 5 FEET MAXIMUM
- **BAFFLES REQUIRED:** *3 BAFFLES*

SEE NC EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL.

*NOTE: BASINS LESS THAN 20' IN LENGTH MAY USE 2 BAFFLES.*

**PERSPECTIVE VIEW**

**INLET FLOW**  
- PIPE OR DITCH

**STABLE TRANSITION**  
- REQUIRED TO THE BASE OF THE SLOPE

**EMBANKMENT**

**STONE ENERGY DISSIPATOR**

**SKIMMER**

**TETHER**

**OUTLET ZONE 25% OF SURFACE AREA**

**FIRST CHAMBER**  
- 25% OF SURFACE AREA

**SECOND CHAMBER**  
- 25% OF SURFACE AREA

**EXTEND BAFFLES UP SIDES AS TO NOT ALLOW FLOW AROUND THE ENDS.**

**BAFFLE DETAIL**

**SUPPORT ROPE**  
- TO WIRE TO PREVENT SAGGING

**SUPPORT POST**  
- 24" INTO BOTTOM OR SIDES

**STAKE TO SUPPORT WIRE**  
- 3' MIN

**DESIGN LIFE OF FABRIC**  
- IS 6-12 MONTHS

**COIR MESH OR JUTE, TRENCHED**  
- INTO BOTTOM AND SIDE

**NOTES:**

1. LOCATE SEDIMENT INFLOW TO THE BASIN AWAY FROM THE DAM TO PREVENT SHORT CIRCUITS FROM INLETS TO OUTLET.

2. BASIN MUST BE STABILIZED IMMEDIATELY UPON CONSTRUCTION AND PRIOR TO SITE INSPECTION APPROVAL.
REVISIONS
NOT TO SCALE
CITY OF RALEIGH
STANDARD DETAIL

NOTES:

1. MAINTENANCE SHALL OCCUR WHEN NECESSARY. SILT FENCE SHALL BE REPLACED EVERY 6 MONTHS AND POSTS SHALL BE INSPECTED TO ENSURE STRUCTURAL INTEGRITY. SILT FENCE SHALL BE INSPECTED WEEKLY AND ALL MAINTENANCE ISSUES SHALL BE CORRECTED AT THAT TIME.

2. SILT FENCE SHOULD BE A MINIMUM OF 5 FEET FROM THE TOE OF SLOPE.
City of Raleigh
Standard Details

Transit
TYPICAL STOP LOCATION

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS
DATE 8/1/18
NOT TO SCALE

TT-01
GENERAL CONCRETE PAD NOTES:

1. DIMENSIONS OF PAD ARE SUBJECT TO CHANGE DUE TO RIDERSHIP AND AMENITIES, COORDINATE WITH THE CITY OF RALEIGH.

2. CONCRETE PAD WILL CONSIST OF 3,000 PSI CONCRETE IN ACCORDANCE WITH NCDOT STANDARDS.

3. INSTALL AS SHOWN IN TYPICAL SECTION. WOVEN WIRE FABRIC SHALL HAVE MINIMUM 6" OVERLAPS AND MINIMUM COVER OF 2" ON ALL SIDES.

4. WHERE PROPOSED SHELTER PAD ELEVATION IS ABOVE EXISTING GRADE, PROVIDE A 1" WIDE CONCRETE "BEAM" TO EXTEND A MINIMUM OF 6" BELOW THE EXISTING SURROUNDING GRADE WITH A 45° SECTION TO BRING BACK TO THE STANDARD 6" THICKNESS.

5. CONCRETE PAD WILL HAVE A BROOM FINISH.

6. MAXIMUM CROSS SLOPE SHALL BE 2%.

7. EXTEND ABC 1' BEYOND EDGE OF PAD IN ALL DIRECTIONS EXCEPT WHERE BORDERED BY EXISTING PAVEMENT OR SIDEWALK.

8. WHERE HANDRAIL IS INSTALLED INCREASE PAD THICKNESS AS SHOWN ON THE HANDRAIL DETAIL STD. T-8.

9. EXPANSION JOINTS WILL BE INSTALLED AT ALL RIGID OBJECTS AND ADJACENT TO EXISTING PAVEMENT AND HAVE 1/8 " RADIUS TOOLED EDGE AND FILL WITH SEALER. JOINT SEALER TO BE GREY IN COLOR.
NOTES:
1. SHELTER SHOWN IS A FULL SIZE BRASCO MODEL TL 510 ILS, OR APPROVED EQUAL. COORDINATE WITH CITY OF RALEIGH FOR SHELTER TYPE.

2. INSTALL COLUMN BASE 6" FROM EDGE OF CONCRETE PAD WITH APPROVED CONCRETE ANCHOR UNITS RECOMMENDED BY THE MANUFACTURER, TYPICAL UNLESS OTHERWISE SHOWN.

3. INSTALL BENCH ON OPPOSITE SIDE OF LEAN BAR.

4. ALL CERTIFICATIONS OF STRUCTURES TO BE PROVIDED BY MANUFACTURER.
TYPICAL SHELTER LAYOUT WITH EXISTING SIDEWALK

NOTES:
1. IF NO SIDEWALK CURRENTLY EXISTS, PROVIDE SIDEWALK TO NEAREST ADA ACCESSIBLE INTERSECTION OR DRIVEWAY WITH APPROPRIATE RAMPS. SIDEWALK AND PLANTING AREA WIDTH TO BE IN COMPLIANCE WITH THE CITY’S UDO. PROVIDE CURB RAMP IN ACCORDANCE WITH CITY STANDARDS.
2. BUS SHELTER SHALL BE MINIMUM 6" FROM EDGE OF CONCRETE PAD.
NOTES:
1. BENCH STYLE SUBJECT TO CHANGE, COORDINATE WITH CITY.
2. BENCH SHOULD BE A MINIMUM OF 3' FROM THE SIDE OF THE CONCRETE PAD AND 2' FROM THE BACK EDGE OF THE CONCRETE PAD. COORDINATE LOCATION WITH THE CITY.
3. IF NO SIDEWALK CURRENTLY EXISTS, PROVIDE SIDEWALK TO NEAREST ADA ACCESSIBLE INTERSECTION OR DRIVEWAY WITH APPROPRIATE RAMPS.

REFERENCES:
SEE DETAIL TT-06
SEE DETAIL TT-02

CITY OF RALEIGH
STANDARD DETAIL

SITE LAYOUT FOR BENCH

TT-05
NOTES:
1. INSTALL SIGN AHEAD OF STOP 2' FROM CONCRETE SECTION IN UTILITY STRIP
2. CALL 811 FOR UNDERGROUND UTILITY LOCATION PRIOR TO INSTALLATION.
SHELTER PAD INSTALLATION

GRADE INSTALLATION

TOP RAIL SHALL BE CONTINUOUS SMOOTH WITH NO PROJECTIONS.

1 1/2" O.D. GALVANIZED STEEL PIPE (SCH 40)

POST SOCKET

NON-SHRINK GROUT

NOTES:
CONTRACTOR TO PROVIDE FULL SHOP DRAWINGS FOR HANDRAIL PRIOR TO INSTALLING.

CITY OF RALEIGH
STANDARD DETAIL

HANDRAIL INSTALLATION

TT-07
BOLLARD INSTALLATION

DATE: 8/1/18

PAVING

COMPACTED SUBGRADE

TAR COATING ON EXT. SURFACES OF POST IN CONTACT WITH CEMENT

3000 PSI CONCRETE FOOTING

4" DIAMETER STEEL POST (SCH 40)

CAP OFF WITH 3/16" STEEL PLATE, ARC. WELD AND GRIND SMOOTH

FINISHES: ALL SURFACES TO BE HOT DIPPED GALVANIZED, AND SHOP PRIMED AND PAINTED WITH TWO COATS IND. ENAMEL "SAFETY YELLOW"

6" (TYP)

city of raleigh

standard detail

TT-08
GENERAL NOTES:
1. COORDINATE WITH CITY OF RALEIGH ON WHICH WALL TYPE TO USE.
2. ALL RETAINING WALLS SHALL BE DESIGNED AND SEALED BY A LICENSED PROFESSIONAL ENGINEER.

SEGMENTAL GRAVITY RETAINING WALL NOTES:
1. STANDARD UNIT WILL MEET NCDOT APPROVED VENDORS LIST. DIMENSIONS OF CONCRETE BLOCKS ARE TYPICALLY 18" WIDE BY 18" DEEP BY 8" TALL. USE ADHESIVE MEETING MANUFACTURERS RECOMMENDATIONS. BACKFILL LOWS IN BLOCKS WITH #57 STONE TO TOP.
2. DO NOT MIX UNITS FROM DIFFERENT VENDORS ON SAME WALL.
3. TOP CAP UNIT WILL BE GLUED TO BLOCKS WITH ADHESIVE MEETING MANUFACTURERS RECOMMENDATIONS.
4. DO NOT USE SEGMENTAL GRAVITY WALLS WHEN SURCHARGE LOADS WILL BE WITHIN 5'-6" OF THE BACK OF THE CAP UNIT.
5. DO NOT ATTACH FENCE OR HANDRAIL TO WALL.
6. WALL SIMILAR TO NCDOT STANDARD DRAWING 453.02.

REINFORCED CONCRETE GRAVITY RETAINING WALL NOTES:
1. USE CLASS A CONCRETE AND PROVIDE CLASS I SURFACE FINISH ON ALL EXPOSED SURFACES.
2. PROVIDE GROVED CONTRACTION JOINTS EVERY 10'-0".
3. PROVIDE 4" PERFORATED PVC DRAIN PIPE THE LENGTH OF THE WALL. WRAP PIPE WITH FILTER FABRIC AND PROVIDE 1" WIDE BY 1" DEEP WASHED STONE AROUND PIPE. TIE TO STORM DRAIN OR DAYLIGHT AT ENDS AND PROVIDE SOCK AROUND END OF PIPE.
4. DO NOT BACKFILL WALL UNTIL CONCRETE DEVELOPS A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI. COMPACT BACKFILL AND COMPACT WITH HAND OPERATED EQUIPMENT.
5. TAPER END WALL TO 6" ABOVE GRADE IN 3' MINIMUM. END OF WALL SHALL HAVE 6" HORIZONTAL CLEARANCE FROM THE EDGE OF SIDEWALK.
6. WALL SIMILAR TO NCDOT STANDARD DRAWING 453.01.
NOTES:
1. BIKE RACK TO BE 2" SCHEDULE 40 STEEL POWDER COATED BRONZE.
2. COORDINATE LOCATION WITH THE CITY PRIOR TO INSTALLATION.
* USE 6.5" WHEN DRIVEWAY IS USED IN LIEU OF A WHEELCHAIR RAMP TO ACCOMMODATE 12:1 MAXIMUM SLOPE (ADA COMPLIANT), SUCH AS IN A CUL-DE-SAC.
NOTES:

1. WHEN A DRIVEWAY IS TO BE CONSTRUCTED WHERE FINAL LAYER OF ASPHALT HAS BEEN PLACED, THE CURB CAN BE SAW CUT IN A STRAIGHT LINE AND REMOVED. IF THE FINAL LAYER HAS NOT BEEN PLACED, THE ENTIRE CURB AND GUTTER SHALL BE REMOVED AND THE DRIVEWAY SHALL BE A MONOLITHIC POUR USING 3000 PSI MAX. 4" SLUMP CONCRETE.

2. EXPANSION MATERIAL SHALL EXTEND THE FULL DEPTH OF THE CONCRETE. 1/2" EXPANSION JOINTS ALONG SIDEWALK SHALL BE LOCATED AT NOT MORE THAN 40' INTERVALS & DUMMY CONSTRUCTION JOINTS AT 6' INTERVALS. DUMMY JOINTS SHALL BE AT LEAST 1/3 THE SLAB THICKNESS IN DEPTH.

3. SLOPE ON UNPAVED AREAS BETWEEN BACK OF CURB & SIDEWALK SHALL BE 1/4" PER FT.

4. NO EXPOSED AGGREGATE OR OTHER SPECIAL SURFACE TREATMENTS IN ROW.

5. W-DIMENSION AS SHOWN ON PLAN VIEW SHALL BE AS FOLLOWS:
   10' MINIMUM, 18' MAXIMUM FOR RESIDENTIAL DRIVEWAYS
   36' MAXIMUM FOR COMMERCIAL DRIVEWAYS

6. THE DISTANCE FROM THE END OF A STREET CURB RADIUS TO THE BEGINNING OF THE DRIVEWAY RADIUS SHOULD BE MINIMUM OF 20 FT.

7. CURB RADIUS TO BE DISSIPATED BETWEEN LIMITS NOTED ABOVE.

8. 7' MIN. BETWEEN DRIVEWAYS ON ADJACENT LOTS.

9. 45' MIN. BETWEEN DRIVEWAYS ON SAME LOT.

10. NO RADIUS ENCROACHMENT SHALL BE ALLOWED ACROSS AN ADJOINING PROP. FRONTAGE. THIS IS DETERMINED BY EXTENDING A LINE FROM THE PROPERTY CORNER PERPENDICULAR TO THE RW TO THE CURB AND GUTTER LOCATION.

11. ALL CONCRETE MUST BE POURED ON SAME DAY AS INSPECTION OR RE-INSPECTION IS REQUIRED.

12. DRIVEWAY RADIUS SHALL BE A MINIMUM OF 5' FROM ANY CATCH BASIN.
NOTES:
1. SEE STANDARD DETAIL T-10.26.1 FOR CURB AND GUTTER DETAILS.
2. EXPANSION MATERIAL SHALL EXTEND THE FULL DEPTH OF THE CONCRETE.
3. ALL CONCRETE SHALL BE 3000 PSI (MIN.).
NOTES:
1. PIPE TO BE RCP OR HDPE AND SIZED TO CARRY THE DESIGN FLOW OF THE DITCH FOR A 10-YEAR, 24-HOUR STORM EVENT; THE MINIMUM ACCEPTABLE PIPE SIZE IS 15" IF THE DESIGN FLOW WOULD REQUIRE A SMALLER PIPE.
2. 12" MINIMUM COVER OVER PIPE MEASURED FROM TOP OF PAVEMENT.
3. STEEPER SLOPES CAN BE ALLOWED WHERE SPECIAL STABILIZATION IS PROVIDED IN ACCORDANCE WITH EROSION AND SEDIMENTATION CONTROL ORDINANCE.
4. USE 5' VERTICAL CURVE FOR TRANSITION.
5. SEE CITY OF RALEIGH STREET DESIGN MANUAL FOR COMMERCIAL DRIVEWAYS.
6. NO EXPOSED AGGREGATE OR OTHER SPECIAL SURFACE TREATMENTS IN RIGHT OF WAY

CITY OF RALEIGH
STANDARD DETAIL

RESIDENTIAL DRIVEWAY INSTALLATION ON NON CURB & GUTTERED STREETS

T-10.03
DRIVEWAY GRADES

A. CURB & GUTTER, SIDEWALK SECTION

NOTES:
IF THE SLOPE BETWEEN THE TOP OF CURB AND GUTTER AND A POINT 30 FEET FROM THE CURB AND GUTTER EXCEEDS 20%, THIS SLOPE SHALL BE ADJUSTED TO A MAXIMUM OF 8.33% (1"/FT) UP OR 4.17% (1/2"/FT) DOWN.

B. SHOULDER SECTION
NOTES:
1. THE PAVEMENT EDGE SHALL BE DEFINED BY A STRAIGHT EDGE FORMED BY A MACHINED SAW CUT.
2. THE TRENCH SUBGRADE MATERIAL SHALL BE BACKFILLED WITH SUITABLE MATERIAL AND COMPACTED TO A DENSITY OF AT LEAST 95% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-99 AS MODIFIED BY NCDOT.
3. THE FINAL 1' OF FILL SHALL CONSIST OF ABC MATERIAL COMPACTED TO A DENSITY EQUAL TO 100% OF THAT OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH AASHTO T-80 AS MODIFIED BY NCDOT. BITUMINOUS BASE OR BINDER MAY BE SUBSTITUTED IF APPROVED BY TRANSPORTATION DIRECTOR OR DESIGNEE.
4. THE ENTIRE THICKNESS/VERTICAL EDGE OF THE CUT SHALL BE TACKED.
5. THE SAME DEPTH OF PAVEMENT MATERIAL WHICH EXISTS SHALL BE REINSTALLED, BUT IN NO CASE SHALL THE ASPHALT BE LESS THAN 3" THICK.
6. THE ASPHALT PAVEMENT MATERIAL SHALL BE INSTALLED AND COMPACTED THOROUGHLY AND ROLLED WITH A SMOOTH DRUM ROLLER TO ACHIEVE A SMOOTH, LEVEL PATCH.
7. FOR RCP 36" OR LARGER, #57 OR #67 WASHED STONE SHALL BE INSTALLED TO THE SPRING LINE BEFORE BACKFILL.
NOTES:
1. IF DRIVEWAY IS WITHIN CLOSE PROXIMITY OF ACCESS RAMP, TIE SIDEWALK INTO DRIVEWAY.

2. REFER TO STANDARD DETAIL T-10.01.2, DRIVE WAY AND SIDEWALK DETAIL, SHEET 1 OF 2.
When using a center turn lane, the rear distance will be 90' and the back to back curb distance will be 92'.
CITY OF RALEIGH
STANDARD DETAIL

T-10.19

AVENUE, 4 LANE & 6 LANE, DIVIDED
<table>
<thead>
<tr>
<th>City of Raleigh Standards Detail</th>
<th>Date: 8/1/18</th>
</tr>
</thead>
</table>

### Parallel Parking
- Parking: 177' Public R/W
- 6' B.B.
- **General**:
  - Sidewalk: Both Sides
  - Tree Grade / Lawn: 80' C. Avg.
  - Parking Type: Parallel in Access Lane

### Angled Parking
- Parking: 177' Public R/W
- 6' B.B.
- **General**:
  - Sidewalk: Both Sides
  - Tree Grade / Lawn: 60° Angle in Access Lane

**Multi-Way Boulevard**

**Revisions**

**NOT TO SCALE**

**T-10.20**
1. CURB AND GUTTER SECTION SHALL BE REMOVED IN ACCORDANCE WITH DRIVEWAY WIDTH APPROVED BY THE CITY.

2. IF PERPENDICULAR CUT IS LESS THAN 5' FROM NEXT JOINT, THEN THE PARALLEL CUT SHALL BE MADE TO THAT JOINT.

3. THIS METHOD IS NOT ALLOWED IN NEW ROADWAY CONSTRUCTION.

IF THE FINAL LIFT OF ASPHALT HAS BEEN INSTALLED AND IS DAMAGED DURING CURB REMOVAL, A ONE FOOT WIDE SECTION OF ASPHALT SHOULD BE SAWCUT AND REMOVED FOR FORMS TO BE USED TO KEEP A STRAIGHT EDGE ON THE DRIVEWAY APRON. REINSTALL HOT MIX SURFACE ASPHALT PATCH S9.5B.

IF THE FINAL LIFT OF ASPHALT HAS NOT BEEN INSTALLED, THE ASPHALT IN FRONT OF THE APRON CAN REMAIN IN PLACE.

NOTES:
Score full width of curb and gutter.

Plan:
- Back of curb: 2'-0"
- Edge of pavement: 1'-6"
- 6"
- 1-1/2"
- 2'-6"
- 2'-0"
- 6"

Front:
- Edge of pavement: 2'-0"
- Back of curb: 2'-6"
- 6"

End:
- "Score full width of curb and gutter.

City of Raleigh
Standard Detail

T-10.25

Standard method of ending curb and gutter.

Date: 8/1/18
JOINT FILLER
1/8" RADIUS (TYP.)
NOTE: MAINTAIN 50' MAX. BETWEEN EXPANSION JOINTS OR AT ALL RIGID OBJECTS.

FRONT ELEVATION
TRANSVERSE EXPANSION JOINT

1. 30° CURB & GUTTER

MEDIAN CURB AND GUTTER
SIDE ELEVATION

4" COMPACTED A.B.C, UNDER STANDARD CURB & GUTTER (MIN)
NO VALLEY CURB SHALL BE USED AT INTERSECTIONS, HYDRANTS, ETC.

MEDIAN CURB AND GUTTER
(NON-MOUNTABLE)

NOTES:
1. 10' MAXIMUM BETWEEN DUMMY JOINTS.
   15' MAXIMUM BETWEEN DUMMY JOINTS ON MACHINE POURS.
2. 1/2" EXPANSION JOINT EVERY 50'.
3. 3000 PSI CONCRETE MINIMUM, 4" SLUMP MAXIMUM.
4. LIQUID MEMBRANE CURING COMPOUND SHALL MEET THE REQUIREMENTS OF SECTION 1026-2 OF NCDOT STANDARDS & SPECIFICATIONS FOR ROADS AND STRUCTURES.
5. ALL CONSTRUCTION JOINTS SHALL BE FILLED WITH JOINT FILLER AND SEALER IN ACCORDANCE WITH NCDOT ROADWAY STANDARD DETAIL 846.01 THE JOINT MATERIAL SHALL CONFORM TO SECTION 1028-2 OF NCDOT STANDARD & SPECIFICATIONS FOR ROADS AND STRUCTURES.
6. REFER TO NCDOT DETAIL 846.01 FOR CURB AND GUTTER SUPERELEVATION RATES.

SPILL CURB DETAIL

CITY OF RALEIGH
STANDARD DETAIL

CURB AND GUTTER

T-10.26.1
NOTES:
TRANSITION NOT TO BE LOCATED WITHIN THE CURB RADIUS.
NOTES:
A. BOTTOM EDGE OF DELINEATOR SHALL BE 4 FEET ABOVE ROADWAY.
B. THE DELINEATOR STRIPES SHALL SLOPE UPWARD AND OUTWARD FROM TRAFFIC.
C. DELINEATORS TO BE SPACED ON CENTERS AT 1/3 OF THE DISTANCE ‘X’, SHOWN BELOW, FOR NEW ASPHALT WIDTHS ≤ 15 FEET OR AT 1/4 OF ‘X’ FOR NEW ASPHALT WIDTHS > 15 FEET.
D. DELINEATORS SHALL BE MOUNTED ON BREAKAWAY POSTS.
E. DELINEATORS SHALL BE REFLECTORIZED.
F. CALL 811 FOR UNDERGROUND UTILITY LOCATE PRIOR TO INSTALLATION.

1. TAPER ON BOTH ENDS OF ROADWAY WIDENING SHALL BE A MINIMUM
   2:1. THE TRANSPORTATION DIRECTOR OR DESIGNEE AND/OR NCDOT RESERVES THE RIGHT TO REQUIRE A LONGER TAPER IF DEEMED NECESSARY FOR THE SAFETY OF THE PUBLIC.
2. A SOLID WHITE EDGE MARKING SHALL BE EXTENDED ALONG WIDENING AT EXISTING PAVEMENT.
3. DELINEATORS SHALL ONLY BE REQUIRED AT TAPER FROM CURB TO EXISTING PAVEMENT IN DIRECTION OF TRAVEL.
4. DELINEATORS SHALL BE ORIENTED SUCH THAT THE FACE OF THE SIGN IS PERPENDICULAR TO TRAVEL LANE.

NCDOT TYPE 3
DELINEATOR

DETAIL

CITY OF RALEIGH
STANDARD DETAIL
STANDARD PAVEMENT WIDENING TAPER & MARKINGS

PLAN VIEW
1. Barricade(s) to be erected across entire roadway including curb & gutter.

2. Advance warning sign W14-1 (Dead End) shall be placed just after last intersecting street.

3. Markings for barricade rails shall be reflective and alternate red & white strips.

4. "Road Closed" sign shall meet specifications of M.U.T.C.D. R11-2 and be required atop each barricade used.

5. Call 811 for underground utility locate prior to installation.
1. Water and/or sanitary sewer lines shall be a minimum of two feet from the edge of the curb and gutter.

2. Encroachment onto city maintained right of way shall follow conditions of the applicable encroachment agreement or franchise agreement.

3. For hydrant location see Public Utilities Standard Detail W-4.

4. Pue to be expanded on a case by case basis as needed to accommodate private utilities appurtenant facilities and equipment.
NOTE: SEE STANDARD DETAIL T-20.05 FOR PAVEMENT MARKING PLACEMENT

DETAIL SHOWING TYPICAL LOCATION OF SIDEWALK ACCESS RAMPS, PEDESTRIAN CROSSWALKS AND STOP BARS.

FOR RAMPS AT ASPHALT TO ASPHALT STREET TYPE DRIVEWAYS OR PRIVATE STREET TIE IN.
TYPE N-1 (CURB TYPE)

1. 8.33% (12:1) MAX RAMP SLOPE
2. CROSS SLOPE: 2.00%
3. CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.
4. RAMPS AND DOMES SHALL BE INSTALLED THE SAME WIDTH AS THE SIDEWALK.
5. IF LENGTH EXCEEDS 5', TRUNCATED DOMES SHALL BE INSTALLED ALONG THE BACK OF THE CURB COVERING THE FULL WIDTH OF THE RAMP.

CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP OR TRANSITION TO STREET.

TYPE N-1A (FLARE TYPE)

NOTE: USE SMALL FLARES ONLY WHEN A CURB TYPE DIRECTLY CONFLICTS WITH APPROACHING VEHICULAR TURNING MOVEMENTS.

TYPE N-2 (RADIUS)

CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP OR TRANSITION TO STREET.

TYPE N-2 (TEE INTERSECTION)

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS  DATE 8/1/18  NOT TO SCALE
CURB RAMPS
(NEW DEVELOPMENT)
T-20.01.2
NOTE: * USE SMALL FLARE ONLY WHEN A CURB WOULD DIRECTLY CONFLICT WITH APPROACHING VEHICLE TURNING MOVEMENTS.

**TYPE N-3**

1. 8.33% (12:1) MAX RAMP SLOPE
2. CROSS SLOPE: 2.00%
3. CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.
4. RAMPS AND DOMES SHALL BE INSTALLED THE SAME WIDTH AS THE SIDEWALK.

**TYPE N-3A**

(COMMERCIAL/RETAIL USE)
CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.

1. SLOPE TO MEET GRADE, 15' MAXIMUM.
2. CROSS SLOPE: 2.00%
3. Curb ramps require a (4'-0") minimum landing with a maximum cross slope and longitudinal slope of 2.00% where pedestrians perform turning maneuvers. Slope to drain to curb.
4. Ramps and domes shall be installed the same width as the sidewalk.
5. If length exceeds 5', truncated domes shall be installed along the back of the curb covering the full width of the ramp.

CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP OR TRANSITION TO STREET.

TYPE N-4

1/2" EXPANSION JOINT (TYP)

6" W X 12" D CONCRETE CURB

SIDEWALK

GRASS STRIP

LANDING

12" D. (TYP)

1/2" EXPANSION JOINT (TYP)

DETECTABLE WARNING SURFACE (TYP)

R=1' (TYP)

6" (TYP)

4" MIN

6" (TYP)

4" MIN

CONCRETE DEPTH

RAMP 6"

LANDING 4"

TYPE N-4A

CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP OR TRANSITION TO STREET.
CURB RAMPS (RETROFIT)

T-20.01.5

CITY OF RALEIGH

STANDARD DETAIL

REVISIONS | DATE 8/1/18

NOT TO SCALE

1. 8.33% (12:1) MAX RAMP SLOPE
2. CROSS SLOPE: 2.00%
3. CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.
4. RAMPS AND DOMES SHALL BE INSTALLED THE SAME WIDTH AS THE SIDEWALK.

TYPE R-1

TYPE R-2

(USE ONLY WHERE WATER WILL NOT POND WITHIN LANDING)

TYPE R-2A

TYPE R-2B
CURB RAMPS

**TYPE R-3**

1. 8.33% (12:1) MAX RAMP SLOPE
2. CROSS SLOPE: 2.00%
3. CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00%, WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.
4. RAMPS AND DOMES SHALL BE INSTALLED THE SAME WIDTH AS THE SIDEWALK.

**TYPE R-4**

- 1/2" EXPANSION JOINT (TYP)
- 6" W X 12"D CONCRETE CURB
- DEPRESSED 2'-6" CURB & GUTTER
- 1/2" EXPANSION JOINT (TYP)
- R=1' (TYP)
- 6" W X 12"D CONCRETE CURB
- DEPRESSED 2'-6" CURB & GUTTER
- DEPRESSED 2'-6" CURB & GUTTER (HEIGHT VARIES, CURB REVEAL DETERMINED BY FLARE SLOPE).

**CONCRETE DEPTH**

| SIDE RAMPS | 4" |
| LANDING & CURB RAMPS | 6" |
1. 8.33% (12:1) MAX RAMP SLOPE
2. CROSS SLOPE: 2.00%
3. CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 2.00% WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.
4. RAMPS SHALL BE INSTALLED THE SAME WIDTH AS THE SIDEWALK.

**CONCRETE DEPTH**

<table>
<thead>
<tr>
<th>Surface</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIDE RAMPS</td>
<td>4&quot;</td>
</tr>
<tr>
<td>LANDING &amp; CURB RAMPS</td>
<td>6&quot;</td>
</tr>
</tbody>
</table>

**LARGER RADIUS**

15' OR GREATER

**ONLY TO BE USED WITH CITY OF RALEIGH APPROVAL.**
1. CITY OF RALEIGH STANDARD CURB RAMPS HAVE BEEN DEVELOPED IN ACCORDANCE WITH THE AMERICANS WITH DISABILITIES ACT (ADA) AND PUBLIC RIGHT OF WAY ACCESS GUIDELINES (PROWAG).

2. CURB RAMPS SHALL BE PROVIDED AT LOCATIONS AS SHOWN ON THE PLANS OR AS DIRECTED BY THE ENGINEER. SIDEWALK ACCESS RAMPS SHALL BE LOCATED AS INDICATED IN THE DETAIL, HOWEVER, THE LOCATION MAY BE ADJUSTED IN COORDINATION WITH THE CITY OF RALEIGH WHERE EXISTING LIGHT POLES, FIRE HYDRANTS, DROP INLETS, ETC. AFFECT PLACEMENT.

3. DOUBLE WHEELCHAIR RAMPS ARE TO BE INSTALLED AT ALL PUBLIC STREET INTERSECTIONS WHERE SIDEWALK IS REQUIRED.

4. THE WALKING SURFACE SHALL BE SLIP RESISTANT. THE COLOR FOR THE DETECTABLE WARNING AREA SHALL BE YELLOW FOR CONTRAST.

5. NO SLOPE ON THE SIDEWALK ACCESS RAMP SHALL EXCEED 1”/FT (12:1) IN RELATIONSHIP TO THE GRADE OF THE STREET.

6. IN NO CASE SHALL THE WIDTH OF THE SIDEWALK ACCESS RAMP BE LESS THAN 48” ALL RAMPS SHALL BE INSTALLED THE SAME WIDTH AS THE SIDEWALK.

7. USE CLASS A (3000 PSI) CONCRETE WITH A SIDEWALK FINISH IN ORDER TO OBTAIN A ROUGH NONSKID SURFACE.

8. A 1/2” EXPANSION JOINT INSTALLED FULL DEPTH WILL BE REQUIRED WHERE THE CONCRETE SIDEWALK ACCESS RAMP JOINS THE CURB AND ALSO WHERE NEW CONCRETE ABUTS EXISTING CONCRETE.

9. CURB RAMPS SHOULD BE PLACED PARALLEL TO THE DIRECTION OF TRAVEL.
MEDIAN ISLAND Curb Ramps (Medians wider than 20')

Monolithic Concrete Island

Detectable Warning Domes (Yellow)

Concrete Pedestrian Refuge

Triangular Islands may be constructed with only 2 points of entry and exit as shown in the roadway plans.

5" Monolithic Concrete Island

1/2" Expansion Joint (Typ)

T-20.02
CONCRETE PEDESTRIAN REFUGE

1/2" EXPANSION JOINT (TYP)

5:1 SLOPE

VARIABLE (SEE PLANS)

6' (TYP)
4' MIN

5" CONCRETE MONOLITHIC ISLAND

USE 12" X 12" PAVERS
DETECTABLE WARNING SURFACE (YELLOW)

VARY (6' MIN)
(SEE PLANS)

PROFILE VIEW

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS
DATE: 8/1/18
NOT TO SCALE

PEDESTRIAN REFUGE

T-20.03
NOTES:

1. DETECTABLE WARNING DOMES SHALL COVER 2'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON DETAIL. SIZE OF PAVER SHALL BE 1' X 1'.

2. THE COLOR FOR THE DETECTABLE WARNING AREA SHALL BE YELLOW FOR CONTRAST.
1. Detectable warning domes shall cover 2'-0" length and full width of the ramp floor as shown on detail.

2. The color for the detectable warning area shall be yellow for contrast.
NOTES:
1. DETECTABLE WARNING DOMES SHALL COVER 2'-0" LENGTH AND FULL WIDTH OF THE RAMP FLOOR AS SHOWN ON DETAIL.

2. THE COLOR FOR THE DETECTABLE WARNING AREA SHALL BE YELLOW FOR CONTRAST.
NOTES:

1. HI-VISIBILITY CROSSWALKS SHOULD ONLY BE USED AT CROSSINGS WHERE THE INTERSECTION IS SIGNALIZED OR UN-CONTROLLED BY ANY TRAFFIC CONTROL DEVICE (e.g. STOP SIGN).

2. THE CROSSWALK LINE SHOULD BE PLACED AT THE ANGLE OF THE TRAVEL LANE AND TRAVERSE THE PEDESTRIAN CROSSING.

3. A CROSSWALK LINE SHOULD BE PLACED TO AVOID WHEEL PATHS. THIS IS IDEALLY DONE BY CENTERING THE LINES AT THE EDGE OF EACH TRAVEL LANE AND IN THE CENTER OF EACH TRAVEL LANE. DUE TO VARYING LANE WIDTHS THIS IS SOMETIMES NOT POSSIBLE.

4. PLACE STOP BARS A MINIMUM OF 4 FEET FROM NEAREST CROSSWALK LINE. STOP BARS AT SIGNALIZED INTERSECTIONS SHOULD BE COORDINATED WITH THE CITY OF RALEIGH TRANSPORTATION OPERATIONS DIVISION OR AS DIRECTED BY THE ENGINEER.

5. CURB RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE TO THE LATEST CITY OF RALEIGH STANDARD DRAWINGS.
NOTES:
1. TRANSVERSE EXPANSION JOINTS TO BE A MAXIMUM OF 50 FEET.
2. ALL CONCRETE TO BE 3000 PSI AND FINISHED WITH CURING COMPOUND.
3. A 1-INCH DEPTH IS REQUIRED AT LOCATIONS OF DRIVEWAY CROSSINGS, AT STREET INTERSECTIONS (ALONG THE LENGTH OF CURB RETURNS), AND IN THE HANDICAP RAMPS.
TRANSVERSE EXPANSION JOINT

NOTES:
1. TRANSVERSE EXPANSION JOINTS TO BE A MAXIMUM OF 50 FEET APART.
2. ALL CONCRETE TO BE FINISHED WITH CURING COMPOUND.
3. A 6 INCH DEPTH IS REQUIRED.
4. SAW CUT JOINTS EVERY 10 FEET OR SAME AS WIDTH. WHICHEVER IS LESS.
5. NO UTILITY SURFACE COVERS/PLATES/MANHOLES (i.e. WATERLINE VALVE COVERS, ETC.) SHALL BE LOCATED WITHIN PATH AND SHALL BE MINIMUM 1 FOOT FROM THE EDGE OF PATH.
6. ALL PATHS SHALL BE LOCATED MINIMUM 6 FEET FROM THE BACK OF CURB.
7. MULTI-USE PATH WIDTH TO BE DETERMINED BY CITY OF RALEIGH BASED ON ROADWAY TYPE, LOCATION AND PEDESTRIAN VOLUMES.
CONCRETE PAVER
2 3/8" (60 MM) MIN. THICKNESS
1" TO 1 1/2" (25 - 40 MM)
COMPACTED BEDDING SAND
COMPACTED AGGREGATE BASE
4" (100 MM) MIN. THICKNESS
COMPACTED SOIL SUBGRADE

ALUMINUM EDGE RESTRAINT
BRICK OR CONCRETE PAVER
2 3/8" (60 MM) MIN. THICKNESS
1" TO 1 1/2" (25 - 40 MM)
COMPACTED BEDDING SAND
COMPACTED AGGREGATE BASE
4" (100 MM) MIN. THICKNESS
COMPACTED SOIL SUBGRADE

SECTION 1

CONCRETE CURB
SET 1/4" (7 MM) BELOW TOP OF PAVERS
AND CONTROL JOINTS @ 15' (4.58 M) OC

SECTION 2

NOTES:
1. BRICK OR CONCRETE PAVERS ALLOWED ONLY UNDER SPECIAL CONDITIONS.
2. THICKNESS OF BASE MAY VARY WITH SUBGRADE/TRAFFIC CONDITIONS.
3. SCATTER SAND OR SCREENINGS OVER COMPLETE WORK AND SWEEP INTO CRACKS.
4. CONCRETE PAVERS SHOULD CONFORM TO REQUIREMENTS OF ASTM C-1319.
   BRICK PAVERS SHOULD CONFORM TO REQUIREMENTS OF ASTM C902-95
5. SEE CITY OF RALEIGH CODE SECTION 10-7001 (D) FOR CONDITIONS UNDER
   WHICH CONCRETE / BRICK PAVERS ARE ALLOWED.

CITY OF RALEIGH
STANDARD DETAIL
T-30.03
City of Raleigh
Standard Details

Tree Protection and Planting
1. Tree Protection Fencing must be installed at a minimum radius of the critical root zone.
2. The tree protection fencing must remain in place for the duration of the project unless otherwise approved by Urban Forestry staff.
3. Approved impact protection devices must be removed after applicable.
4. Signs shall be placed at least 50' maximum intervals. Place a sign at each end of near tree protection area and at the center of the protected area.
5. Signs shall be placed at 50' maximum intervals. Place a sign at each end of near tree protection and 50'.
6. Attach signs securely to any fencing. Use sign brackets (not shown).
7. Signs shall be placed at 50' maximum intervals. Place a sign at each end of near tree protection area and at the center of the protected area.
8. Signs are to be made of durable, weatherproof material with letters a minimum of 3" high, clearly legible and spaced as shown.

Contact Information:
City of Raleigh Parks, Recreation and Cultural Resources Department
Urban Forester:
Trees@RaleighNC.gov
www.RaleighNC.gov
NOTES:
1. CONTRACTOR MUST PROVIDE AND INSTALL TREE PROTECTION SIGNAGE.
2. A TREE IMPACT PERMIT IS REQUIRED PRIOR TO INITIATION OF CONSTRUCTION IF ANY TREES ON CITY PROPERTY ARE TO BE IMPACTED BY PRUNING, TRENCHING, BORING, REMOVAL, PAVING, PLANTING, ETC.
NOTES:
1. TREES MUST MEET THE TREE QUALITY STANDARDS IN CH. 2 OF THE CITY TREE MANUAL.
2. CONTRACTOR IS RESPONSIBLE FOR ADEQUATE DRAINAGE OF ALL PLANTING PITS. (POSITIVE DRAINAGE AWAY FROM PIT)
3. TREES SHALL BE PLANTED BETWEEN OCTOBER 1ST AND APRIL 30TH.
4. A TREE IMPACT PERMIT IS REQUIRED.
5. ELECTRICAL OUTLETS AND OTHER UTILITIES ARE PROHIBITED IN THE PLANTING AREA IMMEDIATELY SURROUNDING THE TREE.
6. IF STAKING IN ACCORDANCE WITH THE CITY TREE MANUAL, THE STAKING MUST BE REMOVED WITHIN ONE YEAR
7. TREES WILL HAVE A MINIMUM 1 YEAR WARRANTY AFTER THE INITIAL PLANTING IS APPROVED BY THE CITY.
TRENCHING/TUNNELING NEAR EXISTING TREES

1. TRENCHING IS PERMITTED OUTSIDE OF THE CRZ
2. TRENCHING SHALL OCCUR OUTSIDE THE CRZ
   2.1. TUNNELING AND BORING IS PERMITTED WITHIN THE CRZ AS LONG AS IT IS 30 INCHES DEEP OR GREATER. EXCAVATIONS AND HAND HOLES SHALL BE OUTSIDE THE CRZ.
   2.2. ENCROACHMENT INTO THE CRZ REQUIRES APPROVAL FROM THE URBAN FORESTER
3. ROOTS MUST BE PRUNED TO A CLEAN CUT. CUTTING OR PRUNING OF ROOTS 2" OR LARGER IS PROHIBITED.
4. IF EXCAVATION CAUSES PRUNED ROOTS OVER 1.5" IN DIAMETER TO REMAIN EXPOSED FOR MORE THAN 24 HOURS, ROOTS ON TREE SIDE MUST BE KEPT MOIST.
5. A TREE IMPACT PERMIT IS REQUIRED PRIOR TO INITIATION OF CONSTRUCTION IF ANY TREES ON CITY PROPERTY ARE TO BE IMPACTED BY PRUNING, TRENCHING, BORING, REMOVAL, PAVING, PLANTING, ETC.

MIN. (FT) = DBH (IN) x 1.25

EX. TREE DBH

CONTACT INFORMATION:
CITY OF RALEIGH PARKS, RECREATION AND CULTURAL RESOURCES DEPARTMENT URBAN FORESTER: TREES@RALEIGHNC.GOV
WWW.RALEIGHNC.GOV
A TREE IMPACT PERMIT IS REQUIRED.

ADHERE TO STANDARDS IN THE CITY TREE MANUAL.

CONTACT INFORMATION:
CITY OF RALEIGH PARKS, RECREATION AND CULTURAL RESOURCES DEPARTMENT URBAN FORESTER:
TREES@RALEIGHNC.GOV
WWW.RALEIGHNC.GOV

NOTES:
1. A TREE IMPACT PERMIT IS REQUIRED.
2. ADHERE TO STANDARDS IN THE CITY TREE MANUAL.

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WWW.RALEIGHNC.GOV

NOTES:

PRIMARY LINES
1. OVERHEAD 8 FEET
2. SIDE 7.5 FEET
3. BELOW 6 FEET
4. NEUTRAL 2 FEET

SECONDARY LINES
1. OVERHEAD 6 FEET
2. SIDE 4 FEET
3. BELOW 4 FEET
4. NEUTRAL 2 FEET

COMMUNICATION LINES
(SERVICE/PHONE/CABLE/FIBER OPTIC LINES, ETC.)
1. OVERHEAD 2 FEET
2. SIDE 2 FEET
3. BELOW 2 FEET
1. Grate design must be ADA compliant.
2. General pattern design must be as shown.
3. Exceptions or personalization must be reviewed and approved by the City of Raleigh.
4. A tree impact permit is required.
5. Adhere to standards in the City Tree Manual.
6. Electric outlets and other utilities are prohibited in the grate area.

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trees@raleighnc.gov
www.raleighnc.gov

Gray Iron, Rectangular 4'x6', 1.5" min. thick, with 1/4" opening or less

Notes:
- All dimensions shown are in English
- Material: Cast Gray Iron ASTM A-48, Class 35B
- Finish: No Paint
- Weight: 608#/set
NOTES:

1. A SITE SPECIFIC PLAN MUST BE DEVELOPED TO ENSURE THAT:
   1.1. EACH TREE IS PROVIDED A MIN. ROOT-ACCESSIBLE SOIL VOLUME OF 600 CUBIC FEET.
   1.2. THE TREE ROOT AREA BENEATH THE SIDEWALK IS EXPANDED TO MAXIMIZE ROOT ACCESSIBLE SOIL SPACE UNDER THE PAVEMENT.
   1.3. CONNECT SOIL SPACE FOR ROOT EXPANSION WHERE POSSIBLE TO ALLOW ROOT SYSTEMS OF TREES TO OVERLAP AND COLONIZE A SHARED SOIL SPACE.
   1.4. ANY COMBINATION OF STRUCTURAL SOILS, SOIL CONTAINMENT SYSTEM (e.g., SILVA CELL), OR ROOT CHANNELING (e.g., SOIL STRIP DRAIN/AERATION SYSTEM) THAT PERFORMS AS SPECIFIED IS ACCEPTABLE.

3. 40' X 6' WIDTH MINIMUM APPLIES TO BOTH STRUCTURAL SOILS AND SUBSURFACE SOIL CONTAINMENT SYSTEMS.

4. SUBSURFACE APPLICATION SHALL BE REVIEWED AND APPROVED BY CITY OF RALEIGH PARKS, RECREATION AND CULTURAL RESOURCES URBAN FORESTRY DIVISION PRIOR TO INSTALLATION.

CITY OF RALEIGH
STANDARD DETAIL

CONTACT INFORMATION:
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URBAN FORESTER: TREES@RALEIGHNC.GOV
WWW.RALEIGHNC.GOV

TPP-07
NOTES:

1. TREE PROTECTION FENCING MUST BE INSTALLED AT A MINIMUM RADIUS OF THE CRITICAL ROOT ZONE (SEE DETAIL TPP-02 FOR EXAMPLES).
2. THE TREE PROTECTION FENCING MUST REMAIN IN PLACE FOR THE DURATION OF THE PROJECT UNLESS OTHERWISE APPROVED BY URBAN FORESTRY STAFF.
3. APPROVED IMPACT PROTECTION DEVICES MUST BE REMOVED AFTER CONSTRUCTION WHEN APPLICABLE.
4. SIGNS SHALL BE PLACED AT 50' MAXIMUM INTERVALS. PLACE A SIGN AT EACH END OF LINEAR TREE PROTECTION AND 50' ON CENTER FOR THE REMAINDER.
5. FOR TREE PROTECTION AREAS LESS THAN 200' IN PERIMETER, PROVIDE NO LESS THAN ONE SIGN PER PROTECTED AREA.
6. ATTACH SIGNS SECURELY TO FENCE POSTS AND FABRIC.
7. ADDITIONAL SIGNS MAY BE REQUIRED BY CITY OF RALEIGH BASED ON ACTUAL FIELD CONDITIONS.
8. SIGNS ARE TO BE MADE OF DURABLE, WEATHERPROOF MATERIAL WITH LETTERS A MINIMUM OF 3" HIGH, CLEARLY LEGIBLE AND SPACED AS SHOWN.
9. FLOW SHALL NOT RUN PARALLEL WITH THE FENCE. END OF SILT FENCE NEEDS TO BE TURNED UPHILL.
10. SEE NC STATE DENR PRACTICE STANDARDS ¾ SPECIFICATIONS SILT FENCE SET FOR CONDITIONS WHERE APPLIES. PLANNING CONSIDERATIONS & DESIGN CRITERIA. (HOWEVER, FLOW SHALL NOT RUN PARALLEL WITH THE TOE OF THE FENCE.)

CONTACT INFORMATION:
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2" X 4" WOOD SLATS, BETWEEN WOOD SLATS WITH A MINIMUM OF 3 SLATS PER TREE

EXIST TREE TRUNK

ROPE OR STEEL STRAPPING AROUND THE 2X4 WOOD SLATS

12" FROM LOWEST BRANCH

EXIST TREE BRANCH

EXIST GROUND

2" X 4" WOOD SLATS, MAXIMUM 3 INCH SPACING BETWEEN WOOD SLATS WITH A MINIMUM OF 3 SLATS PER TREE

ORANGE PLASTIC CONSTRUCTION FENCE WRAPPED TO A MINIMUM OF 3 LAYERS OUTSIDE SLATS

NOTE: NO SLATS, ROPE, STEEL STRAPPING OR PLASTIC CONSTRUCTION FENCE SHALL BE ATTACHED TO, ANCHORED TO OR TIED TO THE TREE.

SECTION A - A