City of Raleigh

Raleigh Street Design Details

Adopted AUGUST, 2020
PREFACE

The standard detail drawings contained in this manual will apply to all new infrastructure construction plans submitted on or after August, 2020. 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: Mobility Strategy and Infrastructure Manager - 919-996-3030
Greenways: Greenway Planning Manager - 919-996-3285
GSI: Assistant Director of Engineering Services - 919-996-3940
Stormwater: Assistant Director of Engineering Services - 919-996-3940
Transit: Mobility Strategy and Infrastructure Manager - 919-996-3030
Transportation: Mobility Strategy and Infrastructure Manager - 919-996-3030
Tree Protection and Planting: Capital Projects Superintendent - 919-996-3285
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# CITY OF RALEIGH
## STANDARD DETAILS
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<td>STD#</td>
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City of Raleigh

Standard Details

Bicycle Facilities
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, \( W_1 \)
WHERE ADJACENT TO THE EDGE OF PAVEMENT, THE BIKE LANE WIDTH (EXCLUDING THE GUTTER PAN) SHOULD BE: 5’ DESIRED 4’ MINIMUM

BIKE LANE WIDTH, \( W_2 \)
WHERE ADJACENT TO A PARKING LANE, THE BIKE LANE WIDTH SHOULD BE: 5’ MINIMUM, 6’ DESIRED 2’ STRIPED BUFFER DESIRED

BIKE LANE WIDTH, \( W_3 \)
THE PARKING LANE WIDTH (INCLUDING THE GUTTER PAN) SHOULD BE: 8’ DESIRED 7.5’ MINIMUM

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

CITY OF RALEIGH
STANDARD DETAIL

MEDIAN TRANSITIONS
END BIKE LANE AND PLACE SHARED LANE MARKINGS IN THE CENTER OF THE TRAVEL LANE THROUGH A MEDIAN AREA

PARKING LANE WIDTH, \( W_3 \)
THE PARKING LANE WIDTH (INCLUDING THE GUTTER PAN) SHOULD BE: 8’ DESIRED 7.5’ 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.
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 1 of 5, 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 LANES 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.

CITY OF RALEIGH
STANDARD DETAIL
REVISIONS DATE: 8/2020 NOT TO SCALE

B-10.05
Curb

Wheel Stop

Street

Sidewalk

NOTES:
1. Wheel stops to be equipped with retroreflective markings.
2. Angled racks may also be used.

4" Solid White Thermoplastic Strip

15"

Wheel Stop

33"

5'

3'

2' min

12"
BIKE RACK DETAILS

35"
33-36"

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 DETAIL

STANDARD BIKE RACK
City of Raleigh
Standard Details
GREENWAY
INSET 1

CONDITIONS PERMIT USE "INSET 1" WHEN CONDITIONS PERMIT

ORIGINAL GROUND

2:1 MAX

TYPICAL SECTION

VARIABLE WIDTH (8' MIN, 14' MAX)

ORIGINAL GROUND

2:1 MAX

2' MIN, 4' PREF

SHLD

6:1 MAX

GRADE TO THIS LINE

6' SHLD

4' W/ SAFETY RAIL

SAFETY RAILING

SEE NOTE 8 ON GW-10.01.2

J2

V1

C1

0.015*

0.015*

T

3'

6'

J1

8"

6:1 MAX

TYPICAL SECTION

* 0.02 MAX

ORIGINAL GROUND

2:1 MAX

2' MIN, 4' PREF

SHLD

0.015

SEE NOTE 9 ON GW-10.01.2

INSET 1

ASPHALT TYPICAL TRAIL SECTION

VARIABLE WIDTH (8' MIN, 14' MAX)

PAVEMENT SCHEDULE

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<tr>
<th>Code</th>
<th>Description</th>
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<tr>
<td>C1</td>
<td>2&quot; ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 220 LBS. PER SQ. YD. OR 110 LBS. PER SQ. YD. IN EACH OF TWO LAYERS</td>
</tr>
<tr>
<td>J1</td>
<td>6&quot; AGGREGATE BASE COURSE</td>
</tr>
<tr>
<td>J2</td>
<td>VARIABLE DEPTH AGGREGATE BASE COURSE</td>
</tr>
<tr>
<td>T</td>
<td>EARTH MATERIAL</td>
</tr>
<tr>
<td>V1</td>
<td>GEOTEXTILE FOR PAVEMENT STABILIZATION</td>
</tr>
</tbody>
</table>

CITY OF RALEIGH

STANDARD DETAIL

REVISIONS DATE: 12/2022

ASPHALT TYPICAL TRAIL SECTION

VARIABLE WIDTH (8' MIN, 14' MAX)

GW-10.01.1
1. TRAIL WIDTH TO BE DETERMINED BY CITY OF RALEIGH.

2. WHEN CONDITIONS PERMIT, USE 6' SHOULDER IN FILL SECTIONS AND 4' SHOULDER IN CUT SECTIONS. USE MINIMUM 2' SHOULDER IN CUT AND FILL SECTIONS. FOR CUT SECTION CONDITION SHOWN IN "INSET 1," APPLY ENGINEERING JUDGMENT TO DETERMINE IF UPHILL SIDE REQUIRE A SWALE.

3. TRAILS OR TRAIL SEGMENTS OF ANY LENGTH MAY BE CONSTRUCTED WITH RUNNING SLOPES/VERTICAL GRADES UP TO 1:20 (5%). TO ACCOMMODATE STEEP TERRAIN, TRAILS MAY BE DESIGNED WITH STEEPER SECTIONS OF CONSTRAINED LENGTH AS SHOWN IN TABLE 1. RESTING INTERVALS WITH FLATTER GRADES ARE REQUIRED BETWEEN TRAIL SEGMENTS ANY TIME THE RUNNING SLOPE EXCEEDS 1:20 (5%). RESTING INTERVALS SHALL BE LOCATED ON UPHILL SIDE OF TRAIL IF ONLY PROVIDED ON ONE SIDE.

4. TO ENSURE THAT A TRAIL IS NOT DESIGNED AS A SERIES OF STEEP SEGMENTS, NO MORE THAN 30% OF THE TOTAL LENGTH OF TRAIL MAY HAVE A RUNNING SLOPE/VERTICAL GRADE of 7.5% (8.33% OR 1:12 MAX). RESTING INTERVALS MUST BE PROVIDED MORE FREQUENTLY AS THE RUNNING SLOPE INCREASES.

5. RUNNING SLOPE/VERTICAL GRADE RECOMMENDATIONS MAY NOT BE ABLE TO BE ACHIEVED FOR TRAIL REPLACEMENT PROJECTS. FOR THESE TYPES OF PROJECTS, REPLACEMENT OF THE EXISTING CONDITION IN KIND IS SUFFICIENT.

6. 1.5% (2.08% OR 1:48 MAX) CROSS SLOPE. CROSS SLOPE DIRECTION VARIES. SLOPE SHOULDERS FOR POSITIVE DRAINAGE. OFTEN REQUIRES CONTINUING PAVEMENT OR SHOULDER SLOPE UNTIL TIE-IN WITH NATURAL GROUND. SEE PLAN SHEETS AND CROSS SECTIONS.

7. WHEN CONDITIONS PERMIT, SHOULDERS TO MATCH CROSS SLOPE OF TRAIL AND SIDE SLOPES TO BE 3:1 OR FLATTER.

8. PROVIDE A SAFETY RAIL FOR THE FOLLOWING CIRCUMSTANCES WITHIN 6' OF THE EDGE OF PAVEMENT: 1) SLOPE > 3:1 AND DROP OF 6'; 2) SLOPE > 2:1 AND DROP OF 4'; 3) SLOPE > 1:1 AND DROP OF 1'. REFER TO GW-20.01 AND GW-20.02 FOR SAFETY RAIL DETAILS.

9. CONTRACTOR GRADE SEED SHALL BE SEWN INTO AGGREGATE BASE COURSE ON SHOULDERS AT THE SURFACE.

10. CONTRACTOR IS RESPONSIBLE FOR RE-ESTABLISHING ALL SLOPES DISTURBED DURING CONSTRUCTION.

11. PROOF ROLLING SHALL OCCUR IN PRESENCE OF THE OWNER OR THE OWNER'S TESTING AGENCY AT THE FOLLOWING STAGES: 1) PRIOR TO PLACING FILL IN LOW AREAS; 2) AFTER THE PREPARATION OF SUBGRADE PRIOR TO PLACING ABC; 3) AFTER THE PLACEMENT OF ABC PRIOR TO PAVING.

12. PAVEMENT EDGE SLOPES ARE 1:1 UNLESS OTHERWISE NOTED.

13. NO ABOVE-GROUND UTILITIES OR UTILITY SURFACE COVERS/PLATES/MANHOLES SHALL BE LOCATED WITHIN THE TRAIL AND SHALL BE A MINIMUM OF 2' FROM THE EDGE OF TRAIL. RAISED MANHOLES SHALL BE A MINIMUM OF 4' FROM THE EDGE OF TRAIL.

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**TABLE 1 - MAXIMUM RUNNING SLOPE AND TRAIL SEGMENT LENGTH**

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<tr>
<th>RUNNING SLOPE</th>
<th>MAX LENGTH OF SEGMENT</th>
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<tbody>
<tr>
<td>1:20 (5%)</td>
<td>200 FT</td>
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<tr>
<td>1:12 (8.33%)</td>
<td>30 FT</td>
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CONCRETE TYPICAL TRAIL SECTION
VARIABLE WIDTH (8' MIN, 14' MAX)

PAVEMENT SCHEDULE

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>A1</td>
<td>4.5&quot; CONCRETE TRAIL, 3,000 PSI, FINISHED WITH CURING COMPOUND, BRUSHED CONCRETE TEXTURE</td>
</tr>
<tr>
<td>J1</td>
<td>6&quot; AGGREGATE BASE COURSE</td>
</tr>
<tr>
<td>J2</td>
<td>VARIABLE DEPTH AGGREGATE BASE COURSE</td>
</tr>
<tr>
<td>T</td>
<td>EARTH MATERIAL</td>
</tr>
<tr>
<td>V1</td>
<td>GEOTEXTILE FOR PAVEMENT STABILIZATION</td>
</tr>
</tbody>
</table>

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS: DATE: 12/2022

CONCRETE TYPICAL TRAIL SECTION
VARIABLE WIDTH (8' MIN, 14' MAX)

GW-10.02.1
CONCRETE TYPICAL TRAIL SECTION VARIABLE WIDTH (8' MIN, 14' MAX) - NOTES:

1. TRAIL WIDTH TO BE DETERMINED BY CITY OF RALEIGH.

2. WHEN CONDITIONS PERMIT, USE 6' SHOULDERS IN FILL SECTIONS AND 4' SHOULDERS IN CUT SECTIONS. USE MINIMUM 2' SHOULDERS IN CUT AND FILL SECTIONS. FOR CUT SECTION CONDITION SHOWN IN "INSET 1," APPLY ENGINEERING JUDGMENT TO DETERMINE IF UPHILL SIDE REQUIRES A SWALE.

3. TRAILS OR TRAIL SEGMENTS OF ANY LENGTH MAY BE CONSTRUCTED WITH RUNNING SLOPES/VERTICAL GRADES UP TO 1:20 (5%). TO ACCOMMODATE STEEP TERRAIN, TRAILS MAY BE DESIGNED WITH STEEPER SECTIONS OF CONSTRAINED LENGTH AS SHOWN IN TABLE 1. RESTING INTERVALS WITH FLATTER RUNNING SLOPES ARE REQUIRED BETWEEN TRAIL SEGMENTS ANYTIME THE RUNNING SLOPE EXCEEDS 1:20 (5%). RESTING INTERVALS SHALL BE LOCATED ON UPHILL SIDE OF TRAIL IF ONLY PROVIDED ON ONE SIDE.

4. TO ENSURE THAT A TRAIL IS NOT DESIGNED AS A SERIES OF STEEP SEGMENTS, NO MORE THAN 30% OF THE TOTAL LENGTH OF TRAIL MAY HAVE A RUNNING SLOPE/VERTICAL GRADE OF 7.5% (8.33% OR 1:12 MAX). RESTING INTERVALS MUST BE PROVIDED MORE FREQUENTLY AS THE RUNNING SLOPE INCREASES.

5. RUNNING SLOPE/VERTICAL GRADE RECOMMENDATIONS MAY NOT BE ABLE TO BE ACHIEVED FOR TRAIL REPLACEMENT PROJECTS. FOR THESE TYPES OF PROJECTS, REPLACEMENT OF THE EXISTING CONDITION IN KIND IS SUFFICIENT.

6. 1.5% (2.08% OR 1:48 MAX) CROSS SLOPE. CROSS SLOPE DIRECTION VARIES. SLOPE SHOULDERS FOR POSITIVE DRAINAGE. OFTEN REQUIRES CONTINUING PAVEMENT OR SHOULDER SLOPE UNTIL TIE-IN WITH NATURAL GROUND. SEE PLAN SHEETS AND CROSS SECTIONS.

7. WHEN CONDITIONS PERMIT, SHOULDERS TO MATCH CROSS SLOPE OF TRAIL AND SIDE SLOPES TO BE 3:1 OR FLATTER.

8. PROVIDE A SAFETY RAIL FOR THE FOLLOWING CIRCUMSTANCES WITHIN 6' OF THE EDGE OF PAVEMENT: 1) SLOPE > 3:1 AND DROP OF 6'; 2) SLOPE > 2:1 AND DROP OF 4'; 3) SLOPE > 1:1 AND DROP OF 1'. REFER TO GW-20.01 AND GW-20.02 FOR SAFETY RAIL DETAILS.

9. CONTRACTOR GRADE SEED SHALL BE SEWN INTO AGGREGATE BASE COURSE ON SHOULDERS AT THE SURFACE.

10. TRANSVERSE EXPANSION JOINTS TO BE MAXIMUM 50' APART. SAWCUT TRANSVERSE CONTROL JOINTS AT MAXIMUM 10' ON-CENTER OR AS OTHERWISE SHOWN ON PLANS.

11. CONTRACTOR IS RESPONSIBLE FOR RE-ESTABLISHING ALL SLOPES DISTURBED DURING CONSTRUCTION.

12. PROOF ROLLING SHALL OCCUR IN PRESENCE OF THE OWNER OR THE OWNER'S TESTING AGENCY AT THE FOLLOWING STAGES: 1) PRIOR TO PLACING FILL IN LOW AREAS; 2) AFTER THE PREPARATION OF SUBGRADE PRIOR TO PLACING ABC; 3) AFTER THE PLACEMENT OF ABC PRIOR TO POURING CONCRETE.

13. NO ABOVE-GROUND UTILITIES OR UTILITY SURFACE COVERS/PLATES/MANHOLES SHALL BE LOCATED WITHIN THE TRAIL AND SHALL BE A MINIMUM OF 2' FROM THE EDGE OF TRAIL. RAISED MANHOLES SHALL BE A MINIMUM OF 4' FROM THE EDGE OF TRAIL.

<table>
<thead>
<tr>
<th>TABLE 1 - MAXIMUM RUNNING SLOPE AND TRAIL SEGMENT LENGTH</th>
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<tbody>
<tr>
<td>RUNNING SLOPE</td>
</tr>
<tr>
<td>1:20 (5%)</td>
</tr>
<tr>
<td>1:12 (8.33%)</td>
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</tbody>
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UNPAVED TRAIL - NOTES:

1. TRAIL WIDTH TO BE DETERMINED BY CITY OF RALEIGH.

2. TRAIL TO BE FIRM AND STABLE. MATERIALS SUCH AS PACKED CRUSHED STONE, GRAVEL FINES COMPACTED WITH ROLLER, PACKED SOIL, AND OTHER NATURAL MATERIALS BONDED WITH SYNTHETIC MATERIALS CAN BE USED TO PROVIDE THE REQUIRED DEGREE OF STABILITY AND FIRMNESS. MATERIAL SELECTION TO BE APPROVED BY THE CITY.

3. TRAILS OR TRAIL SEGMENTS OF ANY LENGTH MAY BE CONSTRUCTED WITH RUNNING SLOPES/VERTICAL GRADES UP TO 1:20 (5%). TO ACCOMMODATE STEEP TERRAIN, TRAILS MAY BE DESIGNED WITH STEEPER SECTIONS OF CONSTRAINED LENGTH AS SHOWN IN TABLE 1. RESTING INTERVALS WITH FLATTER RUNNING SLOPES ARE REQUIRED BETWEEN TRAIL SEGMENTS ANYTIME THE RUNNING SLOPE EXCEEDS 1:20 (5%).

4. TO ENSURE THAT A TRAIL IS NOT DESIGNED AS A SERIES OF STEEP SEGMENTS, NO MORE THAN 30% OF THE TOTAL LENGTH OF TRAIL MAY HAVE A RUNNING SLOPE/VERTICAL GRADE EXCEEDING 1:12 (8.33%). THE RUNNING SLOPE MUST NEVER EXCEED 1:8 (12.5%). RESTING INTERVALS MUST BE PROVIDED MORE FREQUENTLY AS THE RUNNING SLOPE INCREASES.

5. RESTING INTERVALS MAY BE PROVIDED WITHIN THE TRAIL TREAD OR ADJACENT TO THE TRAIL TREAD. WHEN THE RESTING INTERVAL IS WITHIN THE TRAIL TREAD, IT MUST BE AT LEAST 60 INCHES LONG AND AT LEAST AS WIDE AS THE TRAIL. WHEN THE RESTING INTERVAL IS ADJACENT TO THE TRAIL, IT MUST BE AT LEAST 60 INCHES LONG AND 36 INCHES WIDE. RESTING INTERVALS SHALL BE LOCATED ON UPHILL SIDE OF TRAIL IF ONLY PROVIDED ON ONE SIDE.

6. IF COMPLIANCE CANNOT BE ACHIEVED FOR NOTES 2 THROUGH 5 ABOVE DUE TO CONDITIONS SUCH AS THE EXISTING TERRAIN, PREVAILING CONSTRUCTION PRACTICES, THE FUNCTION OR PURPOSE OF THE FACILITY, OR IF THE SETTING WOULD BECOME FUNDAMENTALLY ALTERED, THEN IT MUST BE DEMONSTRATED THAT THE STANDARDS CANNOT BE ACHIEVED.

7. FIVE PERCENT MAX CROSS SLOPE. CROSS SLOPE DIRECTION VARIES TO FACILITATE POSITIVE DRAINAGE.

8. PROVIDE A SAFETY RAIL FOR THE FOLLOWING CIRCUMSTANCES WITHIN 6' OF THE EDGE OF TRAIL: 1) SLOPE > 3:1 AND DROP OF 6'; 2) SLOPE > 2:1 AND DROP OF 4'; 3) SLOPE > 1:1 AND DROP OF 1'. REFER TO GW-20.01 AND GW-20.02 FOR SAFETY RAIL DETAILS.

9. CONTRACTOR IS RESPONSIBLE FOR RE-ESTABLISHING ALL SLOPES DISTURBED DURING CONSTRUCTION.

10. NO ABOVE-GROUND UTILITIES OR UTILITY SURFACE COVERS/PLATES/MANHOLES SHALL BE LOCATED WITHIN THE TRAIL AND SHALL BE A MINIMUM OF 2' FROM THE EDGE OF TRAIL. RAISED MANHOLES SHALL BE A MINIMUM OF 4' FROM THE EDGE OF TRAIL.

<table>
<thead>
<tr>
<th>TABLE 1 - MAXIMUM RUNNING SLOPE AND TRAIL SEGMENT LENGTH</th>
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<tbody>
<tr>
<td>RUNNING SLOPE</td>
</tr>
<tr>
<td>STEEPER THAN</td>
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<tr>
<td>1:20 (5%)</td>
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<tr>
<td>1:12 (8.33%)</td>
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<tr>
<td>1:10 (10%)</td>
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CITY OF RALEIGH
STANDARD DETAIL

UNPAVED TRAIL

GW-10.03.2
DRIVEWAY, SIDEWALK, AND TRAIL TIE-IN - NOTES:

1. The driveway, sidewalk, trail tie-in shall be built in accordance with the Americans with Disabilities Act (ADA) and Public Right-Of-Way Accessibility Guidelines (PROWAG).

2. The driveway, sidewalk, trail tie-in shall be placed parallel to the trail direction of travel.

3. Detectable warnings shall be installed along the back of curb covering the full width of the ramp.

4. For the trail apron, use Class A (3000 psi) concrete with a sidewalk finish in order to obtain a rough, nonskid surface.

5. A 1/2" expansion joint installed full depth will be required where the concrete ramp joins the curb and also where new concrete abuts existing concrete.

6. Remove and replace curb and gutter to nearest joint.

7. Bollards/booulders should be set back from the roadway edge a minimum of 7 feet and a maximum of 30 feet and will vary depending on location. Owner shall indicate which option is best for the site location. Bollard shall not be placed within the roadway right-of-way unless an approved right-of-way obstruction permit is secured with the City of Raleigh right-of-way services. See details GW-10.06, GW-10.07, and GW-10.08 for bollard/booulder details.

8. Stop sign (MUTCD R1-1) and no motor vehicles sign (MUTCD R5-3) shall be 0.063 gauge, 3105 alloy aluminum and shall conform to the Manual of Uniform Traffic Control Guidelines.

1. 8.33% (12:1) max ramp slope (drain to roadway)

2. Cross slope: Maximum 2.00%

3. Ramp requires a (4'-0") minimum landing with a maximum cross slope and longitudinal slope of 2.00% where pedestrians perform turning maneuvers. Slope to drain curb.
TRAIL PAVEMENT MARKINGS

NOTES:
1. TRAIL STRIPING MATERIAL SHALL BE STANDARD ROAD PAINT UNLESS OTHERWISE NOTED. UTILIZE NON-SLIP/NON-SKID STRIPING MATERIALS TO AVOID HAZARDS WHEN TRAILS ARE WET.
2. WHEN TRAIL STRIPING IS REQUIRED PER THE CITY OF RALEIGH, 4" WIDTH DASHED YELLOW CENTERLINE STRIPE IS TYPICALLY USED. 4" WIDTH SOLID YELLOW CENTERLINES ARE RECOMMENDED ON TIGHT OR BLIND CORNERS, ON TRAIL SWITCHBACKS, AND ON THE APPROACHES TO ROADWAY CROSSINGS. 4" WIDTH SOLID WHITE EDGE LINES OFFSET 4" FROM EDGE OF TRAIL SHALL ONLY BE USED WHEN HAZARDOUS CONDITIONS ARE PRESENT. THESE HAZARDOUS CONDITIONS INCLUDE BUT ARE NOT LIMITED TO WHEN A TRAIL IS ADJACENT TO A WALL OR STEEP SLOPE. ADDITIONAL TRAIL WIDTH IS TYPICALLY REQUIRED WHEN THESE HAZARDOUS CONDITIONS ARE PRESENT.
3. STRIPING AN ENVELOPE AROUND THE BOLLARD POST WITH 4" SOLID YELLOW IS RECOMMENDED. SEE GW-10.06, GW-10.07, AND GW-10.08 FOR BOLLARD DETAILS.
NOTES:

1. A PERMANENT BOLLARD IS TYPICALLY USED ON THE OUTSIDE OF TRAILS TO PREVENT UNAUTHORIZED MOTOR VEHICLE ENTRY. PERMANENT BOLLARDS MAY BE USED IN COMBINATION WITH HINGED BOLLARDS. IN SOME CASES, A PERMANENT BOLLARD CAN BE USED IN THE CENTER OF THE TRAIL IN LIEU OF A HINGED BOLLARD WHEN REQUESTED BY THE OWNER. SEE DETAIL GW-10.08 FOR THE VARIOUS BOLLARD COMBINATIONS. PERMANENT BOLLARDS SHOULD BE UTILIZED AT ALL MAJOR ACCESS POINTS AND TRAIL HEADS. "NO MOTOR VEHICLES" SIGNAGE (MUTCD R5-3) MAY BE USED TO REINFORCE ACCESS RULES.

2. BOLLARDS SHOULD BE SET BACK FROM THE ROADWAY EDGE A MINIMUM OF 7 FEET AND A MAXIMUM OF 30 FEET AND WILL VARY DEPENDING ON LOCATION. OWNER SHALL INDICATE WHICH OPTION IS BEST FOR THE SITE LOCATION. BOLLARD SHALL NOT BE PLACED WITHIN THE ROADWAY RIGHT-OF-WAY UNLESS AN APPROVED RIGHT-OF-WAY OBSTRUCTION PERMIT IS SECURED WITH THE CITY OF RALEIGH RIGHT OF WAY SERVICES.

3. STRIPING AN ENVELOPE AROUND THE POST IS RECOMMENDED IF THE BOLLARD IS LOCATED WITHIN THE PAVED LIMITS OF THE TRAIL (SEE DETAIL GW-10.05).

4. SEE MIDDLE BOLLARD WITH TRAIL SIDE BOLLARDS DETAIL, GW-10.08, FOR TYPICAL BOLLARD PLACEMENT.
HINGED BOLLARD

NOTES:

1. A HINGED BOLLARD IS TYPICALLY USED IN THE CENTER OF TRAILS TO PREVENT UNAUTHORIZED MOTOR VEHICLE ENTRY. HINGED BOLLARDS MAY BE USED IN COMBINATION WITH PERMANENT BOLLARDS AND BOULDERS. SEE DETAIL GW-10.08 FOR THE VARIOUS BOLLARD AND BOULDER COMBINATIONS. HINGED BOLLARDS SHOULD BE UTILIZED AT ALL MAJOR ACCESS POINTS AND TRAIL HEADS. "NO MOTOR VEHICLES" SIGNAGE (MUTCD R5-3) MAY BE USED TO REINFORCE ACCESS RULES.

2. BOLLARDS SHOULD BE SET BACK FROM THE ROADWAY EDGE A MINIMUM OF 7 FEET AND A MAXIMUM OF 30 FEET AND WILL VARY DEPENDING ON LOCATION. OWNER SHALL INDICATE WHICH OPTION IS BEST FOR THE SITE LOCATION. BOLLARD SHALL NOT BE PLACED WITHIN THE ROADWAY RIGHT-OF-WAY UNLESS AN APPROVED RIGHT-OF-WAY OBSTRUCTION PERMIT IS SECURED WITH THE CITY OF RALEIGH RIGHT OF WAY SERVICES.

3. STRIPING AN ENVELOPE AROUND THE POST IS RECOMMENDED IF THE BOLLARD IS LOCATED WITHIN THE PAVED LIMITS OF THE TRAIL (SEE DETAIL GW-10.05).

4. LOCKABLE, REMOVABLE BOLLARDS ALLOW ENTRANCE BY AUTHORIZED VEHICLES. WHERE USED, THE TOP OF THE MOUNT POINT SHOULD BE FLUSH WITH THE PATH SURFACE.

5. SEE MIDDLE BOLLARD WITH TRAIL SIDE BOLLARDS DETAIL, GW-10.08, FOR TYPICAL BOLLARD PLACEMENT.

FINISHED GRADE 2' MIN.

HOLE FOR LOCK 2" DIAMETER

1" x 10" STEEL LOCK PIN
1" x 10" STEEL HINGE PIN
3" x 13" x 1" STEEL PLATE

TACK WELD PIN CAP TYP.

2" x 1 1/2" x 1 1/4" x 3" LONG STEEL ANGLE
4" TYP.

FINISHED GRADE

LOCK PIN
HINGE PIN

2 - 6" SQUARE FOOTING

4" GRAVEL BASE

CLASS 'AA' @4500 PSI CONCRETE FOOTING

BOLLARD TO BE CENTERED ON TRAIL

1" x 10" STEEL LOCK PIN
1" x 10" STEEL HINGE PIN
3" x 13" x 1" STEEL PLATE

GALVANIZED AND POWDER COATED YELLOW WITH YELLOW REFLECTIVE TAPE COVERING LENGTH AND WIDTH OF BOLLARD ON BOTH SIDES

PROVIDE ADEQUATE DRAINAGE AT TOP OF FOOTER. PITCH CONCRETE AS NEEDED TO FACILITATE ADEQUATE DRAINAGE.

FINISHED GRADE 2' MIN.
MIDDLE BOLLARD WITH TRAIL SIDE BOLLARDS

NOTES:

1. OWNER SHALL INDICATE WHICH OF THE THREE BOLLARD/BOULDER PLACEMENT OPTIONS IS BEST FOR THE SITE LOCATION.

2. BOLLARDS/BOULDERS ARE EFFECTIVE IN PREVENTING UNAUTHORIZED MOTOR VEHICLE ENTRY AND SHOULD BE UTILIZED AT ALL MAJOR ACCESS POINTS AND TRAIL HEADS. "NO MOTOR VEHICLES" SIGNAGE (MUTCD R5-3) MAY BE USED TO REINFORCE ACCESS RULES.

3. BOLLARDS SHOULD BE SET BACK FROM THE ROADWAY EDGE A MINIMUM OF 7 FEET AND A MAXIMUM OF 30 FEET AND WILL VARY DEPENDING ON LOCATION. OWNER SHALL INDICATE WHICH OPTION IS BEST FOR THE SITE LOCATION. BOLLARD SHALL NOT BE PLACED WITHIN THE ROADWAY RIGHT-OF-WAY UNLESS AN APPROVED RIGHT-OF-WAY OBSTRUCTION PERMIT IS SECURED WITH THE CITY OF RALEIGH RIGHT OF WAY SERVICES.

4. STRIPING AN ENVELOPE AROUND THE POST IS RECOMMENDED IF THE BOLLARD IS LOCATED WITHIN THE PAVED LIMITS OF THE TRAIL (SEE DETAIL GW-10.05).
HEADWALLS WITH WINGWALLS ARE REQUIRED ON BOTH ENDS OF TUNNEL/UNDERPASS

FRONT VIEW (ENTRANCE/EGRESS OF TUNNEL/UNDERPASS)

2.0% MINIMUM SLOPE (ARBITRARY DIRECTION SHOWN)

CROSS-SECTION VIEW

CITY OF RALEIGH

STANDARD DETAIL

DATE: 12/2022

TRAIL TUNNEL/UNDERPASS

REINFORCED, Poured-in-place concrete or Precast Tunnel/Underpass as per NCDOT Specifications

CONDUIT

LIGHT

REINFORCED, Poured-in-place or Precast Concrete Underpass as per NCDOT Specifications for Structures

PARTIAL LONGITUDINAL SECTION

TRAIL TUNNEL/UNDERPASS

CITY OF RALEIGH

STANDARD DETAIL

DATE: 12/2022

TRAIL TUNNEL/UNDERPASS

GW-10.09.1
TRAIL TUNNEL/UNDERPASS - NOTES:

1. 14-FOOT MINIMUM WIDTH DESIRED; GREATER WIDTHS PREFERRED FOR LENGTHS OVER 60 FEET.

2. THE UNDERPASS AS WELL AS THE TRAIL APPROACH SHOULD HAVE A CENTERLINE STRIPE EVEN IF THE REST OF THE TRAIL DOES NOT HAVE ONE.

3. UNDERPASSES SHOULD HAVE A DAYTIME ILLUMINANCE MINIMUM OF 10 FOOT-CANDLES AND A NIGHT-TIME LEVEL OF 4 FOOT-CANDLES.

4. SEALING OF FIXTURES TO BE DESIGNED IN ACCORDANCE WITH ILLUMINATING ENGINEERING SOCIETY (IES) STANDARDS.

5. LIGHTING FIXTURE SPACING TO BE 12 FEET MINIMUM AND 15 FEET MAXIMUM.

6. CONDUIT CONNECTION TO POWER SOURCE SHALL BE DETERMINED BY THE ENGINEER AND SPECIFIED ON THE PLANS ACCORDINGLY.

7. PROPER DRAINAGE MUST BE ESTABLISHED TO AVOID POOLING OF STORMWATER; HOWEVER, SOME UNDERPASSES MAY FLOOD PERIODICALLY. WHERE APPROPRIATE, INCORPORATE TRENCH DRAINS AT THE TUNNEL ENTRANCE TO INTERCEPT WATER.

8. POST ADVANCED WARNING SIGNAGE ON OPPOSITE ENDS OF THE UNDERPASS APPROACH WITH INFORMATION ON VISIBILITY AND OTHER SAFETY REGULATIONS.

9. APPROPRIATE SIGNAGE MAY BE REQUIRED AT ENTRANCE TO INDICATE NARROWING TRAIL WIDTH AND/OR LIMITED VERTICAL CLEARANCE.

10. CONVEX MIRRORS SHOULD BE PROVIDED AT BLIND CORNERS AND AT THE APPROACHES TO UNDERPASSES WITH POOR SIGHT LINES.
NOTES:
1. TRAIL WIDTH TO BE DETERMINED BY CITY OF RALEIGH. 10 FEET MINIMUM TRAIL WIDTH IS NECESSARY FOR BICYCLISTS TO PASS OTHER USERS SAFELY ON SIDE TRAILS.
2. TRAILS CAN MEANDER BUT SHALL BE LOCATED MINIMUM 6 FEET FROM THE BACK OF CURB. NCDOT WILL ALLOW A 3-FOOT VEGETATED BUFFER INSTEAD OF 6-FOOT UNDER CERTAIN CONDITIONS WHERE ROW IS CONSTRAINED. SPECIAL PERMISSION MUST BE GRANTED.
3. IDEALLY, NO ABOVE-GROUND UTILITIES OR UTILITY SURFACE COVERS/PLATES/MANHOLES SHALL BE LOCATED WITHIN THE TRAIL AND SHALL BE A MINIMUM OF 2 FEET FROM THE EDGE OF TRAIL. RAISED MANHOLES SHALL BE A MINIMUM OF 4 FEET FROM THE EDGE OF TRAIL.
4. TRAIL RUNNING SLOPES/VERTICAL GRADE SHALL NOT EXCEED THE VERTICAL GRADE OF THE ROADWAY.
5. 1.5% (2.08% OR 1:48 MAX) CROSS SLOPE. CROSS SLOPE DIRECTION TYPICALLY SLOPES TOWARD ROADWAY BUT CAN VARY. SLOPE SHOULDERS FOR POSITIVE DRAINAGE. OFTEN REQUIRES CONTINUING PAVEMENT OR SHOULDER SLOPE UNTIL TIE-IN WITH NATURAL GROUND. SEE PLAN SHEETS AND CROSS SECTIONS.
6. WHEN CONDITIONS PERMIT, SHOULDERS TO MATCH CROSS SLOPE OF TRAIL AND SIDE SLOPES TO BE 3:1 OR FLATTER.
7. CONTRACTOR IS RESPONSIBLE FOR RE-ESTABLISHING ALL SLOPES DISTURBED DURING CONSTRUCTION.
8. PROOF ROLLING SHALL OCCUR IN PRESENCE OF OWNER OR OWNER'S TESTING AGENCY AT THE FOLLOWING STAGES: 1) PRIOR TO PLACING FILL IN LOW AREAS; 2) AFTER PREPARING SUBGRADE PRIOR TO PLACING ABC; 3) AFTER PLACEMENT OF ABC PRIOR TO PAVING.
9. PAVEMENT EDGE SLOPES ARE 1:1 UNLESS OTHERWISE NOTED.
10. UNDER SOME CIRCUMSTANCES, SIDE TRAILS MAY TRANSITION TO SIDEWALKS AND DESIGNATED BICYCLE LANES. IN THE EVENT THAT SIDE TRAILS MERGE ONTO STREETS, PROVIDE APPROPRIATE SIGNAGE AND PAVEMENT MARKINGS TO HELP SAFE MERGING.
11. ALL TRAILS WITHIN NCDOT ROADWAY ROW MUST CONSIDER THE FOLLOWING:
   - NCDOT REQUIRES AN ENCROACHMENT PERMIT FROM NCDOT.
   - STRUCTURES, SUCH AS RETAINING WALLS AND BRIDGES, ARE TYPICALLY NOT PERMITTED IN NCDOT ROW AND MAY ONLY BE USED IN SPECIAL CONDITIONS.
   - NCDOT MAY REQUIRE A CLEAR RECOVERY ZONE OF 11.5 FEET TO 24 FEET (IN THE PRESENCE OF A DITCH SECTION) FROM THE EDGE OF TRAVEL LANE TO EDGE OF GREENWAY TRAIL DEPENDING ON AVERAGE DAILY TRAFFIC (ADT) AND DESIGN SPEEDS.
   - STORMWATER TREATMENT AND VEG. MUST BE INSTALLED PER NCDOT'S SPECS.
CONCRETE MULTI-USE STREET
SIDE TRAIL, VARIABLE WIDTH

NOTES:
1. TRAIL WIDTH TO BE DETERMINED BY CITY OF RALEIGH. 10 FEET MINIMUM TRAIL WIDTH IS NECESSARY FOR BICYCLISTS TO PASS OTHER USERS SAFELY ON SIDE TRAILS.
2. TRAILS CAN MEANDER BUT SHALL BE LOCATED MINIMUM 6 FEET FROM THE BACK OF CURB. NCDOT WILL ALLOW A 3-FOOT VEGETATED BUFFER INSTEAD OF 6-FOOT UNDER CERTAIN CONDITIONS WHERE ROW IS CONSTRAINED. SPECIAL PERMISSION MUST BE GRANTED.
3. IDEALLY, NO ABOVE-GROUND UTILITIES OR UTILITY SURFACE COVERS/PLATES/MANHOLES SHALL BE LOCATED WITHIN THE TRAIL AND SHALL BE A MINIMUM OF 2 FEET FROM THE EDGE OF TRAIL. RAISED MANHOLES SHALL BE A MINIMUM OF 4 FEET FROM THE EDGE OF TRAIL.
4. TRAIL RUNNING SLOPES/VERTICAL GRADE SHALL NOT EXCEED THE VERTICAL GRADE OF THE ROADWAY.
5. 1.5% (2.08% OR 1:48 MAX) CROSS SLOPE. CROSS SLOPE DIRECTION TYPICALLY SLOPES TOWARD ROADWAY BUT CAN VARY. SLOPE SHOULDERS FOR POSITIVE DRAINAGE. OFTEN REQUIRES CONTINUING PAVEMENT OR SHOULDER SLOPE UNTIL TIE-IN WITH NATURAL GROUND. SEE PLAN SHEETS AND CROSS SECTIONS.
6. WHEN CONDITIONS PERMIT, SHOULDERS TO MATCH CROSS SLOPE OF TRAIL AND SIDE SLOPES TO BE 3:1 OR FLATTER.
7. CONTRACTOR IS RESPONSIBLE FOR RE-ESTABLISHING ALL SLOPES DISTURBED DURING CONSTRUCTION.
8. PROOF ROLLING SHALL OCCUR IN PRESENCE OF OWNER OR OWNER'S TESTING AGENCY AT THE FOLLOWING STAGES: 1) PRIOR TO PLACING FILL IN LOW AREAS; 2) AFTER PREPARING SUBGRADE PRIOR TO PLACING ABC; 3) AFTER PLACEMENT OF ABC PRIOR TO PAVING.
9. TRANSVERSE EXPANSION JOINTS TO BE MAXIMUM 50 FEET APART.
10. UNDER SOME CIRCUMSTANCES, SIDE TRAILS MAY TRANSITION TO SIDEWALKS AND DESIGNATED BICYCLE LANES. IN THE EVENT THAT SIDE TRAILS MERGE ONTO STREETS, PROVIDE APPROPRIATE SIGNAGE AND PAVEMENT MARKINGS TO HELP SAFE MERGING.
11. ALL TRAILS WITHIN NCDOT ROADWAY ROW MUST CONSIDER THE FOLLOWING:
   - NCDOT REQUIRES AN ENCROACHMENT PERMIT FROM NCDOT.
   - STRUCTURES, SUCH AS RETAINING WALLS AND BRIDGES, ARE TYPICALLY NOT PERMITTED IN NCDOT ROW AND MAY ONLY BE USED IN SPECIAL CONDITIONS.
   - NCDOT MAY REQUIRE A CLEAR RECOVERY ZONE OF 11.5 FEET TO 24 FEET (IN THE PRESENCE OF A DITCH SECTION) FROM THE EDGE OF TRAVEL LANE TO EDGE OF GREENWAY TRAIL DEPENDING ON AVERAGE DAILY TRAFFIC (ADT) AND DESIGN SPEEDS.
   - STORMWATER TREATMENT AND VEG. MUST BE INSTALLED PER NCDOT'S SPECS.
12. IF THE MULTI-USE PATH IS ALONG A NON-NCDOT ROAD, THEN THE CITY OF RALEIGH DEPARTMENT OF TRANSPORTATION STANDARDS AND SPECIFICATIONS WILL APPLY.

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS  DATE: 12/2022

CONCRETE MULTI-USE STREET SIDE TRAIL, VARIABLE WIDTH

GW-10.11
GALVANIZED SAFETY RAILING - VARIABLE HEIGHT

NOTES:
1. PROVIDE A SAFETY RAIL FOR THE FOLLOWING CIRCUMSTANCES WITHIN 6' OF THE EDGE OF PAVEMENT, WHICH ARE CONSIDERED HAZARDOUS DROP-OFFS:
   1) SLOPE > 3:1 AND DROP OF 6'
   2) SLOPE > 2:1 AND DROP OF 4'
   3) SLOPE > 1:1 AND DROP OF 1'
2. ALL CONCRETE TO BE CLASS 'A' AT 3000 PSI COMPRESSIVE STRENGTH.
3. TYPE OF PIPE TO BE USED IS 1' - 5/8" MAX O.D. BLACK IRON, LOW CARBON PIPE, OR GALVANIZED.
4. ALL JOINTS TO HAVE A 3/8" FILLET WELD.
5. ALL METAL SHALL BE GALVANIZED.
6. SAFETY RAIL SHALL BE UNIFORM IN HEIGHT ALONG EACH PROPOSED SEGMENT. 42" RAIL HEIGHT SHALL BE THE MINIMUM. 48" RAIL HEIGHT SHALL BE UTILIZED ALONG BRIDGES, BRIDGE APPROACHES, AND AT OTHER LOCATIONS WHERE HIGH-SPEED, STEEP-ANGLE (25 DEGREES OR GREATER) IMPACTS BETWEEN A BICYCLIST AND THE RAILING MAY OCCUR, SUCH AS AT A CURVE AT THE FOOT OF A LONG, DESCENDING GRADE WHERE THE CURVE RADIUS IS LESS THAN THAT APPROPRIATE FOR THE DESIGN SPEED OR ANTICIPATED SPEED. 54" RAIL HEIGHT SHALL BE UTILIZED IN EXTREME CONDITIONS AND WHERE CITY REGULATIONS DICTATE.
7. SAFETY RAIL LATERAL OFFSET FROM EDGE OF PAVEMENT WILL VARY BUT SHOULD BE 1' MINIMUM. THE ENDS OF THE SAFETY RAIL SHOULD BE FLARED AWAY FROM THE PATH EDGE.
NOTES:
1. PROVIDE A SAFETY RAIL FOR THE FOLLOWING CIRCUMSTANCES WITHIN 6' OF THE EDGE OF PAVEMENT, WHICH ARE CONSIDERED HAZARDOUS DROP-OFFS:
   1) SLOPE > 3:1 AND DROP OF 6'
   2) SLOPE > 2:1 AND DROP OF 4'
   3) SLOPE > 1:1 AND DROP OF 1'
2. SAFETY RAIL TO BE THREE-RAIL WHITE VINYL WITH NOMINAL 8' SECTION LENGTH.
3. FOOTING WIDTH TO BE 2X POST WIDTH OR 1', WHICHEVER IS GREATER. MIN FOOTING DEPTH OF 30". ALL CONCRETE TO BE CLASS 'A' AT 3000 PSI COMPRESSION STRENGTH.
4. SAFETY RAIL SHALL BE UNIFORM IN HEIGHT ALONG EACH PROPOSED SEGMENT. 42" RAIL HEIGHT SHALL BE THE MINIMUM. 48" RAIL HEIGHT SHALL BE UTILIZED ALONG BRIDGES, BRIDGE APPROACHES, AND AT OTHER LOCATIONS WHERE HIGH-SPEED, STEEP-ANGLE (25 DEGREES OR GREATER) IMPACTS BETWEEN A BICYCLIST AND THE RAILING MAY OCCUR, SUCH AS AT A CURVE AT THE FOOT OF A LONG, DESCENDING GRADE WHERE THE CURVE RADIUS IS LESS THAN THAT APPROPRIATE FOR THE DESIGN SPEED OR ANTICIPATED SPEED. 54" RAIL HEIGHT SHALL BE UTILIZED IN EXTREME CONDITIONS AND WHERE CITY REGULATIONS DICTATE.
5. SAFETY RAIL LATERAL OFFSET FROM EDGE OF PAVEMENT WILL VARY BUT SHOULD BE 1' MINIMUM. THE ENDS OF THE SAFETY RAIL SHOULD BE FLARED AWAY FROM THE PATH EDGE.

CITY OF RALEIGH
STANDARD DETAIL

VINYL SAFETY RAILING - VARIABLE HEIGHT

DATE: 12/2022

REVISIONS

NOT TO SCALE

GW-20.02
BOARDWALK OR BRIDGE
TIMBER APPROACH RAILING

NOTES:
1. THE LENGTH OF THE APPROACH RAILING SHALL VARY DEPENDING ON SITE CONDITIONS.
2. THE LATERAL OFFSET OF THE RAILING SHOULD BE AT LEAST 1 FOOT FROM THE EDGE OF PATH. THE ENDS OF THE RAILING SHOULD BE FLARED AWAY FROM THE PATH EDGE.
3. THE APPROACH RAILING HEIGHT SHALL MATCH THE HEIGHT OF THE BRIDGE OR BOARDWALK RAILING, UNLESS OTHERWISE NOTED. THE RAILING HEIGHT WILL BE 42" (MIN), 48", OR 54" (MAX).
4. ALL CONCRETE FOOTERS AND END BLOCKS SHALL BE 3000 PSI MIN.
NOTES:
1. THE LENGTH OF THE APPROACH RAILING SHALL VARY DEPENDING ON SITE CONDITIONS.
2. THE LATERAL OFFSET OF THE RAILING SHOULD BE AT LEAST 1 FOOT FROM THE EDGE OF PATH. THE ENDS OF THE RAILING SHOULD BE FLARED AWAY FROM THE PATH EDGE.
3. THE APPROACH RAILING HEIGHT SHALL MATCH THE HEIGHT OF THE BRIDGE OR BOARDWALK RAILING, UNLESS OTHERWISE NOTED. THE RAILING HEIGHT WILL BE 42" (MIN), 48", OR 54" (MAX).
TYPICAL BOARDWALK SECTION

NOTES:

1. BOARDWALK DECK IS TO BE CAST-IN-PLACE REINFORCED CONCRETE WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI.
2. THE REINFORCING STEEL IN THE CAST-IN-PLACE CONCRETE BOARDWALK DECK SHALL BE EPOXY COATED GRADE 60.
3. CONCRETE DECKING CROSS SLOPE SHALL MATCH CROSS SLOPE OF TRAIL ON BOTH APPROACHES TO FACILITATE POSITIVE DRAINAGE AND PREVENT PONDING.
4. STAY-IN-PLACE METAL FORMS SHALL BE PROVIDED TO FACILITATE REINFORCED CONCRETE DECK CONSTRUCTION.
5. STAY-IN-PLACE METAL FORMS SHALL BE ATTACHED TO LONGITUDINAL TIMBER JOISTS USING AN APPROVED METHOD. ALL SCREWS AND OTHER HARDWARE USED SHALL BE GALVANIZED.
6. ALL OTHER HARDWARE (NUTS, WASHERS, BOLTS, ETC.) SHALL BE HOT DIPPED GALVANIZED PER ASTM A153.
7. TOP RAIL AND OTHER CONNECTIONS SHALL BE MADE WITH WOOD SCREW; NAILED CONNECTIONS WILL NOT BE ACCEPTABLE.
8. THE MINIMUM HEIGHT OF BRIDGE/BOARDWALK RAILING SHALL BE 42", UNLESS OTHERWISE NOTED. THE HEIGHT CAN RANGE BETWEEN 42", 48", OR 54".
9. A GRIPABLE, ROUND RAIL THAT WILL ACT AS BOTH A RUB RAIL AND HANDRAIL SHALL ONLY BE REQUIRED WHEN GRADES ARE GREATER THAN 5%. REFER TO DETAIL GW-30.04 FOR BRIDGE OR BOARDWALK RUB RAIL/HANDRAIL ATTACHMENT.
10. BLACK VINYL COATED CHAIN LINK FENCE AND TENSION TIES SHALL BE IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
11. ALL TIMBER BOARDWALK COMPONENTS AND REINFORCED CONCRETE DECK SHALL DESIGNED IN ACCORDANCE WITH THE CURRENT EDITION OF THE AASHTO LRFD GUIDE SPECIFICATIONS FOR PEDESTRIAN BRIDGES.
12. SPAN LENGTHS, JOIST SPACING, SIZING OF MEMBERS, REINFORCED CONCRETE DECK, AND OTHER DESIGN SPECIFICS SHALL BE DETERMINED BY THE ENGINEER ON A PROJECT SPECIFIC BASIS.
13. FOUNDATION SHALL CONSIST OF DRIVEN PILES, AUGURED PILES, HELICAL PIERS, OR OTHER APPLIED FOUNDATION SYSTEM. SPECIFICS SUCH AS NUMBER OF PILES, SPACING, AND HEIGHT SHALL BE DETERMINED BY ENGINEER ON A PROJECT SPECIFIC BASIS BASED ON REQUIRED LOADING.
NOTES:
1. PREMANUFACTURED PEDESTRIAN BRIDGE SECTION AND DETAILS MAY VARY BY
PROJECT. STRUCTURAL STEEL TRUSS BRIDGE SECTION SHOWN.
2. PREMANUFACTURED PEDESTRIAN BRIDGE SHALL BE DESIGNED AND DETAILED ON A
PROJECT-SPECIFIC BASIS DEPENDING ON OVERALL GEOMETRY, LOADING, AND
AESTHETIC REQUIREMENTS BY MANUFACTURER WITH INPUT FROM THE ENGINEER.
3. CONCRETE DECKING CROSS SLOPE SHALL MATCH CROSS SLOPE OF TRAIL ON BOTH
APPROACHES TO FACILITATE POSITIVE DRAINAGE AND PREVENT PONDING.
4. THE MINIMUM HEIGHT OF BRIDGE/BOARDWALK RAILING SHALL BE 42", UNLESS
OTHERWISE NOTED. THE HEIGHT CAN RANGE BETWEEN 42", 48", OR 54".
5. A GRIP-ABLE, ROUND RAIL THAT WILL ACT AS BOTH A RUB RAIL AND HANDRAIL SHALL
ONLY BE REQUIRED WHEN GRADES ARE GREATER THAN 5%. REFER TO DETAIL GW-30.04
FOR BRIDGE OR BOARDWALK RUB RAIL/HANDRAIL ATTACHMENT.
6. FOUNDATION SYSTEM SHALL BE DETERMINED BY ENGINEER ON A PROJECT SPECIFIC
BASIS BASED ON REQUIRED LOADING.
NOTES:

1. BRIDGE/BOARDWALK FOUNDATION, BACKWALL, AND STRINGERS NOT SHOWN FOR CLARITY.
2. BRIDGE/BOARDWALK APPROACH SLABS TO MATCH APPROACH TRAIL WIDTH AND CROSS SLOPE AS REQUIRED BY DESIGN.
3. APPROACH SLAB REQUIRED ON BOTH ENDS OF BRIDGE/BOARDWALK IF TRANSITIONING TO ASPHALT TRAIL PAVEMENT. BEGIN APPROACH SLAB SHOWN IN DETAIL ABOVE. END APPROACH SLAB WILL BE SIMILAR.
4. APPROACH TRAIL PAVEMENT DESIGN TO BE DETERMINED ON A PROJECT SPECIFIC BASIS BY THE ENGINEER. ASPHALT PAVEMENT DESIGN IS SHOWN IN THIS DETAIL TO ILLUSTRATE TRANSITION FROM ASPHALT TO CONCRETE.
1. A GRIP-ABLE, ROUND RAIL THAT WILL ACT AS BOTH A RUB RAIL AND HANDRAIL SHALL ONLY BE REQUIRED WHEN GRADES ARE GREATER THAN 5%.
NOTES:

1. THE MINIMUM HEIGHT OF BRIDGE/BOARDWALK RAILING SHALL BE 42", UNLESS OTHERWISE NOTED. THE HEIGHT CAN RANGE BETWEEN 42", 48", OR 54".

2. A GRIP-ABLE, ROUND RAIL THAT WILL ACT AS BOTH A RUB RAIL AND HANDRAIL SHALL ONLY BE REQUIRED WHEN GRADES ARE GREATER THAN 5%. REFER TO DETAIL GW-30.04 FOR BRIDGE OR BOARDWALK RUB RAIL/HANDRAIL ATTACHMENT.

3. UTILIZE DETAIL GW-30.04 "BRIDGE OR BOARDWALK RUB RAIL/HANDRAIL ATTACHMENT" AS A TYPICAL RAIL ATTACHMENT DETAIL FOR HORIZONTAL RAILS TO RAIL POST CONNECTIONS.

4. BLACK VINYL COATED CHAIN LINK FENCE AND TENSION TIES SHALL BE IN ACCORDANCE WITH MANUFACTURER’S SPECIFICATIONS.

5. SPAN LENGTHS, JOIST SPACING, SIZING OF MEMBERS, REINFORCED CONCRETE DECK, AND OTHER DESIGN SPECIFICS SHALL BE DETERMINED BY THE ENGINEER ON A PROJECT SPECIFIC BASIS.

6. FOUNDATION SHALL CONSIST OF DRIVEN PILES, AUGURED PILES, HELICAL PIERS, OR OTHER APPLIED FOUNDATION SYSTEM. SPECIFICS SUCH AS NUMBER OF PILES, SPACING, AND HEIGHT SHALL BE DETERMINED BY ENGINEER ON A PROJECT SPECIFIC BASIS BASED ON REQUIRED LOADING. TIMBER PILES ARE SHOWN IN THIS DETAIL AS AN EXAMPLE.
ALL HARDWARE TO BE GALVANIZED AND FILED TO PREVENT THEFT/REMOVAL.

EDGE OF PAVEMENT

TRAIL

2' MIN - 5' MAX FROM EDGE OF TRAIL

PROVIDE ADEQUATE DRAINAGE AT TOP OF FOOTER. PITCH CONCRETE AS NEEDED TO FACILITATE ADEQUATE DRAINAGE.

CONCRETE FOOTING TYP. 3,000 PSI @ 28 DAYS

COMPACTED SUBGRADE

4" U-CHANNEL POST OR 2 1/2" SCH 40 ALUMINUM POST, PMS 451 TAUPE.

2' - 0"

4" MIN 5' MAX

NOTE:
1. SMALLER SCALE SIGNS OR PLAQUES MAY BE USED FOR GREENWAY TRAIL APPLICATIONS.
CONSTRUCTION BARRICADE AND SIGN - NOTES:

1. CONTRACTOR TO UTILIZE PROVIDED PEDESTRIAN DETOUR PLANS TO INSTALL AND MAINTAIN PEDESTRIAN DETOUR ROUTES FOR EACH PHASE OF THE PROJECT. IF PEDESTRIAN DETOUR PLANS ARE NOT PROVIDED, CONTRACTOR IS TO DEVELOP SAID PLANS AND OBTAIN CITY APPROVAL PRIOR TO IMPLEMENTATION.

2. INSTALL DETOUR SIGNS BEFORE BARRICADES WHEN CLOSING TRAIL TO PEDESTRIAN TRAFFIC. REMOVE BARRICADES BEFORE DETOUR SIGNS WHEN OPENING TRAIL TO PEDESTRIAN TRAFFIC. INSTALL/REMOVE DETOUR SIGNS AND BARRICADES WITHIN SAME CALENDAR DAY.

3. EACH DETOUR SHALL BE ADEQUATELY MARKED. THE NUMBER OF BARRICADES AND SIGNS NEEDED WILL BE DETERMINED BY THE CONTRACTOR BASED ON THE PROPOSED PEDESTRIAN DETOUR PLANS.

4. INSTALL PEDESTRIAN BARRICADES TO BLOCK FULL WIDTH OF TRAIL DURING TRAIL CLOSURES. MORE THAN ONE BARRICADE MAY BE NEEDED TO COVER THE FULL WIDTH OF TRAIL. CHAIN BARRICADES TOGETHER AS NEEDED IF MULTIPLE BARRICADES ARE USED.

5. "TRAIL CLOSED AHEAD" SIGNS AND BARRICADES SHOULD BE USED WHERE PEDESTRIAN FLOW IS RESTRICTED SUCH AS AT THE BEGINNING AND END OF THE CLOSED TRAIL AND AT THE INTERSECTIONS PRECEDING THE CLOSED TRAIL, IF APPLICABLE.

6. MOUNT "TRAIL CLOSED AHEAD" SIGN TO BARRICADE RAILS TO ENSURE SIGN WILL NOT BECOME DETACHED DURING NORMAL WIND CONDITIONS.

7. PLACE SANDBAGS OR OTHER APPROVED BALLASTING METHODS ON THE FEET OF THE FRAME. DO NOT PLACE SANDBAGS ON TOP OF A STRIPED RAIL OR STABILIZER BAR. DO NOT BALLAST BARRICADES WITH HEAVY OBJECTS SUCH AS ROCKS, CHUNKS OF CONCRETE, OR OTHER ITEMS THAT WOULD CAUSE DAMAGE IF THE BARRICADE IS STRUCK.
CONSTRUCTION PROJECT IDENTIFICATION SIGN

NOTES:

1. CONSTRUCTION PROJECT IDENTIFICATION SIGNS ARE TO BE PLACED AT EITHER END OF THE TRAIL SECTION UNDER CONSTRUCTION UNLESS OTHERWISE INSTRUCTED BY THE CITY. IF THE PROJECT IS CONSTRUCTED IN SECTIONS, THE CONSTRUCTION PROJECT IDENTIFICATION SIGNS CAN BE MOVED TO EACH SEGMENT UNDER CONSTRUCTION AS NEEDED.

2. ERECT SUPPORTS AND FRAMING ON SECURE FOUNDATION, RIGIDLY BRACED AND FRAMED TO RESIST WIND LOADINGS AND SIGN THEFT. INSTALL SIGN SURFACE PLUMB AND LEVEL.

3. REMOVE SIGN(S), FRAMING, SUPPORTS, AND FOUNDATIONS AT COMPLETION OF PROJECT AND RESTORE THE AREA.

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS DATE: 12/2022

CONSTRUCTION PROJECT IDENTIFICATION SIGN

GW-40.03
NOTES:

1. CONTRACTOR TO UTILIZE PROVIDED PEDESTRIAN DETOUR PLANS TO INSTALL AND MAINTAIN PEDESTRIAN DETOUR ROUTES FOR EACH PHASE OF THE PROJECT. IF PEDESTRIAN DETOUR PLANS ARE NOT PROVIDED, CONTRACTOR IS TO DEVELOP SAID PLANS AND OBTAIN CITY APPROVAL PRIOR TO IMPLEMENTATION.

2. INSTALL DETOUR SIGNS BEFORE BARRICADES WHEN CLOSING TRAIL TO PEDESTRIAN TRAFFIC. REMOVE BARRICADES BEFORE DETOUR SIGNS WHEN OPENING TRAIL TO PEDESTRIAN TRAFFIC. INSTALL/REMOVE DETOUR SIGNS AND BARRICADES WITHIN SAME CALENDAR DAY.

3. EACH DETOUR SHALL BE ADEQUATELY MARKED. THE NUMBER OF SIGNS NEEDED WILL BE DETERMINED BY THE CONTRACTOR BASED ON THE PROPOSED PEDESTRIAN DETOUR PLANS.

4. THE PEDESTRIAN/BICYCLE DETOUR (M4-9A) SIGN SHOULD BE USED WHERE A PEDESTRIAN/BICYCLE DETOUR ROUTE HAS BEEN ESTABLISHED TO REROUTE PEDESTRIAN TRAFFIC DUE TO A TRAIL CLOSURE. THE M4-9A DETOUR SIGN SHALL HAVE AN ARROW POINTING IN THE APPROPRIATE DIRECTION.

5. STATIONARY TRAIL DETOUR SIGNAGE IS PREFERABLE FOR PEDESTRIAN DETOUR ROUTES THAT SHALL BE IN PLACE FOR EXTENDED DURATIONS OR IF THERE IS DEEMED TO BE A HIGH PROBABILITY OF SIGN THEFT. CONSULT WITH CITY OF RALEIGH PROJECT MANAGER TO DETERMINE IF STATIONARY OR PORTABLE SIGNS SHALL BE USED. REFER TO DETAIL GW-40.05 FOR PORTABLE TRAIL DETOUR SIGNAGE IF APPLICABLE.

6. ALL HARDWARE TO BE GALVANIZED AND FILED TO PREVENT THEFT/REMOVAL.
NOTES:
1. CONTRACTOR TO UTILIZE PROVIDED PEDESTRIAN DETOUR PLANS TO INSTALL AND MAINTAIN PEDESTRIAN DETOUR ROUTES FOR EACH PHASE OF THE PROJECT. IF PEDESTRIAN DETOUR PLANS ARE NOT PROVIDED, CONTRACTOR IS TO DEVELOP SAID PLANS AND OBTAIN CITY APPROVAL PRIOR TO IMPLEMENTATION.
2. INSTALL DETOUR SIGNS BEFORE BARRICADES WHEN CLOSING TRAIL TO PEDESTRIAN TRAFFIC. REMOVE BARRICADES BEFORE DETOUR SIGNS WHEN OPENING TRAIL TO PEDESTRIAN TRAFFIC. INSTALL/REMOVE DETOUR SIGNS AND BARRICADES WITHIN SAME CALENDAR DAY.
3. EACH DETOUR SHALL BE ADEQUATELY MARKED. THE NUMBER OF SIGNS NEEDED WILL BE DETERMINED BY THE CONTRACTOR BASED ON THE PROPOSED PEDESTRIAN DETOUR PLANS.
4. THE PEDESTRIAN/BICYCLE DETOUR (M4-9A) SIGN SHOULD BE USED WHERE A PEDESTRIAN/BICYCLE DETOUR ROUTE HAS BEEN ESTABLISHED TO REROUTE PEDESTRIAN TRAFFIC DUE TO A TRAIL CLOSURE. THE M4-9A DETOUR SIGN SHALL HAVE AN ARROW POINTING IN THE APPROPRIATE DIRECTION.
5. PORTABLE TRAIL DETOUR SIGNAGE IS PREFERABLE FOR PEDESTRIAN DETOUR ROUTES THAT SHALL BE IN PLACE FOR SHORT DURATIONS AND IF THERE IS DEEMED TO BE A LOW PROBABILITY OF SIGN THEFT. CONSULT WITH CITY OF RALEIGH PROJECT MANAGER TO DETERMINE IF STATIONARY OR PORTABLE SIGNS SHALL BE USED. REFER TO DETAIL GW-40.04 FOR STATIONARY TRAIL DETOUR SIGNAGE IF APPLICABLE.
6. USE COMPOSITE OR ROLL-UP SIGN SUBSTRATES ON PORTABLE SIGN STANDS. FOR BOTH COMPOSITE AND ROLL-UP SIGN SUBSTRATES, USE GRADE B FLUORESCENT ORANGE RETROREFLECTIVE SHEETING. USE ROLL-UP SIGNS THAT HAVE A MINIMUM 3/16 INCH X 1 1/4 INCHES HORIZONTAL RIB AND 3/8 INCH X 1 1/4 INCHES VERTICAL RIB.
HEAVY DUTY PARK BENCH WITH RECYCLED PLASTIC SLATS AND GALVANIZED FRAME

NOTES:
1. LOCATE BENCHES ALONG THE GREENWAY TRAIL WHERE APPROPRIATE, WHERE THERE IS A DEMAND BY USERS, OR AS DIRECTED BY THE CITY. PROVIDING SEATING AT ONE MILE GAPS IS THE GOAL. SEATING WITHIN 1/2 MILE OF TRAIL HEADS IS RECOMMENDED.
2. PROVIDE BENCHES IN AREAS THAT PROVIDE INTERESTING VIEWS, ARE CLOSE TO AN INTERPRETIVE ELEMENT, AND OFFER SHADE OR SHELTER FROM SEASONAL WINDS.
3. LOCATE BENCHES A MINIMUM OF 4 FEET FROM RESTROOMS, DRINKING FOUNTAINS, AND TRASH AND RECYCLING RECEPTACLES.
4. DRAINAGE SHOULD SLOPE AWAY FROM THE BENCH AND THE GREENWAY TRAIL.
5. FRAME: 3 HOT-DIPPED GALVANIZED FRAMES ALL WELDED STEEL FROM CONSTRUCTION, SEAT SUPPORT CHANNEL DIE-FORMED FROM 1/8" THICK STEEL, FRAME POSTS 2' - 3/8" OD STEEL PIPE.
6. FINISH: HOT DIP GALVANIZED FINISH AFTER FABRICATION.
7. BENCH TO BE INSTALLED BY THE CONTRACTOR IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND DETAILS. SEAT SHOULD BE SECURELY ANCHORED TO THE GROUND. TO BE STATIONARY/EMBEDDED, MOUNT WITH FRAME POSTS IN CONCRETE FOOTING.
8. LENGTH: RECYCLED PLASTIC 6 FEET LONG.
9. SEAT BACK MATERIAL: 2" x 4" 100% RECYCLED PLASTIC PLANK.
10. ACCEPTABLE BENCH MANUFACTURER IS PILOT ROCK SCXB3/G-6PC24 EMBEDDED MOUNT BENCH, CEDAR COLOR OR APPROVED EQUAL BY CITY OF RALEIGH.
NOTES:

1. LOCATE BENCHES ALONG THE GREENWAY TRAIL WHERE APPROPRIATE, WHERE THERE IS A DEMAND BY USERS, OR AS DIRECTED BY THE CITY. PROVIDING SEATING AT ONE MILE GAPS IS THE GOAL. SEATING WITHIN 1/2 MILE OF TRAIL HEADS IS RECOMMENDED.
2. PROVIDE BENCHES IN AREAS THAT PROVIDE INTERESTING VIEWS, ARE CLOSE TO AN INTERPRETIVE ELEMENT, AND OFFER SHADE OR SHELTER FROM SEASONAL WINDS.
3. LOCATE BENCHES A MINIMUM OF 4 FEET FROM RESTROOMS, DRINKING FOUNTAINS, AND TRASH AND RECYCLING RECEPTACLES. LOCATE BENCHES A MINIMUM OF 2 FEET FROM LIGHTING POLES AND SIGN POSTS. BENCHES AND RECEPTACLES CAN BE LOCATED ON THE SAME CONCRETE PAD IF SIZED APPROPRIATELY.
4. WHEELCHAIR ACCESS SHOULD BE POSSIBLE ALONGSIDE BENCHES. PROVIDE ACCESS WITH A HARDENED SURFACE SUCH AS CONCRETE OR ASPHALT.
5. DRAINAGE SHOULD SLOPE AWAY FROM THE BENCH AND THE GREENWAY TRAIL.
6. FRAME: 3 HOT-DIPPED GALVANIZED FRAMES ALL WELDED STEEL FROM CONSTRUCTION, SEAT SUPPORT CHANNEL DIE-FORMED FROM 1/8" THICK STEEL, FRAME POSTS 2' - 3/8" OD STEEL PIPE.
7. FINISH: HOT DIP GALVANIZED FINISH AFTER FABRICATION.
8. BENCH TO BE INSTALLED BY THE CONTRACTOR IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS AND DETAILS. SEAT SHOULD BE SECURELY ANCHORED TO THE GROUND. TO BE STATIONARY, MOUNT WITH FRAME FOOT AND CONCRETE ANCHORS TO CONCRETE SLAB.
9. LENGTH: RECYCLED PLASTIC 6 FEET LONG.
10. SEAT BACK MATERIAL: 2" x 4" 100% RECYCLED PLASTIC PLANK.
11. WHEN CONCRETE SLAB IS ADJACENT TO CONCRETE TRAIL, A 1/2" EXPANSION JOIN INSTALLED FULL DEPTH WILL BE REQUIRED WHERE THE CONCRETE SLAB JOINS THE CONCRETE TRAIL.
12. ACCEPTABLE BENCH MANUFACTURER IS PILOT ROCK PCXB/G-6PC24 SURFACE MOUNT BENCH, CEDAR COLOR OR APPROVED EQUAL BY CITY OF RALEIGH.
TRASH RECEPTACLE INSTALLATION

IN-GROUND MOUNT

NOTES:
1. LOCATE RECEPTACLE AT EACH TRAIL HEAD OR AS DIRECTED BY THE CITY. RECEPTACLES AND BENCHES CAN BE LOCATED ON THE SAME CONCRETE PAD IF SIZED APPROPRIATELY. RECEPTACLES MUST BE A MINIMUM OF 4 FEET FROM BENCHES.
2. RECEPTACLES NEED TO BE ACCESSIBLE TO MAINTENANCE PERSONNEL AND GREENWAY TRAIL USERS.
3. DRAINAGE SHOULD SLOPE AWAY FROM THE RECEPTACLES AND TRAIL.
4. STEEL MEMBERS FINISH: HOT DIP GALVANIZED FINISH AFTER FABRICATION.
5. TRASH RECEPTACLE CRADLE SHALL BE CONSTRUCTED OF 1" X ½" STEEL BARS.
6. FOLLOWING FABRICATION, STEEL CRADLE AND POST SHALL BE SEALED IN VINYL TO INHIBIT RUST AND ELIMINATE PERIODIC PAINTING.
7. A 40-GALLON LINER SHALL FIT INSIDE STEEL CRADLE. LINER AND LINER LID SHALL BE CONSTRUCTED OF TOUGH, ROTARY MOLDED POLYETHYLENE WITH A ROCKER BOTTOM. WEIGHT OF LINER SHALL NOT EXCEED 12-POUNDS. LINER LID SHALL BE ATTACHED TO STEEL CRADLE WITH A VINYL CABLE. PROVIDE WEEP HOLE IN LINER TO PERMIT DRAINAGE FOR OUTDOOR APPLICATION. PROVIDE AN OPENING IN THE LID ON BOTH SIDES FOR DEPOSITING LITTER.
8. PROVIDE MOUNTING BRACKET FOR ATTACHING STEEL CRADLE TO IN-GROUND POST. IN-GROUND POST SHALL BE MANUFACTURER'S STANDARD. ANCHOR POST IN CONCRETE FOUNDATION.
9. TRASH RECEPTACLES ARE SINGLE RECEPTACLES (SEPARATE PIECES WITH IN-GROUND POSTS).
10. ACCEPTABLE TRASH RECEPTACLE MANUFACTURER IS BEST LITTER RECEPTACLE, INC RTC-1000, GREEN COLOR OR APPROVED EQUAL BY CITY OF RALEIGH.
11. LID TO BE GREEN COLOR TO MATCH CRADLE. LID TO HAVE TWO OPENINGS.
## TRASH RECEPTACLE INSTALLATION

**SURFACE MOUNT**

### NOTES:

1. LOCATE RECEPTACLE AT EACH TRAIL HEAD OR AS DIRECTED BY THE CITY. RECEPTACLES AND BENCHES CAN BE LOCATED ON THE SAME CONCRETE PAD IF SIZED APPROPRIATELY. RECEPTACLES MUST BE A MINIMUM OF 4 FEET FROM BENCHES.
2. RECEPTACLES NEED TO BE ACCESSIBLE TO MAINTENANCE PERSONNEL AND GREENWAY TRAIL USERS.
3. DRAINAGE SHOULD SLOPE AWAY FROM RECEPTACLES AND TRAIL.
4. STEEL MEMBERS FINISH: HOT DIP GALVANIZED FINISH AFTER FABRICATION.
5. TRASH RECEPTACLE CRADLE SHALL BE CONSTRUCTED OF 1" X ½" STEEL BARS.
6. FOLLOWING FABRICATION, STEEL CRADLE AND POST SHALL BE SEALED IN VINYL TO INHIBIT RUST AND ELIMINATE PERIODIC PAINTING.
7. A 40-GALLON LINER SHALL FIT INSIDE STEEL CRADLE. LINER AND LINER LID SHALL BE CONSTRUCTED OF TOUGH, ROTARY MOLDED POLYETHYLENE WITH A ROCKER BOTTOM.
8. WEIGHT OF LINER SHALL NOT EXCEED 12-POUNDS. LINER LID SHALL BE ATTACHED TO STEEL CRADLE WITH A VINYL CABLE. PROVIDE WEEP HOLE IN LINER TO PERMIT DRAINAGE FOR OUTDOOR APPLICATION. PROVIDE AN OPENING IN THE LID ON BOTH SIDES FOR DEPOSITING LITTER.
9. TRASH RECEPTACLES ARE SINGLE RECEPTACLES (SEPARATE PIECES WITH SURFACE MOUNT).
10. ACCEPTABLE TRASH RECEPTACLE MANUFACTURER IS BEST LITTER RECEPTACLE, INC RTC-1000, GREEN COLOR OR APPROVED EQUAL BY CITY OF RALEIGH.
11. LID TO BE GREEN COLOR TO MATCH CRADLE. LID TO HAVE TWO OPENINGS.
12. WHEN CONCRETE SLAB IS ADJACENT TO CONCRETE TRAIL, A 1/2" EXPANSION JOINT INSTALLED FULL DEPTH WILL BE REQUIRED WHERE THE CONCRETE SLAB JOINS THE CONCRETE TRAIL.

### CITY OF RALEIGH

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**GW-50.04**

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**PLAN VIEW**

**SIDE VIEW**

**CONCRETE SLAB**

**TRASH RECEPTACLE LID**

**40 GALLON POLYETHYLENE LINER**

**1" x ½" STEEL BAR CRADLE**

**½" x 3" STEEL SURFACE PLATE**

**OPENING IN LID ON BOTH SIDES FOR DEPOSITING TRASH**

**TRASH RECEPTACLE SIDE VIEW**

**CONCRETE SLAB PLAN VIEW**
NOTES:
1. LOCATE RECEPTACLES AT EACH TRAIL HEAD OR AS DIRECTED BY THE CITY. RECEPTACLES MUST BE A MINIMUM OF 4 FEET FROM BENCHES.
2. RECEPTACLES SHOULD BE SET BACK A MINIMUM OF 3 FEET FROM THE EDGE OF THE GREENWAY TRAIL.
3. DRAINAGE SHOULD SLOPE AWAY FROM THE RECEPTACLES AND GREENWAY TRAIL. PROVIDE 2% MAX CROSS SLOPE FROM EDGE OF TRAIL TO RECEPTACLES WHERE FEASIBLE.
4. RECEPTACLE CRADLES SHALL BE CONSTRUCTED OF 1" X ⅝" STEEL BARS.
5. FOLLOWING FABRICATION, STEEL CRADLES AND POSTS SHALL BE SEALED IN VINYL TO INHIBIT RUST AND ELIMINATE PERIODIC PAINTING.
6. A 40-GALLON LINER SHALL FIT INSIDE EACH STEEL CRADLE. LINERS AND LINER LIDS SHALL BE CONSTRUCTED OF TOUGH, ROTARY MOLDED POLYETHYLENE WITH A ROCKER BOTTOM. WEIGHT OF LINERS SHALL NOT EXCEED 12-POUNDS. LINER LIDS SHALL BE ATTACHED TO STEEL CRADLES WITH A VINYL CABLE. PROVIDE WEEP HOLE IN LINERS TO PERMIT DRAINAGE FOR OUTDOOR APPLICATION. PROVIDE TWO OPENINGS (ONE ON EACH SIDE) IN THE TRASH RECEPTACLE LID AND ONE OPENING IN THE RECYCLING RECEPTACLE LID FOR DEPOSITING LITTER AND RECYCLABLES, RESPECTIVELY.
7. RECEPTACLES ARE A COMBINATION UNIT (COMBINED UNIT WITH IN-GROUND POST).
8. ACCEPTABLE RECEPTACLE MANUFACTURER IS BEST LITTER RECEPTACLE, INC RTC-1000. GREEN COLOR FOR TRASH AND BLUE COLOR FOR RECYCLING OR APPROVED EQUAL BY CITY OF RALEIGH. RECYCLING RECEPTACLES SHOULD BE SIGNED AS RECYCLING AND PROVIDE INFORMATION ON WHAT RECYCLABLES ARE ACCEPTED. CONSIDER INCLUDING EDUCATIONAL SIGNAGE ABOUT THE IMPORTANCE OF RECYCLING AND THE ENVIRONMENTAL BENEFITS.
9. TRASH RECEPTACLE LID TO BE GREEN COLOR TO MATCH CRADLE. RECYCLING RECEPTACLE LID TO BE BLUE COLOR TO MATCH CRADLE.
TRASH AND RECYCLING RECEPTACLE INSTALLATION SURFACE MOUNT - NOTES:

1. LOCATE RECEPTACLES AT EACH TRAIL HEAD OR AS DIRECTED BY THE CITY. RECEPTACLES MUST BE A MINIMUM OF 4 FEET FROM BENCHES.

2. RECEPTACLES SHOULD BE SET BACK A MINIMUM OF 3 FEET FROM THE EDGE OF THE GREENWAY TRAIL.

3. DRAINAGE SHOULD SLOPE AWAY FROM THE RECEPTACLES AND GREENWAY TRAIL. PROVIDE 2% MAX CROSS SLOPE FROM EDGE OF TRAIL TO RECEPTACLES WHERE FEASIBLE.

4. RECEPTACLE CRADLES SHALL BE CONSTRUCTED OF 1" X ½" STEEL BARS.

5. FOLLOWING FABRICATION, STEEL CRADLES AND POSTS SHALL BE SEALED IN VINYL TO INHIBIT RUST AND ELIMINATE PERIODIC PAINTING.

6. A 40-GALLON LINER SHALL FIT INSIDE EACH STEEL CRadle. LINERS AND LINER LIDS SHALL BE CONSTRUCTED OF TOUGH, ROTARY MOLDED POLYETHYLENE WITH A ROCKER BOTTOM. WEIGHT OF LINERS SHALL NOT EXCEED 12-POUNDS. LINER LIDS SHALL BE ATTACHED TO STEEL CRADLES WITH A VINYL CABLE. PROVIDE WEEP HOLE IN LINERS TO PERMIT DRAINAGE FOR OUTDOOR APPLICATION. PROVIDE TWO OPENINGS (ONE ON EACH SIDE) IN THE TRASH RECEPTACLE LID AND ONE OPENING IN THE RECYCLING RECEPTACLE LID FOR DEPOSITING LITTER AND RECYCLABLES, RESPECTIVELY.

7. RECEPTACLES ARE A COMBINATION UNIT (COMBINED UNIT SURFACE MOUNT).

8. ACCEPTABLE RECEPTACLE MANUFACTURER IS BEST LITTER RECEPTACLE, INC RTC-1000, GREEN COLOR FOR TRASH AND BLUE COLOR FOR RECYCLING OR APPROVED EQUAL BY CITY OF RALEIGH. RECYCLING RECEPTACLES SHOULD BE SIGNED AS RECYCLING AND PROVIDE INFORMATION ON WHAT RECYCLABLES ARE ACCEPTED. CONSIDER INCLUDING EDUCATIONAL SIGNAGE ABOUT THE IMPORTANCE OF RECYCLING AND THE ENVIRONMENTAL BENEFITS.

9. TRASH RECEPTACLE LID TO BE GREEN COLOR TO MATCH CRADLE. RECYCLING RECEPTACLE LID TO BE BLUE COLOR TO MATCH CRADLE.
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 RADI 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.

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS DATE: 8/2020 NOT TO SCALE

CURB-SIDE AND BUMP-OUT BIORETENTION

GSI-01

(Optional) Concrete Curb Extension Detail
Typical Median Bioretention Section

Posted Speed Limit of 30 MPH and Lower

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 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 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.

City of Raleigh
Standard Detail

Revisions Date 8/2020 Not to Scale

Median Bioretention
(for 30 MPH and Below)

GSI-02.1
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 GEO TECHNICAL INVESTIGATION CONSISTENT WITH THE GUIDANCE PROVIDED IN THE NCDEQ STORMWATER DESIGN MANUAL AND CITY OF RALEIGH DESIGN MANUAL. PERMEABLE 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 CLEANOUT LOCATIONS AND INSTALLATION DETAILS.
7. GEOTEXTILE MAY BE UTILIZED IN-PLACE 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.
FILL VOIDS BETWEEN AS SPECIFIED IN NOTE 7 AND SWEEP EXCESS FROM SURFACE

EXISTING OR PROPOSED 30” CURB AND GUTTER PER T-10.26.1, FLUSH W/ TOP OF PICP

2” THICK BEDDING LAYER NO. 8 WASHED STONE

MIN 4” THICK AGGREGATE BASE NO. 57 WASHED STONE

30 MIL IMPERMEABLE LINER, ALL SIDES BOTTOM LINER IF REQUIRED

UNCOMPACTED SUBGRADE (WITHOUT LINER, SEE NOTE 4), OR 90% COMPACTION (WITH LINER)

SECTION VIEW

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 HS G 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 PAVING 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.
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 RAFFLE 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, INTERGRATED 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 13354, 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.
EXISTING GRADE

EXISTING DRAINAGE STRUCTURE

MIN. 12"

FLOW

EXISTING GRADE

EXISTING DRAINAGE PIPE

MIN. 12"

45° BEND

135°

EXISESTING DRAINAGE STRUCTURE

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

RECOMMENDED METHOD OF CUTTING HOLE IS DIAMOND BIT FOR CONCRETE

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

NOTES

1. INSTALL INSERTA TEE PER MANUFACTURER'S SPECIFICATIONS.

CITY OF RALEIGH
STANDARD DETAIL

NOT TO SCALE

DATE: 08/2021

GSI-07.2
NOTES:
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.
NOTE:

1. CONTACT UTILITY OWNER FOR SLEEVE, COVERAGE, AND OTHER CROSSING REQUIREMENTS.
2. INCLUDE SLEEVE WITHIN PERVIOUS 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.
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.
REVISIONS
DATE: 08/2021

CITY OF RALEIGH
STANDARD DETAIL

LINEAR BIORETENTION
CHECK DAM DETAIL

GSI-11.1

NOT TO SCALE

NOTES:
1. REFER TO PLANS FOR HORIZONTAL AND VERTICAL CONTROL INFORMATION.
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.
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.
City of Raleigh

Standard Details

Stormwater
NOTES:

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.

3000 PSI CONCRETE
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

DOUBLE WIDTH
CATCH BASIN

SW-10.02
GRATE PER CITY STANDARDS
USE STD. SW-10.08 OR SW-10.09

NOTES:
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.

CITY OF RALEIGH
STANDARD DETAIL

SW-10.03
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

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<tr>
<th>PIPE SIZE</th>
<th>MH DIAMETER</th>
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<tr>
<td>12-24&quot;</td>
<td>4'-0&quot;</td>
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<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>
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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.
Use East Jordan Ironworks, Inc. V-4096-2 or approved equal.

CITY OF RALEIGH
STANDARD DETAIL
TWO PIECE CATCH BASIN COVER
SW-10.06.2
BIL OF MATERIAL
MATERIAL LIST FOR ONE UNIT - MAKE ( ) UNITS

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<thead>
<tr>
<th></th>
<th>DESCRIPTION</th>
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<tr>
<td>1</td>
<td>C15 X 33.9# CHANNEL 62 1/2&quot;</td>
<td>MK-ca1</td>
</tr>
<tr>
<td>4</td>
<td>1/8&quot; X 1&quot; H.R. FLAT BAR 3&quot;</td>
<td>MK-pa1</td>
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<tr>
<td>2</td>
<td>3/8&quot; x 3&quot; H.R. FLAT BAR 10&quot;</td>
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<td>2</td>
<td>1/2&quot; STAINLESS STEEL ROUND ROD 18&quot;</td>
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<tr>
<td>8</td>
<td>1/2&quot; STAINLESS STEEL HEX NUTS</td>
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<tr>
<td>4</td>
<td>1/2&quot; STAINLESS STEEL FLAT WASHERS</td>
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</tbody>
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NOTES:
PAINT WITH RUST INHIBITING BLACK PAINT.

DETAIL OF pb1 PLATES

1/2" STAINLESS STEEL DROP HANDLES

25 1/4"  25 1/4"
SECTION B-B

SECTION A-A

STANDARD 24" X 36"
DROP INLET CASTING

CITY OF RALEIGH
STANDARD DETAIL

STANDARD DROP INLET CASTING

SW-10.09
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.

COVER 120 LBS. MINIMUM

BUTYL-NEK OR APPROVED SEALANT BETWEEN FRAME AND COVER

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.
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 4000 ANGLE TYPE FRAME AND 6110 GRADE OR APPROVED EQUAL.

4" Poured Concrete Basin Slab 3000 psi @ 28 Days

Concrete Sidewalk 3000 psi @ 28 Days
6" x 14 Gauge WWG Centered 6" x 4 Galvanized Steel Tubing
Gusset Plate Steel Junction Box With Asphalt Mastic

4" Poured Concrete Basin Slab 3000 psi @ 28 Days

CONCRETE SIDEWALK 3000 PSI @ 28 DAYS
6" X 14 GAUGE WWG CENTERED, 6" X 4 GALVANIZED STEEL TUBING
GUSSET PLATE STEEL JUNCTION BOX WITH ASPHALT MASTIC

COMPACTED ABG GRAVEL
FINISH GRADE
INSTALL CHANNEL FLUSH WITH CURB AND GUTTER

CURB DRAIN DETAIL
SW-10.12

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS
DATE: 8/2020
NOT TO SCALE

Curb Drain Detail

SW-10.12
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.
### CITY OF RALEIGH
#### STANDARD DETAIL

**Cover for Pipes within the R.O.W. Minimum Pipe Clearance from Invert to Subgrade**

<table>
<thead>
<tr>
<th>Pipe Size (in)</th>
<th>Clearance Distance (ft)</th>
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<tbody>
<tr>
<td>15</td>
<td>2.4</td>
</tr>
<tr>
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<td>2.7</td>
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<td>3.3</td>
</tr>
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<td>3.6</td>
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<td>36</td>
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<td>7.6</td>
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**Bedding for Stormwater RCP Pipes**

- **Undisturbed Soil**
- **Class I, II or III Material**
  Densely compacted, backfill tamped in 6" lifts
- **#57 Stone Material**

**Dimensions**

- 6" Min / 12" Max when no trench box required (typical)

**Notes**

- Pipe Spring line
- Varies according with table above

---

**CITY OF RALEIGH**

**DATE: 8/2020**

**REVISIONS: NOT TO SCALE**

**SW-10.14**
**NOTES:**

1. Flow shall not run parallel with the fence.
2. End of silt fence needs to be turned uphill.
3. SEE REG SEDIMENT 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.

**STANDARD DETAIL**

**CITY OF RALEIGH**

**REVISIONS**

**DATE 8/2020**

**NOT TO SCALE**

**STANDARD TEMPORARY**

(SEDIMENT/SILT) FENCE

**SW-20.01**
NOTES:
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 BASKET 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 2.0 FT FROM THE TOP OF THE STREAM BANK AND WATER MUST NOT DISCHARGE IN A DIFFUSE MANNER.
TEMPORARY SEDIMENT TRAP

CITY OF RALEIGH

STANDARD DETAIL

### Baffle Detail
- **Max. 2:1 side slopes**
- **Eartthen embankment**
- **Stable transition required to the base of the slope**

### Inlet Detail
- **Baffle (Typ.)**
- **Inlet flow**
- **First chamber 25% of surface area**
- **Second chamber 25% of surface area**
- **Outlet zone 25% of surface area**

### Maintenance
- Repair/replace baffles when they collapse, tear or decompose.
- Remove sediment when cell is 1/2 full.

### 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.

### Other Details
- Support rope to wire to prevent sagging
- Support post 24" into bottom or sides
- Stake to support wire
- Design life of fabric is 6-12 months
- Support post 24" into bottom and side

### City of Raleigh

**SW-20.05.1**
DESIGN CRITERIA

SUMMARY:
PRIMARY SPILLWAY:
MAXIMUM DRAINAGE AREA:
MINIMUM VOLUME:
MINIMUM SURFACE AREA:
MINIMUM MAX RATIO:
MINIMUM DEPTH:
MAXIMUM HEIGHT:
DEWATERING MECHANISM:
MINIMUM DEWATERING TIME:
BAFFLES REQUIRED:
MIN WEIR (COR)

NOTE: TRAPS LESS THAN 20' IN LENGTH MAY USE BAFFLES.

STONE SPILLWAY
<1 ACRES
3600 CU FT PER ACRE OF DISTURBED AREA
435 SQ FT PER CFS OF Q25 PEAK FLOW
2:1
3.5 FEET, 1.5 FEET EXCAVATED BELOW GRADE
WEIR ELEVATION 3.5 FEET ABOVE GRADE
STONE SPILLWAY
N/A
3 MINIMUM (COR OR JUTE) MESH
10'

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

BASES LESS THAN 20' IN LENGTH MAY USE BAFFLES.

OVERFILL 6' FOR SETTLEMENT
EMERGENCY BYPASS 6' BELOW SETTLED TOP OF DAM
NATURAL GROUND

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.
M A N T E N A N C E:

N O T E S:

P L A N  V I E W

R O C K  P I P E  I N L E T
P R O T E C T I O N

#57 W A S H E D  S T O N E . 1' T H I C K  X  3' H I G H  M I N.

C L A S S  1  R I P - R A P  / H E A D W A L L


N O T E S:

P L A N  V I E W

R O C K  P I P E  I N L E T
P R O T E C T I O N

#57 W A S H E D  S T O N E . 1' T H I C K  X  3' H I G H  M I N.

C L A S S  1  R I P - R A P  / H E A D W A L L


N O T E S:

P L A N  V I E W

R O C K  P I P E  I N L E T
P R O T E C T I O N

#57 W A S H E D  S T O N E . 1' T H I C K  X  3' H I G H  M I N.

C L A S S  1  R I P - R A P  / H E A D W A L L


N O T E S:

P L A N  V I E W

R O C K  P I P E  I N L E T
P R O T E C T I O N

#57 W A S H E D  S T O N E . 1' T H I C K  X  3' H I G H  M I N.

C L A S S  1  R I P - R A P  / H E A D W A L L


N O T E S:

P L A N  V I E W

R O C K  P I P E  I N L E T
P R O T E C T I O N

#57 W A S H E D  S T O N E . 1' T H I C K  X  3' H I G H  M I N.

C L A S S  1  R I P - R A P  / H E A D W A L L


N O T E S:
No. 57 Washed Stone Berm

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.

City of Raleigh
Standard Detail
SW-20.07

Catch Basin Riser

Perspective View

Section View

No. 57 Washed Stone filter laid against hardware cloth (1:1 Max. slope)

Clean out point (1/2 depth Sediment Storage Zone)
CHECK DAM

NOTES:
1. ENSURE THAT CULVERT ENTRANCES BELOW CHECK DAM 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.

PURPOSE: TO REDUCE EROSION IN A CHANNEL BY REDUCING THE VELOCITY OF FLOW.
DO NOT USE CHECK DAM IN INTERMITTENT OR PERENNIAL STREAMS.

MAIN T E N A N C E: CLEAN OUT SEDIMENT AND DEBRIS AND REPAIR WASH OUTS.

M A T T I N G /
S T A B I L I Z A T I O N
2:1 O R FLATTER
CLASS B

SEEN C. D. E. O. S. R. I. O. N. AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL FOR CONDITIONS WHERE PRACTICE APPLIES.
PLANNING CONSIDERATION & DESIGN CRITERIA.
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:
25' or full width of proposed street or entrance, whichever is greater.

Existing roadway

3'-4' stone to be used (surge stone or railroad ballast)

50' min.
And sufficient to keep sediment on site

Silt fence (see note 1)

E X I S T I N G  R O A D W A Y

12" min.

FABRIC UNDER STONE

NEW CONSTRUCTION

35' min.

15' min.

12" min.

CITY OF RALEIGH

STANDARD DETAIL

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.

2" - 3" STONE TO BE USED (SURGE STONE OR RAILROAD BALLAST)

SILT FENCE (SEE NOTE 2)

EXISTING ROADWAY

NEW CONSTRUCTION

RAILROAD BALLAST

SILT FENCE

EXISTING ROADWAY

12"
CROSS SECTION

NOTES:
1. STABILIZE IMMEDIATELY UPON CONSTRUCTION AND PRIOR TO SITE INSPECTION APPROVAL.
2. STABILIZE DIVERSION DITCH BASED ON DESIGN VELOCITY, IF DESIGN VELOCITIES (Q) IN BARE EARTH CONDITIONS EXCEEDS 2 FT/S, A TEMPORARY LINER IS REQUIRED.
3. MAXIMUM 5 ACRE DRAINAGE AREA TO TEMPORARY DIVERSION.

STEEP CUT OR FILL SLOPE

FLOW

2' MIN

2' MAX

6' FREEBOARD MIN.

6' TYPICAL

ORIGINAL GRADE

2:1 MAX

2:1 TYPICAL

DIVERSION DITCH

CITY OF RALEIGH
STANDARD DETAIL

DIVERSION DITCH

SW-20.11
NOTES:
1. TO BE USED WHERE EXCESSIVE STORMWATER VELOCITIES PROHIBIT VEGETATIVE LININGS.
2. DIMENSIONS FOR D & W AND SIZE OF STONE MUST BE DETERMINED BY APPROPRIATE DESIGN CRITERIA.

<table>
<thead>
<tr>
<th>STONE CLASSIFICATION</th>
<th>RIP RAP DEPTH</th>
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<tbody>
<tr>
<td>A</td>
<td>12&quot;</td>
</tr>
<tr>
<td>B</td>
<td>18&quot;</td>
</tr>
<tr>
<td>CLASS 1</td>
<td>27&quot;</td>
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<tr>
<td>CLASS 2</td>
<td>36&quot;</td>
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DIMENSIONS FOR D & W AND SIZE OF STONE MUST BE DETERMINED BY APPROPRIATE DESIGN CRITERIA.

NOTES:
1. TO BE USED WHERE EXCESSIVE STORMWATER VELOCITIES PROHIBIT VEGETATIVE LININGS.
2. DIMENSIONS FOR D & W AND SIZE OF STONE MUST BE DETERMINED BY APPROPRIATE DESIGN CRITERIA.

<table>
<thead>
<tr>
<th>CITY OF RALEIGH</th>
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<tbody>
<tr>
<td>STANDARD DETAIL</td>
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<tr>
<td>REVISIONS</td>
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<tr>
<td>LINED CHANNELS</td>
</tr>
</tbody>
</table>
1/2 DIA METER OF PIPE OR 12" WHICH EVER IS GREATER

FILTER FABRIC

FLOW

NCDOT #5 OR #57 WASHED STONE

6" DEEP

CLASS "B"

1/2 DIA METER OF PIPE OR 12" WHICH EVER IS GREATER

FILTER FABRIC

FLOW

NCDOT #5 OR #57 WASHED STONE

6" DEEP

CLASS "B"

1/2 DIA METER OF PIPE OR 12" WHICH EVER IS GREATER

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FLOW

NCDOT #5 OR #57 WASHED STONE

6" DEEP

CLASS "B"

1/2 DIA METER OF PIPE OR 12" WHICH EVER IS GREATER

FILTER FABRIC

FLOW

NCDOT #5 OR #57 WASHED STONE

6" DEEP

CLASS "B"
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 overflows occur.

2. Carefully fit hardware cloth or comparable wire mesh with ½-inch openings over all block openings to hold gravel in place. Use clean gravel. Place 2 inches below the top of the block on a 2:1 slope or flatter and smooth it to an even grade. Do not wash stone.

3. Use clean gravel. Place one block against the top of the block on a 2:1 slope or flatter and smooth it to an even grade. Do not wash stone.

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

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS
DATE 8/2020
NOT TO SCALE

BLOCK AND GRAVEL
DROP INLET PROTECTION

SW-20.14
GALVANIZED HARDWARE WIRE EXTENDS TO THE TOP OF BOX.
(19 GAUGE, 1/4" MESH OPENINGS.)

DRAINAGE AREA = < 1 ACRE (MAXIMUM).

#57 WASHED STONE PLACED AGAINST HARDWARE WIRE TO A HEIGHT OF 16" MIN. ABOVE TOP OF BOX.

SECTION VIEW

STANDARD METAL POSTS
(MINIMUM LENGTH 5')
2'-0" IN GROUND

HARDWARE WIRE

#57 WASHED STONE
6"-8"
2' BURY IN SOLID GROUND

CONCRETE BLOCKS

2'-0"
1'-6"

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS DATE: 8/2020 NOT TO SCALE

STANDARD CATCH BASIN
YARD INLET PROTECTION

SW-20.15
TEMPORARY SILT DITCH

SW-20.16

FILL SLOPE

COMPACT EXCAVATED MATERIAL, SEED & MULCH AFTER CONSTRUCTION OF DITCH

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.

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

NOTES:

MIN. 2"x4" (TREATED)
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

### Table

<table>
<thead>
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<th>Fill Height</th>
<th>Minimum Top Width</th>
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<tbody>
<tr>
<td>LESS THAN 10 FT</td>
<td>8.0 FT</td>
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<tr>
<td>10 FT TO 15 FT</td>
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### Cross Sectional View

- **Trash Guard**
- **Gravel Fill for Riser Access**
- **Compacted Earthen Dam**
- **Anti-Seep Collar**

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

CITY OF RALEIGH
STANDARD DETAIL

DATE 8/2020

REVISIONS

NOT TO SCALE

SW-20.19

NOTE: SKIMMER TO BE TETHERED

SEE N.C. DETERIORATION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL FOR CONDITIONS WHERE PRACTICE APPLIES; PLANNING CONSIDERATION & DESIGN CRITERIA.
**DESIGN CRITERIA**

**SUMMARY:**
- TEMPORARY SEDIMENT BASIN
- RISER / BARREL PIPE
- 100 ACRES MAX.
- 1800 CUBIC FEET PER ACRE OF DISTURBED AREA
- 435 SQUARE FEET PER CFS OF Q25 PEAK INFLOW
- 2:1
- 6:1
- 2 FEET
- 3 MINIMUM
- 3 YEARS MAX
- 15 FEET OR LESS FROM TOP OF DAM TO LOW POINT OF DOWNSTREAM TOE.

**NOTES:**
1. LOCATE SEDIMENT INFLOW TO THE BASIN AWAY FROM THE DAM TO PREVENT SHORT CIRCUITS FROM INLETS TO OUTLETS
2. BASINS MUST BE STABILIZED IMMEDIATELY UPON CONSTRUCTION AND PRIOR TO SITE INSPECTION APPROVAL

**SPECIFICATIONS:**
- MIN. SIZE 15"CMP
- 12" SMOOTH WALL
- STREAM W/FABRIC
- 9"-16" WIDTH
- 5' CREST WIDTH
- COMPACTED EARThEN DAM
- STONE ENERGY DISSIPATOR
- STABLE TRANSITION REQUIRED TO THE BASE OF THE SLOPE
- 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.

**STABLISH DEWATERING:**
- MINIMUM DEPTH:
- MAXIMUM
- MINIMUM DEWATERING TIME:
- 24 HOURS
- 3 MINIMUM
- 3 YEARS MAX
- 15 FEET OR LESS FROM TOP OF DAM TO LOW POINT OF DOWNSTREAM TOE.

**CONSTRUCTION:**
- PRIMARY SPILLWAY:
- EMERGENCY SPILLWAY
- STABLE TRANSITION REQUIRED TO THE BASE OF THE SLOPE
- 5' CREST WIDTH
- COMPACTED EARThEN DAM
- STONE ENERGY DISSIPATOR

**DESIGN LIFE:**
- 6-12 MONTHS
- SUPPORT ROPE TO WIRE TO PREVENT SAGGING
- SUPPORT POST 24" INTO BOTTOM OR SIDES
- STAKE TO SUPPORT WIRE

**NOTES:**
- 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.

**STABILITY:**
- MINIMUM DEPTH:
- MAXIMUM
- MINIMUM DEWATERING TIME:
- 24 HOURS
- 3 MINIMUM
- 3 YEARS MAX
- 15 FEET OR LESS FROM TOP OF DAM TO LOW POINT OF DOWNSTREAM TOE.

**GENERAL:**
- PRIMARY SPILLWAY:
- EMERGENCY SPILLWAY
- STABLE TRANSITION REQUIRED TO THE BASE OF THE SLOPE
- 5' CREST WIDTH
- COMPACTED EARThEN DAM
- STONE ENERGY DISSIPATOR

**DESIGN LIFE:**
- 6-12 MONTHS
- SUPPORT ROPE TO WIRE TO PREVENT SAGGING
- SUPPORT POST 24" INTO BOTTOM OR SIDES
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- PRIMARY SPILLWAY:
- EMERGENCY SPILLWAY
- STABLE TRANSITION REQUIRED TO THE BASE OF THE SLOPE
- 5' CREST WIDTH
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**DESIGN LIFE:**
- 6-12 MONTHS
- SUPPORT ROPE TO WIRE TO PREVENT SAGGING
- SUPPORT POST 24" INTO BOTTOM OR SIDES
- STAKE TO SUPPORT WIRE
SUMMARY:
- PRIMARY SPILLWAY:
- MAXIMUM DRAINAGE AREA:
- MINIMUM SEDIMENT STORAGE VOLUME:
- MINIMUM SURFACE AREA:
- MINIMUM L/W RATIO:
- MINIMUM DEPTH:
- MAXIMUM HEIGHT:
- Dewatering mechanism:
- MINIMUM DewaterING TIME:
- Baffles required:
- DESIGN BASIN LIFE:
- DAM HEIGHT:

TEMPORARY SEDIMENT BASIN
- STONE SPILLWAY
- <1 ACRE.
- 3600 CUBIC FEET PER ACRE OF DISTURBED AREA.

435 SQUARE FEET PER CFS OF Q10 PEAK INFLOW
- 2:1
- 3.5 FEET, 1.5 FEET EXCAVATION BELOW GRADE
- WEIR ELEVATION 6 FEET ABOVE GRADE
- STONE SPILLWAY
- N/A
- 3 MINIMUM
- 3 YEARS OR LESS
- LIMITED TO 8 FEET.

CROSS-SECTION VIEW

CITY OF RALEIGH
STANDARD DETAIL

SEE N.C. DEQ SEDIMENT DESIGN MANUAL FOR CONSTRUCTION SPECIFICATIONS, WHERE PRACTICE APPLIES AND PLANNING CONSIDERATIONS.

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.
1. Wattles shall be filled with straw or other approved material.
2. Spacing for wattles shall be determined by the site engineer.
3. Wattles may be used for protection of catch basins and drop inlets with approval by the stormwater program manager or designer.
4. For use of wattle in a ditch, grade of ditch must be < 2.5%.

NOTES:

WATTLE / INLET PROTECTION DETAIL

CITY OF RALEIGH

REVISIONS DATE: 8/2020

NOT TO SCALE

SW-20.23
NOTES:
1. REMOVE SEDIMENT WHEN HALF OF STONE OUTLET IS COVERED.
2. REPLACE STONE AS NEEDED TO ENSURE DEWATERING.

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS DRAFT DATE: 8/2020 CITY OF RALEIGH
STANDARD SILT
FENCE OUTLET

SW-20.24
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 HOLE IN THE BLOCKS.

3. STONE SHALL BE PILLED 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.

CITY OF RALEIGH

STANDARD DETAIL

REVISIONS

DATE: 8/2020

NOT TO SCALE

BLOCK AND GRAVEL INLET

PROTECTION FOR CURB INLET

SW-20.26
NOTES:
ALL PARTIALLY COMPLETED STORM DRAINS SHALL BE PROTECTED AT THE END OF EACH DAY IN ACCORDANCE WITH THESE DETAILS.

DATE: 8/2020
IN ACCORDANCE WITH THESE DETAILS.
PB-20.28

DATE: 8/2020

SKIMMER SEDIMENT BASIN

REVISIONS

NOT TO SCALE

CITY OF RALEIGH

STANDARD DETAIL

SUMMARY:
- PRIMARY SPILLWAY:
  - MAXIMUM/DRAINAGE AREA: 10 ACRES
  - MAXIMUM/CURB FEET PER ACRE OR DISTURBED AREA
  - 2100 CUBIC FEET PER ACRE OF DISTURBED AREA
- 10 FEET OF WATER

DESIGN CRITERIA:
- DESIGN CRITERIA:
  - PER SPECTIVE VIEW
  - PERSPECTIVE VIEW
  - 1800 CUBIC FEET PER ACRE OF DISTURBED AREA
  - 2:1
  - 6:1
  - 2 FEET

PRIMARILY SPILLWAY:
- MAXIMUM VOLUME:
  - MINIMUM DWELLING TIME:
  - 2 YEARS OR LESS
  - 3 FEET OR MORE
  - 3 DAYS

PLAN:"
NOTES:

1. Maintenance shall occur when necessary. Silt fence shall be replaced every 6 (six) months and posts 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 Detail

Chainlink Construction Fence

Silt Fence

Fasteners 6" Between (Typ)

Silt Fence Main at Ends

10" O.C. Max.

Top Rail

1½" - 2½" Dia. Galvanized or Aluminum Posts

4' Min

2' - 3'

3' 0"
City of Raleigh

Standard Details

Transit
3. The bikeway shifting taper should be 7:1 preferred, 3:1 minimum.

2. See TT-02 for bus stop pad design specifications.

1. Stops serving high-frequency routes should be twice as long as the dimensions shown, or as otherwise approved by the transit division.
NOTES:
1. STOPS SERVING HIGH-FREQUENCY ROUTES SHOULD BE TWICE AS LONG AS THE DIMENSIONS SHOWN, OR AS OTHERWISE APPROVED BY THE TRANSIT DIVISION.
2. SEE TT-02 FOR BUS STOP PAD DESIGN SPECIFICATIONS.
3. THE BIKEWAY SHIFTING TAPER SHOULD BE 7:1 PREFERRED, 3:1 MINIMUM.
NOTES:
1. Stops serving high-frequency routes should be twice as long as the dimensions shown, or as otherwise approved by the Transit Division.
2. See TT-02 for bus stop pad design specifications.

BUS STOP AT STREET-LEVEL BIKEWAY

**NOT TO SCALE**

**CITY OF RALEIGH**

**STANDARD DETAIL**

**TT-01.3**

**DATE: 08/2023**
GENERAL CONCRETE PAD NOTES:

1. TYPICAL SECTION AND DIMENSIONS OF PAD ARE SUBJECT TO CHANGE DUE TO RIDERSHIP, AMENITIES TO BE INSTALLED, AND TO ENSURE PROPOSED FIXED OBJECTS ARE OUTSIDE THE CLEAR ZONE. COORDINATE WITH THE CITY OF RALEIGH & GORALEIGH, BY CALLING 919-996-4043 OR COMMUNICATING WITH TRANSIT DIVISION (TRANSPORTATION DEPARTMENT) STAFF.

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

3. REINFORCE AS SHOWN IN TYPICAL SECTION. WOVEN WIRE FABRIC SHALL HAVE MINIMUM 6" OVERLAPS AND MINIMUM COVER OF 3" 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.


11. SIDEWALK AND CONCRETE IN UTILITY STRIP AT BACK OF CURB WILL BE 4" THICK IN ACCORDANCE WITH THE STANDARD SIDEWALK SECTION.
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.

5. IF INSTALLED WITHIN NCDOT RIGHT-OF-WAY, SHELTER MUST BE ON THE NCDOT 
   APPROVED PRODUCTS LIST.
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.

3. FIXED OBJECTS SHALL BE PLACED OUTSIDE OF THE CLEAR ZONE.

CITY OF RALEIGH
STANDARD DETAIL
REVISIONS  DATE: 8/2020  NOT TO SCALE

SITE LAYOUT FOR SHELTER

TT-04
REVISIONS

NOT TO SCALE

SITE LAYOUT FOR BENCH

TT-05

DATE: 8/2020

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.

4. FIXED OBJECTS SHALL BE PLACED OUTSIDE OF THE CLEAR ZONE.
NOTES:
1. INSTALL SIGN AHEAD OF STOP 2' FROM CONCRETE SECTION IN UTILITY STRIP
2. CALL 811 FOR UNDERGROUND UTILITY LOCATION PRIOR TO INSTALLATION.

2"x2" GALV. STEEL POST, 12 GAUGE.

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS
DATE: 8/2020

NOT TO SCALE
SIGN POST LAYOUT

TT-06
NOTES:
1. CONTRACTOR TO PROVIDE FULL SHOP DRAWINGS FOR HANDRAIL PRIOR TO INSTALLING.

PARALLEL RAIL:
- 1-1/4" O.D. GALVANIZED SCHEDULE 40 STEEL PIPE OR 1-1/8" I.D. ALUMINUM PIPE, 0.145" WALL THICKNESS

POSTS:
- 1-1/4" O.D. GALVANIZED SCHEDULE 40 STEEL PIPE OR 2-1/2" I.D. ALUMINUM PIPE 0.203 WALL THICKNESS

STEEL POST SOCKET
- NON-SHRINK GROUT

SECTION VIEW
- MAXIMUM DENSITY COMPACT SUBGRADE TO 95%
- NCDOT CLASS 'A' 3000 PSI CONCRETE

SIDE VIEW
- EPOXY FASTENERS INTO CONCRETE
- NCDOT CLASS 'A' 3000 PSI CONCRETE

ALUMINUM POST MOUNT
- NOT TO SCALE
CITY OF RALEIGH
STANDARD DETAIL

BOLLARD INSTALLATION

TT-08

DATE: 8/2020

NOT TO SCALE

PAVING

3'

COMPACTED SUBGRADE

4''

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"

COMPACTED SUBGRADE

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

3000 PSI CONCRETE FOOTING

6'' (TYP)
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. WITH PIN OR SIMILAR LOCKING MECHANISMS. BACK FILL voids 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 ENDS OF 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.

RETAINING WALL

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS: 8/2020
DATE: 8/2020
NOT TO SCALE

TT-09
NOTES:
1. BIKE RACK TO BE 2" SCHEDULE 40 STEEL POWDER COATED BLACK.
2. COORDINATE LOCATION WITH THE CITY PRIOR TO INSTALLATION.

EXISTING SIDEWALK

EXISTING CURB & GUTTER

PLANTING AREA

TYPICAL BIKE PAD LAYOUT

BIKE RACK SCHEMATIC

BIKE RACKS

6" CONCRETE BIKE PAD

2 "U" STYLE BIKE RACKS (4 BIKES)

7'
City of Raleigh
Standard Details
Transportation
** 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.

** 2.08% (1:48) max
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-OUTLINE 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. NO RADIUS ENTRANCE SHALL BE ALLOWED ACROSS AN ADJOINING PROP. FRONTAGE. THIS IS DETERMINED BY EXTENDING A LINE FROM THE PROPERTY CORNER PERPENDICULAR TO THE R/W TO THE CURB AND GUTTER LOCATION.
10. ALL CONCRETE MUST BE Poured ON SAME DAY AS INSPECTION OR RE-INSPECTION IS REQUIRED.
11. DRIVeway RADIUS SHALL BE A MINIMUM OF 5' FROM ANY

   CATCH BASIN.
12. WHERE UTILITY BOXES/VAULTS MUST BE LOCATED IN THE SIDEWALK, THEY SHALL HAVE A MINIMUM 3" WIDE FRAME OF CONCRETE AROUND THEM.
MONOLITHIC POUR OF 3000 PSI CONCRETE

EXPANSION JOINT

6' TYP.

EXPANSION JOINT

5' TYP.

EXPANSION JOINT

3.5' RADIUS TYP.

1/2" EXPANSION JOINT

EXPANSION JOINT

MONOLITHIC POUR OF 3000 PSI CONCRETE

DUMMY JOINT

SEE T-10.01.4 FOR ADDITIONAL NOTES

6" EXPANSION JOINT

7.5"

6"

6" BIKEWAY

6" CONCRETE

6" SIDEWALK

** SLOPE 1.5%**

** 2.08% (1:48) max

** SHEET 3 OF 4 **

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS
DATE: 8/2022

DATE: 12/2022

DRIVEWAY, BIKEWAY AND SIDEWALK DETAIL

T-10.01.3
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. 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.

10. ALL CONCRETE MUST BE POUR ED ON SAME DAY AS INSPECTION OR RE-INSPECTION IS REQUIRED.

11. FINISH THE SURFACE TO GRADE AND CROSS SECTION WITH A FLOAT, TROWEL SMOOTH AND FINISH WITH A BROOM.

12. DRIVEWAY RADIUS SHALL BE A MINIMUM OF 5' FROM ANY CATCH BASIN.

13. WHERE UTILITY BOXES/Vaults MUST BE LOCATED IN THE SIDEWALK, THEY SHALL HAVE A MINIMUM 3" WIDE FRAME OF CONCRETE AROUND THEM.
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.).
RESIDENTIAL DRIVEWAY INSTALLATION ON NON CURB & GUTTERED STREETS

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. PIPE TO BE EXTENDED TO ALLOW ACCEPTABLE COVER AND SLOPES.

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.

7. W-DIMENSION AS SHOWN ON PLANS SHALL BE AS FOLLOWS: 15" MINIMUM, 16" MAXIMUM FOR RESIDENTIAL DRIVEWAYS.

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS DATE: 8/2020

NOT TO SCALE

RESIDENTIAL DRIVEWAY INSTALLATION ON NON CURB & GUTTERED STREETS

T-10.03
DRIVEWAY GRADES

EXISTING OR PROPOSED PAVEMENT GUTTER LINE DRIVE WAY APRON SIDEWALK

2' 6.5' 6' 5' 5' 5'

+9.6% 1.5%** +16% +25%

-4% -15% -25%

* 5' FOR SENSITIVE AREA AVENUE AND SENSITIVE AREA RESIDENTIAL STREET

** 2.08% (1:48) max

A. CURB & GUTTER, SIDEWALK SECTION

VARIABLE

PAVEMENT WIDTH

1/4" PER FT.

SHOULDER WIDTH

1/4"/FT OR -2.08%

-8.33% OR 1"/FT

+8% -18% -25%

B. SHOULDER 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.

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS DATE: 8/2020 NOT TO SCALE

DATE: 12/2022

DRIVEWAY GRADES

T-10.04
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.
NOTES:

1. THE PAVEMENT EDGES SHALL BE DEFINED BY A STRAIGHT EDGE FORMED BY A MACHINED SAW CUT OR MILLING MACHINE.
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.
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, COMPACTED THOROUGHLY AND ROLLED WITH A SMOOTH DRUM ROLLER TO LEVEL PATCH.

CITY OF RALEIGH
STANDARD DETAIL

MILL AND RESURFACE TO OPPOSITE SIDE

EDGE OF PAVEMENT/GUTTER OR NEXT TRAVEL LANE

MILL AND OVERLAY TO CL

SAW CUT (TYP)

CROWN OR EDGE OF TRAVEL LANE

IF AREA SPACING BETWEEN PATCHES IS LESS THAN 10' (14' BETWEEN SAW CUTS), MILL AND OVERLAY SHALL COVER ENTIRE AREA BETWEEN CUTS

LATERAL PAVEMENT CUTS FOR UTILITY SERVICE

MILL AND RESURFACE

MILL AND RESURFACE 1" - 1.5" MIN SURFACE COURSE OR FULL DEPTH REPAIR

EDGE OF PAVEMENT/GUTTER OR NEXT TRAVEL LANE

MILL AND OVERLAY TO OPPOSITE SIDE IF PARALLEL CUT IS LESS THAN 2' FROM CL OR CROSSES CL

PARALLEL PAVEMENT CUTS FOR UTILITY SERVICE

EDGE OF PAVEMENT/GUTTER OR NEXT TRAVEL LANE

SAW CUT (TYP)
NOTES:
1. IF DRIVEWAY IS WITHIN CLOSE PROXIMITY OF ACCESS RAMP, TIE SIDEWALK INTO DRIVEWAY.
2. REFER TO STANDARD DETAIL T-10.01.2, DRIVEWAY AND SIDEWALK DETAIL, SHEET 1 OF 2.
** 2.08% (1:48) max

** 2.08% (1:48) max

P.S. - PAVED SHOULDERS
G.S. - GRASS SHOULDERS

5' UTILITY PLACEMENT EASEMENT

GRADE POINT

GRADING POINT

MEDIAN CURB

(4-LANE CURB ALTERNATIVE)

CITY OF RALEIGH

SENSITIVE AREA PARKWAY

STANDARD DETAIL

T-10.07

REVISIONS
DATE 11/02/09

DATE 11/02/09

PAVEMENT DESIGN

3" S9.5B
4" H19.0B
10" ABC

GENERAL

WALKWAY TYPE
MULTI-USE PATH

PLANTING TYPE
TREE/LAWN

TREE SPACING
50' O.C. AVG

PARKING TYPE
NONE
** 2.08% (1:48) max

| WALKWAY TYPE | SIDEWALK |
| PLANTING TYPE | TREE/LAWN |
| TREE SPACING | 50' O.C. AVG |

3" SF9.5A
8" ABC
NOTE
1. THE BIKE LANE MATERIAL SHALL BE BLACK-DYED CONCRETE, SEE T-30.01.2.
2. THE BUFFER WIDTH BETWEEN THE SIDEWALK AND BIKE LANE IS A MAXIMUM AND MAY BE REDUCED AS LONG AS
   A) NOTE 3 IS MET AND B) THE TOTAL WIDTH OF THE SIDEWALK, BUFFER AND BIKEWAY IS 125.
3. THE BUFFER BETWEEN THE BIKE LANE AND THE SIDEWALK MUST BE DETECTABLE BY PEOPLE WITH VISION
   DISABILITIES. OPTIONS INCLUDE A ROLLED OR BEVELED CURB WHERE THE HEIGHT DIFFERENTIAL BETWEEN THE
   SIDEWALK AND BIKE LANE IS BETWEEN 2" AND 3" OR A DETECTABLE GUIDANCE SURFACE SET 1' OFF THE EDGE OF
   THE BIKEWAY IF THE SIDEWALK AND BIKEWAY ARE FLUSH.
4. WHERE A CURB IS USED, THE CURB HEIGHT SHALL BE BETWEEN 8" AND 12" AND THE CURB WIDTH SHALL BE
   BETWEEN 6" AND 9". AN EXPANSION JOINT SHALL BE PROVIDED ON EACH SIDE OF THE CURB.
5. IN CONTEXTS WITH A LOW VOLUME OF PEDESTRIANS, THE SIDEWALK, BUFFER AND BIKE LANE CAN BE
   COMBINED INTO A 12.5' WIDE MULTI-USE PATH, PENDING THE APPROVAL OF THE OFFICE OF TRANSPORTATION
   PLANNING.

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<tr>
<th>GENERAL</th>
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<tbody>
<tr>
<td>WALKWAY TYPE</td>
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<tr>
<td>BIKEWAY TYPE</td>
</tr>
<tr>
<td>PLANTING TYPE</td>
</tr>
<tr>
<td>TREE SPACING</td>
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<tr>
<td>PARKING TYPE</td>
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<tr>
<td>SIDEWALK</td>
</tr>
<tr>
<td>CURB-LEVEL BIKE LANE</td>
</tr>
<tr>
<td>TREE / LAWN</td>
</tr>
<tr>
<td>40' O.C. AVG</td>
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<tr>
<td>NONE</td>
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</tbody>
</table>

STREET PAVEMENT DESIGN

- 3" S9.5B
- 3" I19.0B
- 8" ABC
NOTE
1. THE BIKE LANE MATERIAL SHALL BE BLACK-DYED CONCRETE; SEE T-30.12.
NOTE
1. THE BIKE LANE MATERIAL SHALL BE BLACK-DYED CONCRETE, SEE T-30.01.2.
NOTE
1. THE BIKE LANE MATERIAL SHALL BE BLACK-DYED CONCRETE, SEE T-30.01.2.
The bike lane material shall be black-dyed concrete, see T-30.012.
<table>
<thead>
<tr>
<th>PARALLEL PARKING</th>
<th>ANGLED PARKING</th>
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</thead>
<tbody>
<tr>
<td><strong>154&quot; Public Rwy</strong></td>
<td><strong>177&quot; Public Rwy</strong></td>
</tr>
<tr>
<td><strong>66' B-B</strong></td>
<td><strong>17'</strong></td>
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<tr>
<td><strong>11'</strong></td>
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<td><strong>2.08% (1:48) max</strong></td>
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### CITY OF RALEIGH

**STANDARD DETAIL**

**DATE:** 8/2020

**MULTI-WAY BOULEVARD**

**T-10.20**
CITY OF RALEIGH
STANDARD DETAIL

DATE: 12/2022

PRIVATE ACCESSWAY
PRIMARY INTERNAL ACCESS DRIVE

T-10.23
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.

NOTES:

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.
SCORE FULL WIDTH OF CURB AND GUTTER

BACK OF CURB

EDGE OF PAVEMENT

PLAN

2'-0"
6"
1'-6"

FRONT

END

CITY OF RALEIGH
STANDARD DETAIL

STANDARD METHOD OF ENDING CURB AND GUTTER

T-10.25
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.

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.
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.
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.

Notes:

- City of Raleigh
- Standard detail
- Locations in street
- T-10.29

DATE: 8/2020
DATE: 12/2022

**2.08% (1:48) max**

**2.08% (1:48) max**

**2.08% (1:48) max**
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. P.T.E. to be expanded on a case-by-case basis as needed to accommodate private utilities, appurtenant facilities, and equipment.

NOTES:

CITY OF RALEIGH
STANDARD DETAIL

STANDARD UTILITY LOCATIONS IN STREET WITH CURB-LEVEL BIKEWAY

T-10.30
CURB-LEVEL BIKEWAY TO SHARED-LANE BIKEWAY WITH CURB & GUTTER

CURB-LEVEL BIKEWAY TO SHARED-LANE BIKEWAY WITHOUT CURB & GUTTER

CURB-LEVEL BIKEWAY TO ON-STREET BIKEWAY

* SEE CITY OF RALEIGH STANDARD DETAIL T-20.01.1
TO DETERMINE APPROPRIATE RAMP TYPE
CURB-LEVEL BIKEWAY TO SHARED-LANE BIKEWAY WITH CURB & GUTTER

CURB-LEVEL BIKEWAY TO SHARED-LANE BIKEWAY WITHOUT CURB & GUTTER

CURB-LEVEL BIKEWAY TO ON-STREET BIKEWAY

* SEE CITY OF RALEIGH STANDARD DETAIL T-20.01.1 TO DETERMINE APPROPRIATE RAMP TYPE
**TYPE N-1 (CURB TYPE)**

1. 7.5%, 8.33% (1:12) MAX RAMP SLOPE
2. 1.5%; 2.08% (1:48) MAX CROSS SLOPE
3. CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 1.5% (2.08% MAX) 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 6', TRUNCATED DOMES SHALL BE INSTALLED ALONG THE BACK OF THE CURB COVERING THE FULL WIDTH OF THE RAMP.
NOTE: * USE SMALL FLARE ONLY WHEN A CURB WOULD DIRECTLY CONFLICT WITH APPROACHING VEHICLE TURNING MOVEMENTS.

### TYPE N-3

1. 7.5%; 8.33% (1:12) MAX RAMP SLOPE
2. 1.5%; 2.08% (1:48) MAX CROSS SLOPE
3. CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 1.5% (2.08% MAX) 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 1.5% (2.08% MAX) WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.

RAMPS AND DOMES SHALL BE INSTALLED THE SAME WIDTH AS THE SIDEWALK.

IF LENGTH EXCEEDS 5', TRUNCATED DOMES SHALL BE INSTALLED ALONG THE BACK OF THE CURB COVERING THE FULL WIDTH OF THE RAMP.

1. 7.5%; 8.33% (1:12) MAX RAMP SLOPE
2. 1.5%; 2.08% (1:48) MAX CROSS SLOPE
3. CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 1.5% (2.08% MAX) 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 1.5% (2.08% MAX) ON ANY PORTION OF RAMP OR TRANSITION TO STREET.

TYPE N-4

CONCRETE DEPTH
RAMP 6"
LANDING 4"

1. 7.5%; 8.33% (1:12) MAX RAMP SLOPE
2. 1.5%; 2.08% (1:48) MAX CROSS SLOPE
3. CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 1.5% (2.08% MAX) 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 1.5% (2.08% MAX) ON ANY PORTION OF RAMP OR TRANSITION TO STREET.

TYPE N-4A
CITY OF RALEIGH
STANDARD DETAIL

TYPE R-1

1. 7.5%; 6.33% (1:12) MAX RAMP SLOPE
2. 1.5%; 2.08% (1:48) MAX CROSS SLOPE
3. CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 1.5% (2.08% MAX) 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.

TYPE R-2

(USE ONLY WHERE WATER WILL NOT POND WITHIN LANDING)

1/2" EXPANSION JOINT (TYP)

TYPE R-2A

R=1' (typ)

TYPE R-2B

R=1' (typ)

DETECTABLE WARNING SURFACE

1/2" EXPANSION JOINT (TYP)

CROSS SLOPE NOT TO EXCEED 1.5% (2.08% MAX) ON ANY PORTION OF RAMP OR TRANSITION TO STREET.

PAY LIMITS FOR CURB RAMP

CONCRETE DEPTH
RAMP / FLARES 6" LANDING 4"

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS DATE 8/2020 NOT TO SCALE
DATE 12/2022

CURB RAMPS (RETROFIT)

T-20.01.5
CITY OF RALEIGH
STANDARD DETAIL

PAY LIMITS FOR CURB RAMP

CONCRETE DEPTH

| SIDE RAMPS | 4" |
| LANDING & OPENINGS | 6" |

CROSS SLOPE NOT TO EXCEED 1.5% (2.08% MAX) ON ANY PORTION OF RAMP OR TRANSITION TO STREET.

1. 7.5%; 8.33% (1:12) MAX RAMP SLOPE
2. 1.5%; 2.08% (1:48) MAX CROSS SLOPE
3. CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 1.5% (2.08% MAX) WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB.
4. RAMPS AND DOMES SHALL BE INSTALLED THE SAME WIDTH AS THE SIDEWALK.

DEPRESSED 2'-6" CURB & GUTTER

1/2" EXPANSION JOINT (TYP)

6" W X 12" D CONCRETE CURB

TYPE R-3

TYPE R-4
CURB RAMPS REQUIRE A (4'-0") MINIMUM LANDING WITH A MAXIMUM CROSS SLOPE AND LONGITUDINAL SLOPE OF 1.5% (2.08% MAX) WHERE PEDESTRIANS PERFORM TURNING MANEUVERS. SLOPE TO DRAIN TO CURB. CROSS SLOPE NOT TO EXCEED 1.5% (2.08% MAX) ON ANY PORTION OF RAMP OR TRANSITION TO STREET.

DEPRESSED 2'-6" CURB & GUTTER

LARGER RADIUS
15' OR GREATER

ONLY TO BE USED WITH CITY OF RALEIGH APPROVAL.

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS DATE: 8/2020
SHARED CURB RAMP/FLARE (RETROFIT)
T-20.01.7
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')

MEDIAN ISLAND WITH CUT THROUGH
(MEDIANS ≤ 20')
USE 12" X 12" PAVERS
DETECTABLE WARNING
SURFACE (YELLOW)

CONCRETE PEDESTRIAN REFUGE

1/2" EXPANSION
JOINT (TYP)

1:5 SLOPE

VARIABLE (SEE PLANS)

(SEE PLANS)

10'-0" MIN AT SHARED PEDESTRIAN
AND BICYCLE CROSSINGS (TYP)

CONCRETE PEDESTRIAN REFUGE

5" CONCRETE
MONOLITHIC ISLAND

1/2" EXPANSION
JOINT (TYP)

1:5 SLOPE

VARIABLE (SEE PLANS)

6' (TYP)
4' MIN.

6' (TYP)
4' MIN.

CITY OF RALEIGH

STANDARD DETAIL

PEDESTRIAN REFUGE

T-20.03
REVISIONS
NOT TO SCALE
5'X 5'(MIN)
SHARED
LANDING
RAMP
FLARE
5' MIN
FLARE
RAMP
FLARE
RAMP
STOP BAR
FLARE
2' STRIP IF CUT THROUGH IS GREATER THAN 4' IN LENGTH.
OTHERWISE PLACE DETECTABLE WARNING ON THE ENTIRE SURFACE OF CUT THROUGH.
ALIGN CURB PARALLEL WITH CROSSES.
CURB RAMPS AT MEDIAN ISLANDS

1. CROSS SLOPE NOT TO EXCEED 1.5% (2.08% MAX) ON ANY PORTION OF RAMP OR TRANSITION TO STREET.
2. RUNNING SLOPE NOT TO EXCEED 7.5% (8.33% MAX)

1. CROSS SLOPE NOT TO EXCEED 1.5% (2.08% MAX) ON ANY PORTION OF RAMP OR TRANSITION TO STREET.
2. RUNNING SLOPE NOT TO EXCEED 7.5% (8.33% MAX)

1. CROSS SLOPE NOT TO EXCEED 1.5% (2.08% MAX) ON ANY PORTION OF RAMP OR TRANSITION TO STREET.
2. RUNNING SLOPE NOT TO EXCEED 7.5% (8.33% MAX)

PLOTTING OR OTHER NON-WALKING SURFACE IF DROPPOFF IS NOT PROTECTED

1. CROSS SLOPE NOT TO EXCEED 1.5% (2.08% MAX) ON ANY PORTION OF RAMP OR TRANSITION TO STREET.
2. RUNNING SLOPE NOT TO EXCEED 7.5% (8.33% MAX)

1. CROSS SLOPE NOT TO EXCEED 1.5% (2.08% MAX) ON ANY PORTION OF RAMP OR TRANSITION TO STREET.
2. RUNNING SLOPE NOT TO EXCEED 7.5% (8.33% MAX)

1. CROSS SLOPE NOT TO EXCEED 1.5% (2.08% MAX) ON ANY PORTION OF RAMP OR TRANSITION TO STREET.
2. RUNNING SLOPE NOT TO EXCEED 7.5% (8.33% MAX)

D TECTABLE WARNING SURFACE SHALL EXTEND FULL WIDTH OF SIDEWALK OR RAMP

CITY OF RA HALEIGH
STANDARD DETAIL
T-20.04.1
REVISIONS
DATE: 8/2020
NOT TO SCALE
DATE: 12/2022
DETECTABLE WARNING SURFACE PLACEMENT
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.
**SECTION "A-A"**
WITH DETECTABLE WARNING PAVERS

NOTE:
THIS APPLICATION ONLY TO BE USED
WHEN RETRO FITTING EXISTING
BARRIER FREE Ramps

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.

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS  DATE: 02/2020  NOT TO SCALE
DATE: 12/2022

DETECTABLE WARNING
SURFACE, SURFACE APPLIED
(RETROFIT ONLY)

T-20.04.3
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 LINES AND TRAVERSE THE PEDESTRIAN CROSSING. 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.

3. 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.

4. CURB RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE TO THE LATEST CITY OF RALEIGH STANDARD DRAWINGS.

5. CITY OF RALEIGH
   STANDARD DETAIL

   T-20.05
BIKE-XING

CITY OF RALEIGH
STANDARD DETAIL

DATE: 12/2022

GREEN THERMOPLASTIC PANTONE COLOR PALETTE #375

WHITE THERMOPLASTIC LINE

2"  6'

4"  2"

VARES

T18 - THERMOPLASTIC (90 MIL) WHITE / GREEN BICYCLE SKIPS
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, and at street intersections (along the length of radius curb returns).
4. Compacted ABC stone may be required as subgrade at the discretion of the inspector.
5. Surface shall be finished to grade and cross section with a broom tamp.
6. Where utility boxes/vaults must be located in the sidewalk, they shall have a minimum 3" wide frame of concrete around them.
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 6 INCH DEPTH IS REQUIRED AT LOCATIONS OF DRIVEWAY CROSSINGS, AT STREET INTERSECTIONS (ALONG THE LENGTH OF CURB RETURNS) AND IN THE HANDICAP RAPS.
4. BIKEWAY MATERIAL SHALL BE INTEGRALLY COLORED CONCRETE, COLORED BLACK, USING NON-FADING PIGMENTS.
5. CONTRACTOR SHALL SEAL ALL JOINTS. SEAL SHALL BE NON-SHRINKING AND FLUSH WITH FINISHED GRADE OF THE CONCRETE BIKEWAY.
6. JOINTS SHALL BE SAWCUT A MINIMUM OF 1/4 DEPTH, BUT NO MORE THAN 1/2 DEPTH.

** 1.5% 2.08% (1:48) max
COMPACTED SUB GRADE

6" ABC

6" ABC

2" SF 9.5A

CITY OF RAELIGH
STANDARD DETAIL
ASPHALT MULTI-PURPOSE PATH
T-30.02.1
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

SECTION 1

GALVANIZED STAKE
REFER TO MANUFACTURER’S
RECOMMENDATION FOR
INSTALLATION
ALUMINUM EDGE RESTRAINT
BRICK OR
CONCRETE PAVER
2 3/8" (60 MM) MIN. THICKNESS
CONCRETE CURB
SET 1/4" (7 MM) BELOW TOP OF PAVERS
AND CONTROL JOINTS @ 15’ (4.58 M) OC

SECTION 2

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

NOTES:
1. BRICK OR CONCRETE PAVERS ALLOWED ONLY UNDER SPECIAL CONDITIONS.
2. THICKNESS OF BASE MAY VARY WITH SUBGRAGE/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.
NOTES:
1. ALL ROAD PLATES MUST BE ACCOMPANIED BY A VALID RIGHT-OF-WAY PERMIT.
2. TYPE 1 INSTALLATIONS ARE FOR USE ON ROADWAYS WITH A POSTED SPEED LIMIT UNDER 35 MPH.
3. TYPE 2 INSTALLATIONS ARE FOR USE ON ROADWAYS WITH A POSTED SPEED LIMIT ABOVE 35 MPH.
4. ALL ROAD PLATE INSTALLATIONS SHALL BE APPROVED BY THE INSPECTOR PRIOR TO ALLOWING PUBLIC TRAFFIC.
5. ALL ROAD PLATE INSTALLATIONS, LIABILITY AND MAINTENANCE ARE THE RESPONSIBILITY OF THE CONTRACTOR
6. METAL PLATES SHALL BE IDENTIFIED WITH A 24" HIGH STENCIL TEXT OF THE CONTRACTOR NAME OR DESIGNATED ABBREVIATION AND A 6" HIGH STENCIL TEXT OF THE CONTRACTORS AFTER 24/7 CONTACT PHONE NUMBER. ANY MARKING DEEMED UNREADABLE MUST BE REP AINTED. SEE DETAIL T-40.01.2
7. METAL PLATES WILL HAVE WHITE REFLECTIVE MARKING TAPE ON ALL FOUR CORNERS OF EACH END OF A TRENCH. THESE PLATES DESIGNATE THE BEGINNING AND END OF THE EXCAVATION. THE REFLECTIVE TAPE WILL BE DURABLE ENOUGH TO WITHSTAND TRAFFIC. ANY PEELING TAPE DEEMED UNREADABLE MUST BE REPLACED IMMEDIATELY. SEE DETAIL T-40.01.2
8. WARNING SIGNS ADVISING MOTORISTS THAT THEY SHOULD EXPECT TO ENCOUNTER METAL PLATES SHALL BE PLACED AT APPROXIMATELY 100 FEET, IN ADVANCE OF THE METAL PLATE LOCATION THE "BUMP" OR "STEEL PLATE AHEAD" SHALL BE USED. SEE DETAIL T-40.01.2
9. PLATES THAT ARE LEFT OVERNIGHT WILL REQUIRE THAT THE WARNING SIGN BE SUPPLEMENTED WITH A LOW-INTENSITY-FLASHING WARNING LIGHT MOUNTED ON OR ADJACENT TO THE ADVANCE WARNING SIGNAGE.
10. FAILURE TO FOLLOW THE STEPS OUTLINED ABOVE WILL RESULT IN STOP WORK ORDERS, CITATIONS AND FINES TO THE PERMITTEE OR CONTRACTOR WORKING WITHOUT A VALID PERMIT. ROAD PLATES REMOVED OR REPAIRED BY THE CITY WILL RESULT IN STOP WORK ORDERS, CITATIONS AND FINES.
11. PAVEMENT MUST BE RESTORED TO THE PREVIOUS OR BETTER CONDITION ONCE THE PLATE HAS BEEN REMOVED.
ADVANCED WARNING SIGNAGE

W8-1
48" X 48"

OR

STEEL PLATE AHEAD

METAL PLATE MARKING EXAMPLES

RALEIGH CONTRACTING
919-555-5555

EB
984-555-5555

METAL PLATE REFLECTIVE TAPE DETAILS

4" WHITE REFLECTIVE TAPE OR PAINT

STEEL ROAD PLATE
City of Raleigh
Standard Details

Tree Protection and Planting
WARNING SIGN

TREES PROTECTION AREA

DO NOT ENTER

WARNING SIGN DETAIL

NOTE: FOR TREE PROTECTION ONLY

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 2 1/2' 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.

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

CITY OF RALEIGH
STANDARD DETAIL

REVOLUTION DUE: 8/2020
NOT TO SCALE

TREE PROTECTION FENCE LAYOUT

TPP-02
DO NOT PRUNE LEADER. PRUNE OR CUT ONLY DEAD OR DAMAGED BRANCHES TO AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) A300 STANDARDS

REMOVE EXCESS SOIL TO EXPOSE THE ROOT FLARE. THE ROOT FLARE SHALL BE PLANTED AT GRADE, NO HIGHER THAN 2" ABOVE GRADE, AND NEVER BELOW GRADE. TREE SHALL BE SET PLUMB

ROOT BALL SHALL BE PLACED DIRECTLY ON COMPACTED SUBGRADE. HANDLE TREE BY THE ROOT BALL ONLY.

MULCH DEPTH NOT MORE THAN 3". KEEP MULCH 3" FROM ROOT FLARE AND DO NOT CONTACT STEM

PLANTING SOIL MIX AROUND ROOT BALL. 600 CU FT OF SOIL OR STRUCTURAL SOIL REQUIRED PER TREE

COMPLETELY REMOVE TOP HALF OF BURLAP, LACING STRAPS, NAILS AND WIRE BASKET AND DISCARD FROM HOLE. ALL SYNTHETIC BURLAP MUST BE REMOVED FROM SIDES OF ROOT BALL.

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

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.
1. **The Critical Root Zone (CRZ) is defined as a radius extending from the trunk of a tree 1.25 feet per inch of DBH.**

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.**

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**Contact Information:**

City of Raleigh Parks, Recreation and Cultural Resources Department Urban Forester: Trees@RaleighNC.gov

www.RaleighNC.gov

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**Notes:**

**City of Raleigh Standard Detail**

**TPP-04**
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
GRAY IRON, RECTANGULAR 4'X6', 1.5" MIN. THICK, WITH 1/4" OPENING OR LESS

NOTES:
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.

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

NOTE: ALL DIMENSIONS SHOWN ARE IN ENGLISH
MATERIAL: CAST GRAY IRON ASTM A-48, CLASS 35B
FINISH: NO PAINT
WEIGHT: 608#/SET

CITY OF RALEIGH
STANDARD DETAIL

REVISIONS DATE: 8/2020
NOT TO SCALE

TREE GRATE IN SIDEWALK WITHIN ROW

TPP-06
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.

NOT TO SCALE

SECTION

MULCH 3" DEEP MAX. AND 3" MIN. FROM THE BASE OF THE TREE

SIDEWALK PAVING AND SUBBASE

PLANTING SOIL

4" DIAMETER PVC PIPE WRAPPED IN FABRIC LOCATED IN THE LOWEST POINT AND CONNECTED TO THE STORM DRAINAGE SYSTEM WHERE APPLICABLE

COMPACTED OR UNDISTURBED SUBGRADE

NOTE: SEE TREE PLANTING DETAIL

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

CITY OF RALEIGH STANDARD DETAIL

DATE: 8/2020

TPP-07
2" X 4" WOOD SLATS, BETWEEN WOOD SLATS WITH A MINIMUM OF 3 SLATS PER TREE

EXIST TREE TRUNK

EXIST TREE BRANCH

ROPE OR STEEL STRAPPING AROUND THE 2X4 WOOD SLATS

12" FROM LOWEST BRANCH

EXIST TREE BRANCH

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

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.

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

SECTION A - A

CITY OF RALEIGH
STANDARD DETAIL

TPP-09