

TOWN OF PINEVILLE LAND DEVELOPMENT STANDARDS MANUAL

Revision 8 – February 29, 2024

Table of Contents Specifications & Special Provisions

I.	STREETS AND ALLEYWAYS	1
	A. GENERAL NOTES	1
	B. STANDARDS OF STREET DESIGN.....	6
	C. GRADING	10
	D. ROADWAY BASE	10
	E. ROADWAY INTERMEDIATE AND SURFACE COURSE.....	11
	F. SIDEWALKS AND DRIVEWAYS	11
	G. BASE COURSE STREET REPAIR.....	14
	H. SURFACE COURSE STREET REPAIR.....	14
	I. DECORATIVE STREET SIGNS AND POSTS	15
	J. BUS STOPS	15
II.	STORM DRAINAGE.....	15
	A. GENERAL NOTES	15
	B. STANDARDS FOR DESIGN	18
	C. PIPE INSTALLATION.....	19
	D. BACKFILL	19
	E. HIGH DENSITY POLYETHYLENE PIPE (HDPE).....	20
	F. REINFORCED CONCRETE (RCP) AND CULVERTS	21
	G. DRAINAGE STRUCTURES	22
	H. END TREATMENTS	23
	I. NON-STANDARD STRUCTURES	23
	J. PIPE VIDEO STANDARDS	23
III.	PLAN REQUIREMENTS	27
	A. GENERAL NOTES	27
	B. SUBDIVISIONS AND PRELIMINARY PLANS.....	27

C. BOND/SECURITY POLICY – SUBDIVISION IMPROVEMENTS	28
IV. APPROVED PLANT SPECIES	30
V. REFERENCES	37
VI. PINEVILLE LAND DEVELOPMENT STANDARDS (PLDS)	
• 1000 Series – Miscellaneous Infrastructure Standards	
• 2000 Series – Storm Drain Standards	
• 2100 Series – Stormwater BMP Standards	
• 3000 Series – Erosion Control Standards	
• 4000 Series – Tree Standards	
• 5000 Series – Miscellaneous Standards	
• 6000 Series – Paver Details	

Pineville Land Development Standard (PLDS) Details

Revision 8 – February 29, 2024

1000 Series - Miscellaneous Infrastructure Standards

<u>Standard</u>	<u>Description</u>
10.01	Major Collector Street
10.02	Minor Collector Street
10.03	Industrial Street
10.04	Industrial Street (Ditch type)
10.04A	Industrial Local Street (No Parking)
10.04B	Industrial Local Street Parking on One Side of Street
10.04C	Industrial Local Street Parking on Both Sides of Street
10.04D	Industrial Collector Street (No Parking)
10.04E	Industrial Collector Street with Median and No Parking
10.05	Commercial Street (Special Use Conditions)
10.05A	Retail/Mixed Use Local Street with Median and Parking
10.05B	Retail/Mixed Use Local Street Parking and Green Zone Both Sides
10.05C	Retail/Mixed Use Collector Street with Bike Lanes
10.05D	Retail/Mixed Use Collector Street with Median and Bike Lanes
10.05E	Retail/Mixed Use Local Street (No Parking)
10.05F	Retail/Mixed Use Local Street Parking on Both Sides of Street
10.06	Local Residential Street
10.06A	Local Residential Street Parking on One Side of Street
10.06B	Local Residential Street Parking on Both Sides of Street
10.06C	Local Residential Street (Ditch Type)
10.06D	Local Limited Residential Street
10.07	Residential Collector Street
10.07A	Residential Collector Street (On street parking)
10.10A	Residential Collector Street With Bike Lanes
10.10B	Residential Divided Collector Street
10.10C	Residential Divided Collector Street With Left Turn Lane
10.10D	Residential Collector Street (Ditch Type)
10.10E	Residential Divided Collector Street Ditch Type with Median Ditch

- 10.11A Residential Alley Detail One-Way Operation (Private)
- 10.11B Residential Alley Detail Double Loaded with Two-Way Operation (Private)
- 10.11C Residential Alley Detail Single Loaded with Two-Way Operation (Private)
- 10.11D Standard Alley – 20' Public Right-of-Way
- 10.13 Commercial Cul-De-Sac
- 10.14 Residential Cul-De-Sac
- 10.17A Standard Curb and Gutter
- 10.17B Curb and Gutter
- 10.18 18" Vertical Curb
- 10.19 Curb Transition 2'-6" Curb and Gutter to 2'-0" Valley Gutter
- 10.20 Curb Transition 2'-6" Curb & Gutter to 1'-6" Curb and Gutter
- 10.22 Concrete Sidewalks
- 10.23 Monolithic Concrete Curb and Sidewalk
- 10.24A Commercial Type II and Residential Type I Drop Curb Driveway with Sidewalk Abutting Curb (2'-6" Curb & Gutter)
- 10.24B Commercial Type II and Residential Type I Drop Curb Driveway with Sidewalk Abutting Curb (6"x18" Vertical Curb)
- 10.24C Commercial and Residential Drop Curb Driveway with Sidewalk Abutting Curb
- 10.25A Residential Drop Curb Type I Driveway with Planting Strip (2'-6" Curb and Gutter)
- 10.25A1 Drop Curb Driveway without Planting Strip
- 10.25B Commercial Drop Curb Type II Driveway with Planting Strip (2'-6" Curb and Gutter)
- 10.25C Residential Drop Curb Type I Driveway with Planting Strip (6"x18" Vertical Curb)
- 10.25D Commercial Drops Curb Type II Driveway with Planting Strip (6"x18" Vertical Curb)
- 10.25E Type II Modified Driveway with Planting Strip (2' 6" Curb & Gutter)
- 10.25E1 Modified Driveway without Planting Strip
- 10.25F Commercial Type IV Driveway
- 10.26 Drop Curb Driveway – Monolithic Concrete Curb and Sidewalk
- 10.27A Residential Driveway (Type I) For 2' 0" Valley Gutter
- 10.27B Commercial Type II Driveway for 2'-0" Valley Gutter
- 10.28 Type III Driveway Entrance
- 10.29 Catch Basin Frame in Valley Gutter
- 10.30 Catch Basin Placement at Intersections
- 10.31A Accessible Ramp Standard with Planting Strip (2'-6" Curb and Gutter)
- 10.31B Accessible Ramp Sections with Planting Strip (2'-6" Curb and Gutter)
- 10.32A Accessible Ramp Standard without Planting Strip (2'-6" Curb and Gutter)
- 10.32B Accessible Ramp Sections without Planting Strip (2'-6" Curb and Gutter)
- 10.33A Accessible Ramp Standard (2'-0" Valley Gutter)

10.33B	Accessible Ramp Sections (2'-0" Valley Gutter)
10.34A	Accessible Ramp Standard Monolithic Curb and Sidewalk
10.34B	Accessible Ramp Sections Monolithic Curb and Sidewalk
10.35A	Standard Placement of Accessible Ramps and General Notes
10.35B	Truncated Domes Plan and Cross-Section
10.36A	Culvert Crossings on Residential and Commercial Streets
10.36B	Culvert Crossings on Residential and Commercial Streets
10.37	Typical Residential Street Taper
10.40A	Directional Accessible Ramp with Small/Medium Curb Radius
10.40B	Directional Accessible Ramp with Large Curb Radius
10.40C	Directional Curb Ramp with Valley Gutter
10.41A	Heavy Industrial Driveway without Planting Strip (2'-6" Curb and Gutter)
10.41B	Heavy Industrial Driveway with Planting Strip (2'-6" Curb and Gutter)
10.50	Temporary Turnaround Local Residential Street (Optional)
10.51	Residential Alley Hammerheads and Intersections
10.52	Utility Street Cut Repair

2000 Series - Storm Drain Standards

<u>Standard</u>	<u>Description</u>
20.00 A,B,C	NCDOT Standards Approved For Use in the Town of Pineville
20.03	Double Brick Catch Basin 15" 36" Pipe
20.05A	Slab Type Catch Basin 15" Thru 48" Pipe
20.05B	Manhole Ring and Cover for Slab Type Catch Basin
20.17A	Concrete Wingwall with Splash Pad
20.17B	Concrete Wingwall with Splash Pad Notes
20.22	Flared End Section 12" To 72"
20.23	Rip Rap Aprons at Outfalls
20.24	Rip Rap Plunge Pool
20.25	Trench Detail for Storm Drain
20.26	Concrete Paved Ditches
20.27	Rip Rap Ditches
20.28	Subdrain Detail
20.29	Overlapping Sewer and Storm Easements

20.30	Minimum Storm Easements Pipe and Channel
20.34	Offset Catch Basin
20.35	Grading At Drop Inlet

2100 Series – Stormwater BMP Standards

<u>Standard</u>	<u>Description</u>
21.00	Bioretention Plan (BMP Fig. 4.1.2)
21.01	Bioretention Cross-Section (BMP Fig. 4.1.3)
21.02	Bioretention Planting Plan (BMP Fig. 4.1.4)
21.04	Flow Splitter Structure (BMP Fig. 4.1.11)
21.05	Wetpond Plan (BMP Fig. 4.2.2)
21.06	Wetpond Profile (BMP Fig. 4.2.2)
21.07	Wetpond Cross Sections (BMP Fig. 4.2.3)
21.08	Wetpond Littoral Shelf and Berm Detail (BMP Fig. 4.2.4)
21.09	Wetpond Planting Plan (BMP Fig. 4.2.5)
21.10	Wetland Plan (BMP Fig. 4.3.2)
21.11	Wetland Section (BMP 4.3.2)
21.12	Wetland Cross Sections (BMP 4.3.3)
21.14	Wetland Planting Plan (BMP Fig. 4.3.4)
21.15	Enhanced Grass Swale Planting Plan (BMP Fig. 4.4.3)
21.16	Enhanced Grass Swale Details (BMP Fig. 4.4.2)
21.17	Grass Channel (BMP Fig. 4.5.2)
21.18	Grass Channel Planting Plan (BMP Fig. 4.5.3)
21.19	Infiltration Trench (BMP Fig. 4.6.2)
21.20	Observation Well (BMP Fig. 4.6.3)
21.21	Buffer Strip (BMP Fig. 4.7.3)
21.22	Buffer Strip Planting Plan (BMP Fig. 4.7.4)
21.23	Underground Sand Filter
21.24	Surface Sand Filter
21.25	Surface Sand Filter Section

3000 Series - Erosion Control Standards

<u>Standard</u>	<u>Description</u>
30.00	Special Erosion Control Requirements & Notes
30.01	Temporary Sediment Trap
30.02A	Skimmer Sediment Basin
30.02B	Skimmer
30.03A	Sediment Basin
30.03B	General Notes – Sediment Basins
30.04	Flexible Pipe Slope Drain
30.05	Temporary Silt Ditch
30.06A	Temporary Silt Fence
30.06B	High Hazard Temporary Silt Fence
30.06C	Silt Fence Outlet Option 1
30.06D	Silt Fence Outlet Option 2
30.07	Block and Gravel Stone Inlet Protection
30.08	Stone Inlet Protection
30.09	Hardware Cloth and Gravel Inlet Protection
30.10A	Temporary Rock Check Dam
30.10B	Temporary Rock Check Dam with Matting and Optional PAM
30.10C	Temporary Waffle with Matting and Optional PAM
30.11A	Stabilized Construction Entrance
30.11B	Construction Entrance Tire Wash
30.12	Gravel and Rip Rap Filter Berm Basin
30.13	Erosion Control Dewatering
30.14	Temporary Stream Crossing
30.15	Catch Basin Inlet Protection
30.16	Slope Stability
30.17	Temporary Seeding Schedule
30.17A	Seeding Schedule
30.17B	Seeding Schedule (Seasonal)
30.18	Construction within Creek Bank
30.19	Baffle Installation
30.20	Embankment Matting Detail
30.21	Brick Storm Structure with Temporary Pipe

4000 Series - Tree Standards

<u>Standard</u>	<u>Description</u>
40.01	Tree Planting Detail (For Single & Multi-Stem Trees)
40.02	Tree Protection Detail
40.03	Large and Small Maturing Tree Pit with Grate in Sidewalk (Plan)
40.03A	Large and Small Maturing Tree Pit with Grate in Sidewalk (Section A)
40.03B	Large and Small Maturing Tree Pit with Grate in Sidewalk (Section B)
40.03C	Large and Small Maturing Tree Pit with Grate in Sidewalk (Section C)
40.04	Typical Valve and Valve Box Installation
40.05A	Shrub Planting Bed
40.05B	Individual Small Shrub / Tree Planting
40.08A	Median Greater than 120 Inches Excavation, Drainage and Backfill
40.08B	Median 73 to 120 Inch Excavation, Drainage and Backfill
40.08C	Median 48 to 72 Inch Excavation, Drainage and Backfill
40.09	Root Flare Depths (Tree Root Ball Condition on Trees from Suppliers)
40.10	Tree Planting Notes (Drainage and Inspection)
40.11	Bridging Tree Roots
40.12	Temporary Tree Protection Detail
40.13	Asphalt Curb Placement at Existing Trees
40.14	Rock Chimney

5000 Series - Miscellaneous Standards

<u>Standard</u>	<u>Description</u>
50.03	Typical Concrete Control Monument
50.04A	Safety Rail
50.04B	Safety Rail Warrants
50.05A	Street Name Sign (NCDOT Maintained Streets)
50.05B	Street Name Sign (NCDOT Maintained Streets)
50.05C	Decorative Street Name Sign and Post
50.05D	Decorative Street Name Sign and Post Notes
50.05DE	Decorative Street Sign and Post

50.06	Street Name Sign Installation Locations
50.07A	Dead End Street Barricade
50.07B	Dead End Street Barricade General Notes
50.08A	End of Roadway Marker
50.08B	End of Roadway Marker Guard Rail Clamp Installation
50.09A	Parking Standards
50.09B	Parking Standards (Continued)
50.10A	Accessible Parking and Signage Standards
50.10B	Supplemental Van Accessible Sign (R7-8P)
50.11	Signage and Pavement Markings at Roundabouts
50.13	Directional Crossover with Raised Medians
50.14	Piano Style Crosswalk
50.15	Raised Crosswalk
50.16	Speed Bump
50.17	Speed Table
50.20	Inverted "U" Rack Bicycle Parking
50.21	Wave Rack for Bicycle Parking
50.22A	12' Decorative Lighting Post
50.22B	30' Decorative Lighting Post

6000 Series – Paver Details

<u>Standard</u>	<u>Description</u>
60.01	Residential Driveway With Concrete Edges
60.02	Patio/Sidewalk/Plaza on Compacted Aggregate
60.03	Patio/Sidewalk/Plaza on Concrete Base
60.04	Street/Parking Lot/Residential Driveway Overlay on Existing Concrete Pavement
60.05	Street/Parking Lot/Residential Driveway Overlay on Existing Asphalt Pavement
60.08	Steps with Pavers
60.09	Street/Parking Lot on Compacted Gravel Base
60.10	Concrete Curb and Gutter with Pavers
60.11	Crosswalk on Compacted Aggregate Base
60.12	Crosswalk on Concrete Base
60.13	Crosswalk on Asphalt or Cement Treated Base
60.14	Utility Structure

- 60.15 Utility Structure Valve Box/Pull Box/Lamphole
- 60.16 Catch Basin
- 60.17 Tree Pit – Non-compacted Root Zone under Pavers
- 60.18 Slope Protection Pavers
- 60.19 Fountain
- 60.22 Parking Garage over Uninhabited Space Expansion Joint
- 60.23 Parking Garage over Inhabited/Uninhabited Space - Drain
- 60.24 Parking Garage over Inhabited Space Expansion Joint
- 60.25 Bridge Deck
- 60.26 Gas Station on Cement Treated Base
- 60.27 Port/Industrial/Airfield Pavement With Cement Treated Base
- 60.28 Port/Industrial Pavement on Existing Asphalt or Concrete
- 60.31 Fire Lane, Driveway & Intermittent Parking
- 60.32 Slope Protection
- 60.33 Riparian Stabilization for Stream and Lake Sides
- 60.34 Ditch Liner for Intermittent Flows

The above 6000 Series – Paver Details were developed using Cambridge Paver and Turfstone details as examples. Pavers manufactured by others may be used upon approval by The Town of Pineville. If others are used, they shall be comparable in quality to the Cambridge product.

PINEVILLE LAND DEVELOPMENT STANDARDS MANUAL SPECIFICATIONS AND SPECIAL PROVISION NOTES

Revision 8 – February 29, 2024

The following specifications and special provisions are intended to be used in conjunction with Pineville Land Development Standard Drawings, NCDOT Roadway Standard Drawings, NCDOT Asphalt Quality Management System (QMS) Manual, and NCDOT Standard Specifications for Roads and Structures, and the stamped approved plans for all development within the Town of Pineville unless otherwise directed by the Public Works Director or Town Engineer.

I. STREETS AND ALLEYWAYS

A. GENERAL NOTES

1. All streets are either public or private. Public or private streets that are maintained by the Town, POA, or HOA, including alleyways, must comply with these regulations. All other streets must comply with the stamped approved plans.
2. All work and materials shall conform to the latest edition of the North Carolina Department of Transportation Standard Specifications for Roads and Structures *unless otherwise specified in this manual*.
3. Public state streets will need to be accepted for maintenance by NCDOT prior to maintenance bonds being released. Public streets within the Town limits will require approval from County/Town and be dedicated to the Town prior to release of the performance guarantee/bonds.
4. If a project connects to an existing Town maintained road, the Design Engineer will need to coordinate an on-site pre-submittal meeting with the Town, MC, and Owner to determine if any repairs will be needed to the roadway or obtain Town approval if repairs are not warranted. Any pre-existing condition of the roadway, such as asphalt failure, shall be documented by the owner/owner's Geotechnical Engineer prior to construction. The pre-submittal meeting will also determine to what extent mill and overlay may be required. All repair areas, method of repair, and mill and overlay will be included on the approved plans. All street repairs must meet sections G and H below. Pre-existing asphalt failure will require a minimum of full depth asphalt repair prior to overlay and/or release of performance guarantee/bond.
5. All precautions must be taken to protect an existing Town maintained road. Any damage caused by construction activity will require a minimum of full depth asphalt repair as specified in these Special Provisions. The Town and MC will mark the areas to be repaired and will follow sections G and H below.

6. Proof rolls should be scheduled 48 hours in advance with the Mecklenburg County Land Development Inspector “County Inspector” and will be conducted on all curb, subgrade, stone base, and chemically stabilized base. Proof rolls will not be conducted on surfaces that are not to grade, impacted by weather (too wet or dry, frozen ground), not properly compacted, or any other unsuitable conditions as deemed by the County Inspector, Town or the Geotechnical Engineer. Proof rolls will not be conducted in the rain and when the ground is frozen. Proof rolls will be conducted with a minimum 15-ton ticketed truck or more if there has been a history of non-compliance. If safety is an issue, a full-sized motor grader can be used if approved by the County Inspector. Owners/contractors are required to pre-proof roll and work out any issues with the Geotechnical Engineer prior to scheduling with the County Inspector. There shall be no deflection or pumping to pass inspection. Pumping, deflection or not being prepared for the proof roll is a failed inspection and is subject to re-inspection fees.
7. Third Party Geotechnical Engineer/staff will be required at all proof rolls and during paving operations. Mecklenburg County and Towns are 100% pass/fail and cannot make recommendations for remediation. Third Party Geotechnical Engineers can make recommendations for remediation if approved by the County Inspector and/or Town. The Geotechnical Engineer will also need to certify the roadways; therefore, attendance is required. If the Geotechnical Engineer/staff is not present, the proof roll will be rescheduled, and a reinspection fee will be required.
8. Density testing will be required every 200 feet or a minimum of 3 per road for subgrade, stone base, chemically stabilized base, and asphalt. Density test could be required for curb if unsuitable material is present, as determined by the County, Town or Geotechnical Engineer/staff. Electronic density testing reports are required to be provided to the County and maintained by the County in the Electronic Plans Management system. Third Party Geotechnical Engineering reports shall include project name, date, weather, type of inspection, station numbers and/or site map of each test location, layer/material tested, type of test used, percent moisture, percent density (wet and dry), required percent density, and pass/fail. All digital reports and tests shall be sent to the County Inspector (24 hours in advance for proof rolls and 72 hours after paving operations are complete). The person performing the inspection and/or testing shall be competent and be able to provide Quality Control and preferred to be a certified QMS Roadway Technician. All tests shall be performed by developer at no cost to the County or Towns.
9. Subgrade - compacted to at least 100% of the maximum dry density as determined by AASHTO T 99 as modified by NCDOT.
10. Chemically treated subgrade (lime or cement) - compacted to at least 97% of the maximum dry density as determined by AASHTO T 99 as modified by NCDOT. Report must include weather conditions and number of curing days.

11. Aggregate-stabilized subgrade - compacted to at least 100% of the maximum dry density as determined by AASHTO T 99 as modified by NCDOT.
12. Aggregate Base Course (ABC) - compacted to at least 100% of the maximum dry density as determined by AASHTO T 180 as modified by NCDOT.
13. Cement-treated Base Course (CTBC) - compacted to at least 97% of the maximum dry density as determined by AASHTO T 180 as modified by NCDOT.
14. Asphalt – Density shall be in accordance with the latest QMS for Asphalt Pavements. Asphalt reports shall include proper use of tack, asphalt type, asphalt temperature, ambient temperature, surface temperature before and after laydown of asphalt, and total layer thickness of asphalt (checked frequently and across all travel lanes).
15. Full Depth Reclamation (FDR) and Chemically Stabilized Bases will require written recommendations by the Geotechnical Engineer and must be approved by the County Inspector and Public Works Director/Town Engineer prior to starting. FDR (Section 541) and Chemically Stabilized Bases (Sections 540 and 542) must follow the most recent addition of NCDOT Standards Specifications for Roads and Structures. Chemically stabilized subgrade or base reports shall include weather, application rates, mixing and compaction methods used, number of curing days, optimal moisture, and compaction tests. If approved as an alternate pavement, then depth testing will be required. The Geotechnical Engineer must certify alternate pavement designs and FDR by using the County’s Engineer’s Certification for Chemically Stabilized Bases.
16. All asphalt cuts shall be made with a saw when preparing street surfaces for patching or widening strips.
17. Paper joints shall be used to seal the ends of an asphalt pour so that future extensions can be made without causing rough joints.
18. When placing asphalt against existing surfaces, a straight edge shall be used to prevent “humping” at that location.
19. Stone shall be primed if paving is not complete within seven days following stone base approval.

20. Surfaces shall be tacked when asphalt is being placed over existing asphalt streets or adjoining concrete, storm drain and sanitary sewer structures. The surfaces must be thoroughly cleaned and dry before applying tack coat. Tack coats must be applied at the proper rate and have a uniform coverage across the mat to be paved (no corn rows). The tack should break prior to placing trucks on tack and beginning the paving operation. See the NCDOT Standard Specifications for Roads and Structures and the QMS Asphalt Manual for additional requirements.
21. All street widening shall be constructed with full depth asphalt. Longitudinal seams located within the tire travel path shall require a repair of minimum 1 ½ inch mill and surface course overlay to cover a full lane width.
22. In rolling and hilly terrains, sweeping of the stone base and/or application of a tack coat may be required near intersections.

These requirements will be established by the Town Inspector based on field conditions.

23. ALL concrete used for streets, curb and gutter, sidewalks and drainage structures, etc. shall have a minimum compressive strength of 3600 PSI at 28 days. This requirement shall be met regardless of any lesser compressive strength specified in the North Carolina Department of Transportation Standard Specifications for Roads and Structures. The contractor shall prepare concrete test cylinders in accordance with Section 1000 of the North Carolina Department of Transportation Standard Specifications for Roads and Structures at the direction of the project inspector. All equipment and cylinder molds shall be furnished by the contractor. It shall be the responsibility of the contractor to protect the cylinders until such time as they are transported for testing. Testing for projects shall be performed by an independent testing lab, at no cost to the Town. The contractor shall provide equipment and perform tests on concrete for a maximum slump and air content as defined in Section 1000 of the North Carolina Department of Transportation Standard Specifications for Roads and Structures. These tests shall be performed at a frequency established by the inspector. Materials failing to meet specifications shall be removed by the contractor.
24. All concrete shall be cured with 100% Resin Base, white pigmented curing compound which meets ASTM Specifications C- 309, Type 1, applied at a uniform rate at 1 gallon to 400 square feet within 24 hours of placement of the concrete. Apply curing compound no more than 30 minutes after newly placed within 24 hours of placement of the concrete. Mechanically operated equipment application rate is 0.0067 gal/sf.
25. All curb and gutter shall be backfilled with soil approved by the Inspector within 48 hours after construction to prevent erosion.

26. All backfill shall be non-plastic in nature, free from roots, vegetative matter, waste, construction material or other objectionable material. Said material shall be capable of being compacted by mechanical means and the material shall have no tendency to flow or behave in a plastic manner under the tamping blows or proof rolling.
27. Materials deemed by the Geotechnical Engineer and/or County Inspector as unsuitable for backfill purposes shall be removed and replaced with select backfill material.
28. All trenches in the street right-of-way shall be backfilled with suitable material immediately after the pipe is laid. The fill around all pipe shall be placed in layers not to exceed 6 inches and each layer shall be compacted thoroughly. For Storm Drainage, see Backfill under Storm Drainage section.
29. Under no circumstances shall water be permitted to rise in un-backfilled trenches after the pipe has been placed.
30. Compaction requirements shall be attained by the use of mechanical compaction methods. Each 6-inch layer of backfill shall be placed loose and thoroughly compacted into place.
31. Straight forms shall not be used for forming curb and gutter in curves.
32. All excess concrete on the front edge (lip) of gutter shall be removed when curb and gutter is poured with a machine.
33. All subgrade shall be compacted to 100% of the maximum density obtainable with the Standard Proctor Test to a depth of 8 inches, and a density of 95% Standard Proctor for depths greater than 8 inches. All tests shall be performed by developer at no cost to the Town.
34. A canvas cover or other suitable cover shall be required for transporting plant mix asphalt during cool weather when the following conditions are present:
 - a. Air temperature is below 60 degrees F.
 - b. Length of haul from plant to job is greater than 5 miles.
 - c. Other occasions at the Inspector's discretion when a combination of factors indicates that material should be covered in order to assure proper placement temperature.

35. Concrete or asphalt shall not be placed until the air temperature measured at the location of the paving operation is at 35 degrees F and rising by 10:00 a.m. Concrete or paving operations should be suspended when the air temperature is 40 degrees F and descending. The contractor shall protect freshly placed concrete or asphalt in accordance with Sections 420 (Concrete Structures), 600 (Asphalt Bases and Pavements), and 700 (Concrete Pavements and Shoulders) of the North Carolina Department of Transportation Standard Specifications when the air temperature is at or below 35 degrees F and the concrete has not obtained an age of 72 hours. (Exception: asphalt concrete surface course placed on paved surfaces. See the most current NCDOT Superpave Manual for minimum air temperature requirements.)
36. The contractor shall maintain two-way traffic at all times when working within existing streets. The contractor shall place and maintain signs, danger lights, and barricades and furnish watchmen or flagmen to direct traffic in accordance with the latest edition Work Area Traffic Control Handbook (WATCH), Work in the right-of-way of State System Streets may require additional traffic control provisions, refer to NCDOT Work Zone Traffic Control Program and/or MUTCD.
37. The contractor shall do that which is necessary to control erosion and to prevent sedimentation damage to all adjacent properties and streams in accordance with the appropriate Town of Pineville Erosion and Sedimentation Control Ordinance.
38. Roadside ditches shall conform to NCDOT standards unless otherwise specified by Town along Town maintained roads.
39. A Professional Engineer (PE) certification of roadway construction will be required, stating construction was performed in accordance with the design standards.

B. STANDARDS OF STREET DESIGN

Note: Use of Hilly Terrain criteria is NOT permitted without PRIOR approval of the Town Engineer.

Note: Design standards will apply from the latest edition of the NCDOT design manual *Subdivision Roads Minimum Construction Standards*. Any revisions to *Subdivision Roads* will supersede the design standards given in the Pineville Land Development Standards for NCDOT maintained roads and under no circumstances shall a NCDOT standard be less restrictive than what is required by the Town of Pineville.

1. STREETS (PUBLIC and PRIVATE):

	ALL LOCAL STREETS (Except Industrial & Collector)		LOCAL INDUSTRIAL & COLLECTOR ONLY	
	<u>Level/Rolling</u>	<u>Hilly</u>	<u>Level/Rolling</u>	<u>Hilly</u>
a. Terrain Classification	0-15%	15% +	0-15%	15%++
b. Maximum Grade	10%	12%	8%	10%
c. Design Speed (mph)	25	20	30	25
d. Minimum Radius (ft.)				
Public Street	150	90	250	175
Private Street	50	50	150	150
e. Min. Tangent between Horizontal Curves (ft.) Horiz. And Vert.	50	50	100	100
f. K Values (crest/sag)	20/20	15/20	28/35	20/20

Note: Provisions of adequate stopping sight distance may require use of larger K values than the minimums listed above. Stopping sight distance for wet pavements shall follow the latest edition of AASHTO – Geometric Design of Highways and Streets. The Pineville Public Works Department reserves the right to prescribe more stringent sight distance standards and/or means to achieve adequate sight distance than these listed above.

2. Intersections:

Criteria is for any proposed street (public or private) that ties into public streets.

- a. PUBLIC STREET: Vertical Alignment is 5% maximum within 100 feet of intersection.
PRIVATE STREET: Vertical Alignment is 5% maximum within 40 feet of intersection.
- b. Minimum Angle of Intersection is 75 degrees.

c. Minimum Curb & R/W Radius:

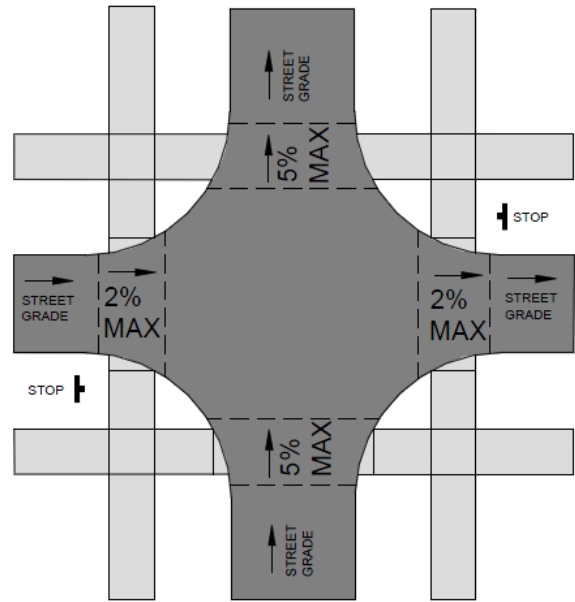
Curb Radii for Local Street Intersections

From/To	R/Narrow	R/Medium	R/Wide	C/Narrow	C/Wide	Industrial
R/Narrow	35					
R/Medium	20	15				
R/Wide	25	15	10			
C/Narrow	30	15	25	35		
C/Wide	15	15	15	30	10	
Industrial	30	25	15	25	25	50

R= Residential; C= Commercial

Narrow = Pavement less than 20 feet wide
 Medium = Pavement 20 feet to 24 feet wide
 Wide = Pavement greater than 24 feet wide

d. Maximum Street Grade at Intersections:



Midblock Pedestrian Street Crossings: At midblock crossings, the cross slope of the pedestrian street crossing is allowed to equal the street grade.

STOP or YIELD Condition: Vertical alignment is 2% maximum through the crosswalk areas (marked or unmarked). Outside the crosswalk areas the vertical alignment is 5% maximum within 100 feet of intersection.

THROUGH MOVEMENT Condition: Vertical alignment is 5% maximum through the crosswalk areas. Where feasible, it is recommended that the vertical alignment for a through-movement street also be set at 2% maximum through crosswalk areas (marked or unmarked).

Preferred option: Design intersections with a max. 2% street grade through the crosswalk area of all legs of the intersection. This will provide a level intersection where the required sidewalks, curb ramps, and street crossings can be constructed with the use of CLDSM standard details included in the plans. Special attention to drainage design is warranted to ensure that these intersections drain properly. For intersections with street grades greater than 2% in any direction it is strongly recommended that the sidewalks, curb ramps, and street crossings be included as part of the design process and site-specific details of the designs and any alternate layouts shall be included in plans as appropriate.

e. Minimum Intersection Separation:

- Along local streets 125 feet
- Along collector streets 200 feet
- Along thoroughfares to be determined by Town

f. Intersection offsets/separation from a thoroughfare, at signalized intersections, or at intersections that may become signalized in the future may need to be greater than these minimums and will be determined by the Town on a case-by-case basis.

g. Intersection corner – A minimum 35 feet by 35 feet sight triangle (measured along right-of-way lines) shall be provided at each intersection corner. An additional 10 feet by 70 feet sight triangle shall be provided at intersections connecting to NCDOT maintained roadways. Other sight distance requirements may be required by the NCDOT or the Town.

h. Design criteria for arterial streets:

Criteria shall be established jointly by the Town Engineer and the Director of the Department of Transportation on a case-by-case basis using the latest edition of the American Association of State Highway and Transportation Officials (AASHTO) A Policy on Geometric Design of Highway and Streets and/or NCDOT Roadway Design Manual.

Refer to the NCDOT Subdivision Roads Minimum Construction Standards Manual for development criteria for sites located outside the Town of Pineville for areas governed by Pineville Land Development Standards Manual and the NCDOT Subdivision Roads Minimum Construction Standards Manual, the more restrictive standard shall apply.

C. GRADING

1. Proposed street rights-of-way shall be graded to their full width for ditch type streets and a minimum of 8 feet behind the curb for curb and gutter sections.
2. Fill embankments shall be formed of suitable material placed in successive layers not to exceed more than 6 inches in depth for the full width of the cross-section, including the width of the slope area. No stumps, trees, brush, rubbish or other unsuitable materials or substances shall be placed in the embankment. Each successive 6-inch layer shall be thoroughly compacted by the sheep's foot tamping roller, 10-ton power roller, pneumatic-tired roller, or other methods approved by the Town Engineer. Embankments over and around all pipe culverts shall be of select material, placed, and thoroughly tamped and compacted as directed by the Town Engineer or his representative.

D. ROADWAY BASE

1. All roadways and alleyways shall be constructed with a base course as described on the appropriate Town of Pineville Land Development Standard Detail Drawing.
2. The material for stone base course shall conform to the requirements of Section 1010, Aggregate for Non-Asphalt Flexible Type Base, and Section 520, Aggregate Base course of the North Carolina Department of Transportation Standard Specifications for Roads and Structures.
3. The stone base shall be compacted to 100% of the maximum density obtainable with the Modified Proctor Test (AASHTO- T180) by rolling with ring or tamping roller or with a pneumatic tired roller with a minimum weight of ten tons. When completed, the base course shall be smooth, hard, dense, unyielding and well bonded. Stone base shall not be segregated.
4. An asphalt concrete base course, as specified on the Standard Detail Drawing may be substituted in lieu of a stone base course.
5. Asphalt base course will only be allowed within widening strips less than 5 feet in width.

E. ROADWAY INTERMEDIATE AND SURFACE COURSE

1. All public roadways shall be constructed with an intermediate and surface course as described on the appropriate Town of Pineville Land Development Standard Detail Drawing.
2. All alleyways will require an intermediate and/or asphalt surface course as described by the Pineville Land Development Standard Detail Drawing as shown on the approved plans.
3. Density tests will be required every 200 feet with a minimum of 3 tests for each roadway. Density testing reports shall be provided to the Town Public Works Director.
4. Plant mixed asphalt shall conform in all respects to Section 610 of the North Carolina Department of Transportation Standard Specifications for Roads and Structures.
5. The Town inspector shall be given a 24-hour notification to inspect the intermediate course deficiencies. All deficiency repairs are to be monitored by a Town Inspector and accepted prior to application of final layer. All asphalt repairs must be done in accordance with Section G and H below and will require full depth asphalt repair (~~5.5"~~) unless otherwise approved by the Public Works Director/Town Engineer.
6. Town inspectors shall be notified prior to using recycled plant mixes.
7. Failure to meet the above requirements may result in the delay or prevention of street acceptance by the Town of Pineville or NCDOT.
8. Core samples may be required by the County Inspector and/or Town to determine layer thickness and quantity of materials used. All expenses will be the responsibility of the owner/developer.

F. SIDEWALKS AND DRIVEWAYS

1. Where sidewalks and pedestrian routes within street crossings (including marked and unmarked crosswalks) are provided, they must be constructed so they are accessible to all potential users, including those with disabilities.

2. The July 26, 2011 “Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way” was written by the US Access Board and is also known as the Public Right-of-Way Accessibility Guidelines or PROWAG. PROWAG provides more specific information than the existing Americans with disabilities Act Accessibilities Guidelines (ADAAG) for transportation facilities within the right-of-way including pedestrian access routes, signals, and parking facilities. The PROWAG requirements are currently in the development and adoption process and have not been officially adopted by the Department of Justice; however, the Federal Highway Administration has issued guidance that the draft version of the PROWAG “are currently recommended best practices and can be considered the state of the practice that could be followed for areas not fully addressed” in the existing ADAAG requirements.
3. Due to the widespread acceptance of the PROWAG, and their pending adoption in the future, the standards in this manual are based upon the PROWAG requirements. The designer is encouraged to reference the complete PROWAG document for additional information www.accessboard.gov. Buildings and other structures not covered by PROWAG must comply with the applicable requirements of the ADAAG.
4. Sidewalks shall be constructed of not less than 3600 P.S.I. concrete and shall be minimum 4 inches thick, except where a sidewalk crosses a driveway it shall be 6 inches thick. Sidewalk shall be placed on a base of 6 inches ABC stone compacted to 95% of the maximum density obtainable with the Standard Proctor Test OR placed on a subbase compacted to 95% density with Geogrid 1100 mat. The surface of the sidewalk shall be steel trowel and light broom finished and cured with an acceptable curing compound. Tooled joints shall be provided at intervals of not less than 5 feet and expansion joints at intervals of not more than 45 feet. The sidewalk shall have a lateral slope of 1.5% (2% maximum).

EXAMPLE SIDEWALK CONSTRUCTION DIMENSIONS:		
WIDTH	RISE	CROSS-SLOPE
4'	¾"	1.56%
5'	1"	1.67%
6'	1-1/8"	1.56%
8'	1-½"	1.56%

5. Planting strip adjacent to sidewalk shall be graded to ¼ inch per foot (min.) up to 1 ¼ inch per foot (max.), except where excessive natural grades make this requirement impractical. In such cases, the Town Engineer may authorize a suitable grade.

6. Sidewalk widths shall be a minimum of 5 feet unless otherwise specified. Where necessary, a 5' x 5' sidewalk is required at least every 200' as required by PROWAG for a passing zone unless otherwise provided by residential driveways, intersecting sidewalk, etc.
7. Approval of sidewalk construction plans must be obtained as part of the plan review process. A recorded public sidewalk easement is required for all sidewalk located outside public right-of-way; the width shall be equal to the distance from the right-of-way line to the back of the sidewalk plus two feet or to the face of building, whichever is less. The sidewalk easement must be recorded with the Mecklenburg County Register of Deeds prior to issuance of a certificate of occupancy for the corresponding building(s).
8. Running slope of all ramps shall be up to 7.5% (8.33% maximum). Ramp length is not required to exceed 15' regardless of the resulting slope, which shall be uniform for the length of the ramp. Curb ramps are required where sidewalks intersect curbing at any street intersection and at Type III driveway connections.
9. Refer to the WATCH Manual, MUTCD (latest edition), and the Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG) for construction zone pedestrian routes and signalization and controls for actuators. Curb ramps shall be designed and constructed in accordance with the American Disability Act.
10. Where pedestrian routes are contained within a street or right-of-way, the grade of pedestrian access routes shall not exceed the general grade established for the adjacent street or highway.
11. Driveways within the public right of way shall be constructed of not less than 3600 P.S.I. concrete and shall be minimum 6 inches thick and placed on a base of 6 inches ABC stone compacted to 95% of the maximum density obtainable with the Standard Proctor Test OR placed on a subbase compacted to 95% density with Geogrid 1100 mat. The surface of the concrete shall be steel trowel and light broom finished and cured with an acceptable curing compound. Tooled joints shall be provided as required by the Standard Details. (PROWAG).
12. The Town Public Works Director shall be given a 48 hour notice prior to any concrete sidewalk or driveway apron pour to schedule an onsite inspection. Failure to schedule an inspection may result in rejection of the work.
13. Electrical Conduit shall be installed with sidewalk construction to allow for future lighting wiring where directed by the Town. Conduit shall be 2-inch Schedule 80 PVC, at minimum 18- inch depth, with stub ups placed in planting strip at 150 feet intervals.

G. BASE COURSE STREET REPAIR

All street repairs will be marked by the County Inspector and Town. All repairs will require full depth asphalt or alternative approved by the County and Public Works Director/Town Engineer. Full depth asphalt is half the stone base and all the intermediate course. For example, a typical base course pavement section is 8" of ABC and a 1.5" intermediate asphalt course; therefore, full depth asphalt would be 5.5 inches. Street repairs will include but not limited to: Alligator cracking, block cracking (>1/2"), longitudinal and transverse cracking (>1/2"), edge cracks (>1/2"), joint reflection cracks (>1/2"), slippage cracks, potholes, depressions, rutting, shoving, upheaval, moisture/weathering damage, loss of aggregates, raveling, and corrosive fluid spills. All repairs are subject to MC and Town inspections.

1. Structural repair areas must encompass the full travel lane of roadways and alleyways.
2. Minimum base course repair patch size is 10 feet by 10 feet.
3. Structural repairs to a road failure cannot be within 10 feet of each other, else the entire area requires structural repair.
4. Backfill depth for full-depth asphalt pavement repairs shall be minimum 9 ½ inches total below finished pavement grade on thoroughfare and industrial streets and 6 ½ inches on business and residential streets. Compaction for pavement repairs shall be 92% for asphalt and 95% for subgrade. Full Depth Reclamation (FDR) is recommended when 30-40% of the roadway needs repair.

H. SURFACE COURSE STREET REPAIR

All surface repairs will be marked by the County Inspector and Town. The surface course shall be smooth (good rideability), free of defects which include but not limited to: Gouges, corrosive fluid spills, pockmarks, cracks, cuts, excessive joints/seams, construction inconsistencies (i.e. waviness, undulations, signs of thermal application issues, etc.), excessive damage, and excessive aging and/or weathering. Any defect that meets the removal criteria shall be milled a minimum 1.5" (more if the damage exceeds 1.5-inches) and then a new surface course applied according to the specifications below. All repairs are subject to MC and Town inspections.

1. Overlay patch area must encompass the full travel lane of roadways and entire width of alleyways.
2. Minimum surface course repair patch size is 10 feet by 10 feet.
3. Overlay patch area cannot be any closer than 150 feet from each other, else the entire area requires mill and replace.

I. DECORATIVE STREET SIGNS AND POSTS

1. New installed and replaced sign posts in the Town of Pineville must be approved by the Public Works Director prior to installation. The posts must conform to the Manual on Uniform Traffic Control Devices (MUTCD) and criteria shown in the Standard Details.
2. A site plan showing the proposed location of all proposed signs must be approved prior to sign placement.

J. BUS STOPS

New developments along Public Bus routes shall provide bus stops as required by the Charlotte Area Transit System (CATS) guidelines and specifications. Standard Details may be found at:
<https://charlottenc.gov/Id/CLDSM/Documents/Revised%20CATS%20Details.pdf>

II. STORM DRAINAGE

A. GENERAL NOTES

1. All materials, methods of construction, and workmanship for the work covered in reference to stormwater infrastructure construction shall conform to the latest edition of the NCDOT Standard Specifications for Roads and Structures, *unless otherwise specified in this manual*. ALL concrete used for drainage structures shall have a minimum compressive strength of 3600 PSI at 28 days. This requirement shall be provided regardless of any lesser compressive strength specified in the NCDOT Standard Specifications.
2. All work shall meet NCDOT Standard Specifications for Roads and Structures, Section 300-3 for unloading, handling and stockpiling concrete pipe.
3. Prior approval shall be obtained to use pre-cast storm drainage structures in any street right-of-way by the Town Public Works Director.
4. Construct non-NCDOT Roadway Standard Drawing endwalls of reinforced concrete or as approved by the Town Public Works Director.

5. All pipes must be sourced through an NCDOT approved producer/supplier participates in the NCDOT QA/QC program for each respective pipe material.
6. Pipe shall have a minimum diameter of fifteen (15) inches (eighteen (18) inches minimum on cross drain culverts) within County limits.
7. Reinforced concrete pipe may be used in all storm drain applications. High Density Polyethylene Pipe (HDPE) may be substituted for pipe diameters of 48-inches or less. but shall not be allowed in culvert applications or installations within an arterial street Right of Way maintained by the Town.
8. The maximum allowable pipe slope is 10 percent.
9. All pipe shall be laid with the bell or groove upgrade and the joint entirely interlocking.
10. For all pipes, wrap geotextile (NCDOT Section 1056 - Type 2) around all pipe joints. Extend geotextile at least 12 inches beyond each side of the joint or band. Secure geotextile against the outside of the pipe by methods approved by the engineer.
11. All pipe shall meet minimum and maximum cover requirements of NCDOT Standard Drawing 300.01 and NCDOT Pipe Material Selection Guide. Refer to NCDOT Pipe Material Selection Guide for allowable pipe fill heights and specifications. For fill heights less than 2' (measured from top of pipe to bottom of pavement structure) Class IV/Class V Reinforced Concrete Pipe (RCP) will be required. Designs outside of the selection guide will be approved at the discretion of the Town Engineer.
12. Pre-installation inspection and acceptance of pipe prior to installation is the responsibility of the Contractor/Installer. Damaged ends, cracks, tears, deformations due to shipping, or manufacturing defects shall be evaluated by the Engineer to determine appropriate action. Materials that can be repaired or must be rejected shall be identified and separated for inspection by the Engineer and inform the County Inspector. Repairs are subject to the Engineer's approval. Any issue of concern or damage to RCP shall be evaluated according to AASHTO R73 "Standard Practice for Evaluation of Precast Concrete Drainage Products." Pre-installation inspection findings shall be subject to inspection by the Engineer and County Inspector.
13. All pipes in storm drain structures shall be flush with the inside wall. Saw cut pipes clean and do not "break" pipes which may cause unwanted cracking and lead to failure.

14. All pipes, structures, dissipators, and flared end sections shall be cleaned out and free of any type of blockage (sediment, stone, trash, debris, trees/woody vegetation, construction materials, etc.). Water shall not back up into pipes and outfalls shall have positive drainage.
15. All storm drain structures over 3 feet and 6 inches in height must have steps in accordance with standard details set forth in this manual.
16. The interior surfaces of all storm drainage structures shall be pointed up and smoothed to an acceptable standard using mortar mixed to manufacturer's specifications. There shall be no cracks and no signs of infiltration in the structure.
17. Storm drainage piping shall be placed in a straight alignment at uniform grade. No changes in alignment shall be allowed except at catch basins, manholes, or other junctions that provide appropriate clean out access. The maximum length between access points is 300 linear feet.
18. A pipe collar meeting NCDOT standards or standard junction structure is required where pipes from two manufacturers or materials are tied together. Pipes should be on the same grade and alignment and have the same internal diameter where a pipe collar is specified.
19. All frames, grates, rings, covers, etc., must conform to the standards set forth in this manual. Supply covers with a minimum of two and a maximum of six 1" diameter vent holes.
20. All graded creek banks and cut/fill slopes shall be at a maximum of 2 feet horizontal to 1 foot vertical (2:1) and not to exceed 10 feet without terracing or the slopes shall be designed by a Professional Geotechnical Engineer and approved by the Town Engineer on a case-by-case basis.
21. Driveway pipe shall be restricted to a single pipe, with minimum inside diameter of 15 inches.
22. CCTV video performed by NASSCO-PACP certified contractor shall be provided for each pipe/culvert segment begin considered for acceptance, in accordance with the Town of Pineville subdivision ordinance and PLDSM Special Provisions.
23. The County and/or Town's approval of construction plans does not relieve the design engineer nor the contractor from responsibility for defective or incomplete work resulting from errors or omissions of any kind.

B. STANDARDS FOR DESIGN

1. All storm drainage design shall conform to the standards and specifications as provided in the Charlotte-Mecklenburg Storm Water Design Manual, North Carolina Department of Transportation Standards Specifications for Roads and Structures, Pineville Land Development Standards Manual, or the more restrictive of any standards that conflict.
2. Adequate storm drainage shall be provided throughout the development by means of storm drainage pipes or properly graded channels. All pipes shall be of adequate size and capacity, as approved by the Town Engineer, to carry all storm water in its drainage area.
3. In accordance with the Town Zoning Ordinance, the Town Engineer shall review the drainage plan for compliance with the standards contained in the current edition of the Pineville Land Development Standards Manual and the Charlotte-Mecklenburg Storm Water Design Manual and all other relevant and appropriate standards established by the Town.
4. Sub-surface drainage shall be provided where the ground water level is likely to be near the surface. In capillary soils, the water level should be 4 feet to 6 feet below the surface to prevent the rise of moisture into the subgrade. Four (4) inch PVC or HDPE pipe with open joints or perforations shall be used to lower ground water in low areas in the street.
5. The NCDOT Standard Drawings have been accepted as approved standards to be specified for Land Development projects in the Town of Pineville. See standard PLDS 20.00A, B, and C of this manual for a table listing the standards accepted. These standard drawings shall be referenced by NCDOT number or shown on all plans submitted to the Town of Pineville for approval.
6. Culverts must be long enough to accommodate the proposed roadway section with a 2:1 fill slope, or flatter, measured from shoulder point and/or back of grade bench to the toe of slope. Extend the pipe to allow the endwall to be placed at the toe of slope. See PLDSM Std. 10.36A.
7. Endwalls or other end treatments are required on all culverts and at the outlet end of all closed pipe systems. Endwalls are required for pipes 36" and larger.
8. Construct endwalls perpendicular to the centerline of the pipe unless specific site conditions warrant construction of an endwall parallel to the roadway.

C. PIPE INSTALLATION

1. All pipe materials referenced herein shall be installed pursuant to Section 300 of the current version of the NCDOT Standard Specifications for Roads and Structures, Pipe installation and 300.01 of the NCDOT Roadway Standard Drawings for method of pipe installation.
2. Storm drainage pipe shall be placed in a straight alignment at uniform grade. All pipes shall be laid with the bell or groove up and the joint entirely interlocking.
3. No changes in alignment shall be allowed except at catch basins, manholes, or other junctions that provide appropriate clean out access. The maximum length between access points is 300 linear feet.
4. Each run of pipe (structure to structure) shall be a single type, class, and material.
5. An NCDOT standard pipe collar or drainage structure is required where pipes from differing manufacturers or materials are joined. Pipes should be on the same grade and alignment and have the same internal diameter where a pipe collar is specified.
6. Lift holes, if present on Reinforced Concrete Pipe are to be repaired per 300-6 (A) of the NCDOT Standard Specifications for Roads and Structures. Alternate repair methods must be submitted to Storm Water for approval prior to construction. Repair must meet or exceed acceptable leakage rates for the pipe joints.
7. All installations of storm drainage infrastructure associated with the subdivision ordinance, unified development ordinance and/or any system conveying runoff into or from a public right of way will require a Closed-Circuit Television (CCTV) inspection and/or Confined Space Entry (CSE) to verify infrastructure was installed correctly and is free of defects and excessive deflection. This inspection should occur after backfilling is completed to final grade but prior to completion of paving operations.

D. BACKFILL

1. Provide and install pipe-trench backfill per NCDOT standards. Pipe bedding and select backfill material used shall be in accordance with NCDOT Article 1016-3 for Class II (Type I only) or Class III select material. Select backfill shall extend to mid-point (spring line) of the pipe and to 1' above the top of the pipe for all flexible pipe materials.

2. Layers shall not exceed six (6) inches loose and each layer shall be compacted thoroughly to the required density of 95% standard proctor density. Compaction requirements shall be attained using mechanical compaction methods. See NCDOT 300.01 for bedding placement for all pipe types.
3. Density tests are required of the haunch and outer bedding every 200' (alternating opposite sides of the pipe). Each layer shall be thoroughly compacted to 95% of the maximum density obtainable with the Standard Proctor Test. 95% or greater is required for all flexible pipe. Digital tests shall be submitted to the County Inspector. A density of 100% Standard Proctor is required for the top eight (8) inches for pipes within roadways or alleyways.
4. All backfill shall be non-plastic in nature, free from roots, vegetative matter, waste, construction material or other objectionable material. Said material shall be capable of being compacted by mechanical means and the material shall have no tendency to flow or behave in a plastic manner under the tamping blows or proof rolling.
5. Materials deemed by the Geotechnical Engineer as unsuitable for backfill purposes shall be removed and replaced with select backfill material. The Geotechnical Engineer must confirm there is suitable material for the foundation and bedding.
6. Backfilling of trenches shall be accomplished immediately after the pipe is laid. Under no circumstances shall water be permitted to rise in un-backfilled trenches after the pipe has been placed. Do not operate heavy equipment over any pipe culvert until the pipe culvert has been properly backfilled, covered, and compacted with at least three (3) feet of an approved material.

E. HIGH DENSITY POLYETHYLENE PIPE (HDPE)

1. The Product used shall be corrugated exterior/smooth interior pipe (Type S), conforming to the requirements of AASHTO Specification M294 (latest edition) for Corrugated Polyethylene Pipe.
2. Bell and spigot joints shall be required on all pipes inside the right-of-way. Bells shall cover at least two full corrugations on each section of pipe. The bell and spigot joint shall have an "O" ring rubber gasket meeting ASTM F477 with the gasket factory installed, placed on the spigot end of the pipe. Pipe joints shall meet all requirements of AASHTO M294. Joints shall be watertight.
3. All HDPE pipe installed must be inspected and approved by the Town's Inspector prior to any backfill being placed. The Town inspector must be present during the backfilling operation as well.

4. Backfill material used to install HDPE pipe within the street right-of-way shall be Select Material, Class II-IV, as defined by Section 1016-3 of the North Carolina Department of Transportation Standard Specifications for Roads and Structures. Upon submittal of written certification of material suitability by a licensed geotechnical engineer, NCDOT Class I Select Material may be used. All backfill material shall be approved by the Town inspector prior to placement of the material within the street right-of-way.
5. The minimum length of HDPE pipe permitted for use shall be 4 feet. HDPE flared end sections are not allowed.
6. All HDPE pipe installed shall be third party certified and shall bear the Plastic Pipe Institute's (PPI) certificate sticker.

F. REINFORCED CONCRETE (RCP) AND CULVERTS

1. All concrete shall be at least 3600 PSI. Prior approval shall be obtained to use pre-cast storm drainage structures in any street right-of-way by the Town Engineer.
2. Concrete pipe used within the street right-of-way shall be a minimum of Class III Reinforced Concrete Pipe, with a minimum diameter of 15 inches (18 inches minimum on cross drain culverts within the County). Installation of Class IV or higher concrete pipe shall be identified on the approved plans and Storm Drain As-Built Plan and the Town inspector shall be given documentation and notification of this information prior to construction. All RCP shall meet AASHTO M 170 for the class pipe called for in the approved plans. All concrete shall be at least 3600 psi.
3. All RCP must have a current certified letter from the pipe manufacturer stating pipes meet or exceed NCDOT, ASTM and AASHTO standards.
4. Joints shall consist of one of the following and should be specified by the design engineer on the approved plans:
 - a. Preformed joint sealant, which conforms to ASTM C 990 Section 6.2 "Butyl Rubber Sealant" and NCDOT 1032-6. F Joints utilizing preformed joint sealant shall be used in combination with Type 2 filtration geotextile wrap around all RCP pipe joints.
 - b. Rubber (elastomeric) gasket seals in accordance with ASTM C 443, which follow ASTM C 1619, Class C (unless otherwise required to exceed this specification, as specified by the engineer). Joints shall be produced with single offset spigot or with a confined O-ring groove. Rubber gaskets may be pre-lubricated profile, profile rubber gaskets, or O-ring. Rubber gasket installation shall be per manufacturer's recommendations. Where rubber gaskets meeting this section are specified, no filtration geotextile wrap is required around the joints for RCP.

5. Fill lift holes with a manufactured soil tight lift hole plug or as approved by the manufacturer. Provide the manufacturers approved method for filling lift holes upon request by the County.
6. Reinforced Concrete Box Culverts (RCBC) must have direct access points into the culvert. Catch basins, manholes, or junctions that connect to the culvert via small diameter pipes will not be considered acceptable access points. All RCBC must be designed with leak resistant joints.
7. Bottomless/Arch Culverts may be allowed is shallow, non-erosive bedrock is found three feet or less below the streambed. A geotechnical report signed and sealed by a North Carolina Professional Engineer stating that the entire length of the culvert will be bedded on non-erosive bedrock is required. Reinforced concrete footings designed by a North Carolina Professional Engineer are required.

G. DRAINAGE STRUCTURES

1. All structures and associated frames, grates and lids must comply with current NCDOT standard details and specifications.
2. All storm drain structures over three (3) feet and six (6) inches in height must have steps which comply with NCDOT 840.66.
3. The interior surfaces of all storm drainage structures shall be pointed up and smoothed to an acceptable standard using mortar mixed to manufacturer's specifications. All pipes shall be cut flush within the interior structure wall.
4. All frames, grates, rings, covers, etc., must conform to the standards set forth in this manual. Supply covers with a minimum of two and a maximum of six 1" diameter vent holes. No Blind/Inaccessible structures will be allowed.
5. Waffle and knockout boxes are prohibited on storm drainage systems within and/or conveying runoff from the public r/w. Boxes with pre-cast openings shall be used.
6. Joints/Sections of pre-cast structures shall use flexible sealants meeting ASTM C990 or rubber gaskets meeting ASTM C443. Sealant type should meet or exceed allowable leakage rates for pipe joints.
7. Drainage structures accepting flexible pipes must provide a resilient connection conforming to ASTM C923 and ASTM C1478.

8. Where Aluminum or Aluminized metal pipe is in direct contact with concrete a barrier coating must be applied. See NCDOT Thermal Spray Coatings Program for acceptable treatments.

H. END TREATMENTS

1. Endwalls are to be NCDOT standard precast concrete, brick masonry with reinforced concrete footings, or cast-in place, reinforced concrete with reinforced concrete footings.
2. No metal or HDPE end treatments are allowed.
3. Where Aluminum or Aluminized metal pipe is in direct contact with concrete a barrier coating must be applied. See NCDOT Thermal Spray Coatings Program for acceptable treatments.

I. NON-STANDARD STRUCTURES

1. Any non-standards structures must have prior approval by the Town of Pineville and will require a sealed design by a North Carolina Professional Engineer.

J. PIPE VIDEO STANDARDS

Installation of pipes/culverts and structures consisting of the following approved materials (concrete, high density polyethylene/ HDPE) used for the purpose of conveying stormwater runoff in and out of public rights-of-way, that are eligible for acceptance/maintenance by the Town of Pineville, are subject to the following:

1. General

- a. All storm drainage system installation requires a Closed-Circuit Television (CCTV) video inspection as part of the pre-final inspection process and prior to installation of final lift of asphalt. The video must be completed after the Town's build-out requirement has been met.
- b. All costs associated with these requirements will be the responsibility of the storm drainage system owner (developer, builder, property owner, etc.). Video costs must be included in the performance/construction bond.

- c. All pipe inspections must be completed by a National Association of Sewer Service Companies (NAASCO) Pipe Assessment Certification Program (PACP) certified professional. Video, video reports, Engineer's certification, and deflection confirmation results (flexible pipes must not exceed 5%) must be approved by Mecklenburg County or Town representative prior to installing the final surface course of asphalt, unless surface course was installed within three years of the base course.
- d. Pipes larger than 48 inches may require manual entry and inspection (confined space regulations may be applicable). See Section 6 below.
- e. Camera must be centered within the pipe, both vertically and horizontally and shall have a full and unobstructed view of the entire pipe and storm drain system. Lighting shall be sufficient to produce a clear image of the entire pipe interior.
- f. The storm drain system must be free of debris and obstructions at the time of inspection to allow for a continuous complete inspection. Weather conditions must not impede visibility. Any flow in the pipe cannot exceed 5 percent of the pipe diameter or impede visibility of pipe invert.
- g. Cracks, fractures, and joint separation may require measurements to determine if a minor repair, major repair (Engineer approved), or replacement is required.
- h. Any systems that do not meet the requirements of this section will be rejected and will require rehabilitation or replacement at the discretion of the Owner's Engineer, Town, NCDOT, or Mecklenburg County.
- i. The Town may require video of private alleys/roads.

2. Video Contractor

- a. All CCTV videos must be performed by a certified NASSCO-PACP professional. The video inspection, reporting, and coding must follow the latest addition of the NASSCO-PACP Manual.
- b. A certified NASSCO-PACP professional (operator) must be on site during collection of data and coding, and that individual's certification number shall be entered on the Header Section of the video report.

3. *Post Installation*

- a. The Town requires storm drainage systems to be clean, have good alignment, tight joints with mastic or manufacturer's seal, no broken or fractured pipes, no infiltration or inflow (I&I) in pipes, joints, or structures. Structures must be pointed up and built per the approved plans prior to performing video and submittal of CCTV video documents.
- b. All evaluation and acceptance of the installed pipe will be based upon the NCDOT Guidelines for Post Installation Evaluation and Repair of Newly Installed Drainage Pipe.
- c. Pipe/Structure rehabilitation must meet or exceed Industry Standards: American Concrete Pipe Association (ACPA), ASTM, AASHTO, NCDOT or other method approved by the County Engineer or Town Engineer.

4. *Video Report*

- a. The storm drainage system owner will provide a Post Installation Inspection Report to the Town or their representative. The report shall include the following:
 - i. Project name, project owner, and pipe installation contractor.
 - ii. Plat, map, or drawing identifying each pipe segment being assessed/presented for acceptance with all structure nodes labeled consistent with the approved development plans.
 - iii. The NASSCO-PACP report shall include each pipe/culvert segment and structures being assessed/considered for acceptance. The report shall include still digital photos of any anomalies or defects that were required and not required to be rehabilitated.
 - iv. All defects must be coded in accordance with the most recent version of the PACP.
 - v. Where repairs were completed prior to the submission of the report, provide documentation and photographs to support repair was completed satisfactorily.
 - vi. Where repairs have not yet been made, provide a remediation method for each observed defect. The suggested remediation must be consistent with pipe manufacture and industry standards for each respective defect and must have a design life equal to or greater than the pipe being repaired.
- b. The Town, or its representative will only review the certified reports (NASSCO-PACP and Engineer's Reports/Certification). Town and/or County representatives will review the report for completeness and accuracy. If staff determines that additional repairs are needed beyond what is recommended, additional video and reporting will be required. Mecklenburg County and/or Town representative may review video upon request, at the Owner's expense.

5. *Engineer's Report & Certification*

- a. The Owner's Engineer will be responsible for documenting the visual observations of the pipe's current condition, determine if/when rehabilitation needs to be made on the pipe segment and specify the best renewal or repair method per Industry Standards. All NASSCO-PACP defect codes and grades will require recommendations from the Owner's Engineer for rehabilitation, or replacement (if warranted).
- b. The Owner's Engineer's recommendations must be reviewed and approved by MC, Towns, or their representatives before starting rehabilitation or replacement.
- c. All video reports, Engineer's recommendations for rehabilitation, and the Engineer's certified report must be submitted to MC, Towns, or their representatives; this would include the initial report and any post rehabilitation reports if deficiencies/defects are found.
- d. Include a copy of the pipe manufacturer's certification letter for the RCPs, including date, project name, compliance with ASTM C-76 and ASTM C- 443, and if the pipes are NCDOT stamped.
- e. The video report shall be sealed by a NC registered professional engineer certifying the recommendations for rehabilitation and that the Pipe Video Standards have been met.
- f. The report shall include an Executive Summary Table in a format to be provided by Mecklenburg County or equivalent Video Summary Table.

6. *Confined Space Entry Inspection (CSE)*

- a. Applies to all pipes 54" in diameter or greater, or pipes with a vertical riser of 54" or greater in non-circular applications.
- b. Entrants/Inspection staff must conduct inspections according to OSHA requirements for confined space entry where applicable.
- c. Camera, Video, and Lighting shall be sufficient to produce a clear image of the entire periphery of the pipe interior.

- d. Provide images and/or video of all defects and code the defects in the report. Use an appropriate measuring tool to document the severity of the defect.
- e. For flexible pipes, provide deflection testing at 10' intervals along pipe alignment. Provide measurements at each location in both the horizontal and vertical directions.
- f. Provide pipe inspection logs for each pipe segment inspected.

III. PLAN REQUIREMENTS

A. GENERAL NOTES

The Town's standard General Notes shall be placed on the Cover sheet of all construction drawings with the Town of Pineville's jurisdiction. A current copy of the General Notes may be obtained from the Town Engineer.

B. SUBDIVISIONS AND PRELIMINARY PLANS

1. The preliminary plan must include, at a minimum, the information described in the Town of Pineville Subdivision Ordinance.
2. Storm Drainage Easements shall be provided for all storm drainage pipe and shown on site plans, construction plans and plats with widths specified below. The following note shall be placed on all grading plans and plats; "The purpose of the storm drainage easement (SDE) is to provide storm water conveyance. Buildings are not permitted in the easement area. Any other objects which impede storm water flow or system maintenance are also prohibited."

PIPES

<u>Diameter</u>	<u>Width</u>
15" – 24"	15'
30" – 36"	20'
42" – 48"	25'
54" +	30'

CHANNELS

<u>Drainage Area (Ac)</u>	<u>Channel Easement Width (ft)</u>
1 – 45	20'
45 – 120	30'
120 – 500	40'
500 +	see PLDS 20.30

3. Overlapping of storm drainage easements shall be approved by the Town Engineer.
4. Storm Drainage Easements shall include all end treatments and energy dissipators, lengthen or widen as needed.

C. BOND/SECURITY POLICY – SUBDIVISION IMPROVEMENTS

1. All requests for Performance/Construction Bonds/Securities, Maintenance/Warranty Bonds/Securities, and Bond/Security re-evaluations must be submitted to the Bond Administrator via email. The Bond Administrator will contact the County Inspector for inspections.
2. Prefinal Inspections: The purpose of a prefinal inspection is for the County Inspector, Town, and/or NCDOT to mark deficiencies and what needs to be repaired and/or replaced, prior to the final layer of asphalt being installed. The storm drain as-built survey and certified CCTV video documents must be approved prior to the prefinal inspection. The storm drain as-built survey and CCTV video inspection should be conducted simultaneously. The Engineer's Certified Video Report will be approved first, followed by the storm drain as-built survey. The Bond Administrator must be notified for a prefinal inspection to start the process to obtain Maintenance/Warranty bonds/securities.
3. Final Inspections: Final inspections are conducted by the County Inspector, Town, and/or NCDOT to verify all repairs/deficiencies were addressed and the site complies with the approved stamped plans. The Bond Administrator will verify that fees have been paid, inspection requests have been submitted, and the Bond Estimate Form has been submitted, prior to the final inspection being conducted.
5. Approval of a subdivision plat will not occur until the improvements required for the area of the final plat are constructed and a final inspection has been performed and found to be in conformance with the plans approved by the Town of Pineville, or a bond/security has been posted and all required documents are received in their entirety.
6. For information related to Bonding/Security timeframes please visit the following webpage. Land Development Project Bonds (mecknc.gov). The bond/security shall be posted and remain in force until the construction is complete and found to be in conformance with the plans approved by the Town of Pineville. The security will be reevaluated after one year from the date of posting.
7. The Applicant shall notify the Town Engineer that construction is complete according to the appropriate subdivision ordinance and the Pineville Land Development Standards Manual before any security will be released. A final inspection will be made to check completeness of the project upon notification.

8. One type of bond/security may be replaced by another type of bond/security in certain situations. The amount of the replacement bond/security will be based on the Town's Engineer Estimate of the work remaining. If the estimate of work results in a lower amount, the replacement bond/security will be treated as a reduction. Certain situations will require an increase in a bond/security and in such cases the replacement security shall be required to equal the higher amount.
9. A one-time reduction in security will be allowed if requested in writing by the principal party of the security. However, the security shall never be less than \$15,000 for completion of subdivision is released the Town of Pineville unless approved by the Town Engineer.
10. Bonds/Securities in the form of a Letter of Credit must be drawn on a full-service bank in Mecklenburg County.

IV. APPROVED PLANT SPECIES

The following list of trees and shrubs represent the approved plant species that may be used to comply with the Pineville Zoning Ordinance. List subject to change.

* - Not allowed for required town planting.

** - Not recommended for required town planting.

† - Cultivars under 15 feet tall only.

‡ - Trees <25 feet mature height can be planted directly under power lines.

Trees 25'- 40' mature height can be planted at least 20' from power lines.

Common Name	Scientific Name	Town Tree Ordinance Approved	CIP/ROW Approved	Town Zoning Approved (Large or Small Maturing)	Duke Transmission Zone(T) or Distribution line(D) Approved	Shade Tolerant	Tolerates Poor Drainage	Native	Blooming	Foliage (Deciduous, Semi-deciduous, or Evergreen)
LARGE MATURING TREES (50'+ H)										
Arborvitae, 'Green Giant'	Thuja 'Green Giant'		X				X			E
Ash, Green	Fraxinus pennsylvanica			L		X		X		D
Ash, White	Fraxinus americana	X		L				X		D
Baldcypress	Taxodium distichum	X	X	L			X	X		D
Beech, American	Fagus grandiflora	X	X	L				X		D
Birch, River	Betula nigra	X	X	L		X	X	X		D
Black Gum	Nyssa sylvatica	X	X	L				X		D
Cedar, Deodar	Cedrus deodara	X	X	L						E
Cedar, Eastern Red	Juniperus virginiana		X	L				X		E
Cryptomeria, Japanese	Cryptomeria japonica	X	X				X			E
Dawn Redwood	Metasequoia glyptostroboides	X	X							S
Elm, Princeton	Ulmus americana 'Princeton'		X							D
Elm, Lacebark	Ulmus parvifolia	X	X	L		X	X			D
Ginkgo ‡	Ginkgo biloba	X	X	L		X	X			D
Hackberry, Common	Celtis occidentalis	X		L		X	X	X		D
Hickory, Bitternut	Carya cordiformis			L				X		D

		Town Tree Ordinance Approved	CIP/ROW Approved	Twon Zoning Approved (Large or Small Maturing)	Duke Transmission Zone(T) or Distribution line(D) Approved		Shade Tolerant	Tolerates Poor Drainage	Native	Blooming	Foliage (Deciduous, Semi-deciduous, or Evergreen)
Common Name	Scientific Name										
LARGE MATURING TREES (50'+ H) continued											
Hackberry, Sugar	<i>Celtis laevigata</i>	x					x	x	x		D
Hemlock, Eastern	<i>Tsuga canadensis</i>			L			x		x		E
Hickory, Pignut	<i>Carya glabra</i>			L					x		E
Hickory, Shagbark	<i>Carya ovata</i>			L					x		E
Holly, American	<i>Ilex opaca</i>	x	x	S			x		x		E
Honeylocust, Shademaster**	<i>Gleditsia tricanthos inermis</i> 'Shademaster'								x		D
Hornbeam, European	<i>Carpinus betulus</i>	x	x	S			x	x			D
Kentucky Coffeetree	<i>Gymnocladus dioicus</i>	x	x				x		x		D
Linden, Little Leaf	<i>Tilia cordata</i>	x					x	x		x	D
Magnolia, Cucumber	<i>Magnolia acuminata</i>		x						x	x	D
Magnolia, Southern	<i>Magnolia grandiflora</i>	x	x	L				x	x	x	E
Maple, Freeman	<i>Acer x fremanii</i>	x	x				x		x		D
Maple, Red *	<i>Acer rubrum</i>		x	L			x	x	x		D
Maple, Sugar	<i>Acer saccharum</i>	x	x	L			x		x		D
Oak, Black	<i>Quercus velutina</i>			L			x		x		D
Oak, Fastigiante English	<i>Quercus robur</i> 'Fastigiata'		x								D
Oak, Laurel	<i>Quercus laurifolia</i>	x		L			x		x		D
Oak, Live	<i>Quercus virginiana</i>	x	x	L			x	x	x		E
Oak, Swamp White	<i>Quercus bicolor</i>		x	L			x	x	x		D

		Town Tree Ordinance Approved	CIP/ROW Approved	Twon Zoning Approved (Large or Small Maturing)	Duke Transmission Zone(T) or Distribution line(D) Approved	Shade Tolerant	Tolerates Poor Drainage	Native	Blooming	Foliage (Deciduous, Semi-deciduous, or Evergreen)
Common Name	Scientific Name									
LARGE MATURING TREES (50'+ H) continued										
Oak, Northern Red*	<i>Quercus rubra</i>			L		x		x		D
Oak, Nuttall	<i>Quercus nuttallii</i>	x	x			x		x		D
Oak, Overcup	<i>Quercus lyrata</i>	x	x			x	x	x		D
Oak, Scarlet**	<i>Quercus coccinea</i>			L				x		D
Oak, Shumard	<i>Quercus shumardii</i>	x	x	L		x		x		D
Oak, Southern Red	<i>Quercus falcata</i>	x	x	L		x		x		D
Oak, Water	<i>Quercus nigra</i>		x	L			x	x		D
Oak, White	<i>Quercus alba</i>		x	L		x		x		D
Oak, Willow	<i>Quercus phellos</i>	x	x	L		x	x	x		D
Pecan	<i>Carya illinoensis</i>			L				x		D
Persimmon	<i>Diospyros virginiana</i>			L		x		x		D
Pine, Austrian	<i>Pinus nigra</i>	x		L			x			E
Pine, Japanese Black	<i>Pinus thunbergi</i>			L						E
Pine, Loblolly	<i>Pinus taeda</i>	x	x	L			x	x		E
Pine, Shortleaf	<i>Pinus echinata</i>		x	L				x		E
Pine, Virginia	<i>Pinus virginiana</i>	x	x	L				x		E
Poplar, Tulip	<i>Liriodendron tulipifera</i>	x	x	L		x	x	x	x	D
Sweetgum, Fruitless	<i>Liquidambar styraciflua</i> 'Rotundiloba'	x	x	L		x	x	x		D

		Town Tree Ordinance Approved	CIP/ROW Approved	Twon Zoning Approved (Large or Small Maturing)	Duke Transmission Zone(T) or Distribution line(D) Approved	Shade Tolerant	Tolerates Poor Drainage	Native	Blooming	Foliage (Deciduous, Semi-deciduous, or Evergreen)
Common Name	Scientific Name									
MEDIUM MATURING TREE (30'-50'H) continued										
Golden Raintree	<i>Koelreuteria paniculata</i>		x	S					x	D
Sweetgum, Slender	<i>Liquidambar styraciflua</i> 'Slender Silhouette'		x			x	x	x		D
Zelkova, Japanese *	<i>Zelkova serrata</i>			L		x				D
Arborvitae, American †	<i>Thuja occidentalis</i>		x		D		x	x		E
Carolina Silverbell	<i>Halesia carolina</i>	x	x	S		x		x	x	D
Chinese Pistache	<i>Pistacia chinensis</i>	x	x			x	x			D
Crape Myrtle (Biloxi, Natchez)*	<i>Lagerstroemia</i>		x							D
Dogwood, Flowering ‡	<i>Cornus florida</i>	x	x	S	D	x		x	x	D
Dogwood, Kousa ‡-	<i>Cornus kousa</i>	x	x	S	D	x		x	x	D
Fringetree, Chinese	<i>Chionanthus retusus</i>	x				x			x	D
Hawthorne, Green	<i>Crataegus viridis</i> 'Winter King'	x	x				x	x	x	D
Holly, 'Emily Brunner'	<i>Ilex X 'Emily Brunner'</i>		x			x				E
Holly, 'Nellie R. Stevens'	<i>Ilex X 'Nellie R. Stevens'</i>		x			x				E
Holly, Savannah	<i>Ilex X attenuata</i> 'Savannah'		x	S			x	x		E
Hornbeam, American	<i>Carpinus caroliniana</i>	x	x	S		x	x	x		D
Maple, Hedge	<i>Acer campestre</i>		x	S			x			D
Maple, Paperbark	<i>Acer griseum</i>		x							D

		Town Tree Ordinance Approved	CIP/ROW Approved	Twon Zoning Approved (Large or Small Maturing)	Duke Transmission Zone(T) or Distribution line(D) Approved	Shade Tolerant	Tolerates Poor Drainage	Native	Blooming	Foliage (Deciduous, Semi-deciduous, or Evergreen)
Common Name	Scientific Name									
MEDIUM MATURING TREE (30'-50'H) continued										
Maple, Trident	<i>Acer buergeranum</i>	x	x			x				D
Redbud, Chinese ‡	<i>Cercis chinensis</i>	x	x		D	x			x	D
Sourwood	<i>Oxydendrum arboreum</i>			S		x		x	x	D
SMALL MATURING TREES (UP-25'H)										
Arborvitae, Emerald Green	<i>Thuja occidentalis 'Emerald Green'</i>		x							E
Buckeye, Bottlebrush †	<i>Aesculus parviflora</i>	x	x		T	x		x	x	D
Camellia, Sasanuqa	<i>Camellia sasanqua</i>		x	S		x			x	E
Cherry, Kwanzan	<i>Prunus serrulata 'Kwanzan'</i>	x		S					x	D
Cherry, Snowgoose	<i>Prunus serrulata 'Snowgoose'</i>		x						x	D
Cherry, 'Okame'	<i>Prunus X 'Okame'</i>	x	x						x	D
Cherry, Weeping	<i>Prunus subhirtella pendula</i>			S					x	D
Cherry, Yoshino	<i>Prunus X yedoensis</i>	x	x	S	D				x	D
Cherrylaurel, Carolina	<i>Prunus caroliniana</i>			S		x	x	x	x	E
Crabapple, Japanese Flowering †	<i>Malus floribunda</i>		x	S	D				x	D
Crape Myrtle	<i>Lagerstroemia</i>		x							D
Dogwood, redbud †	<i>Cornus sericea f. baileyi</i>		x		D		x	x	x	D
Dogwood, Rutger's Hybrid	<i>Cornus kousa X florida</i>		x		D	x	x		x	D
Filbert, American	<i>Corylus americana</i>	x	x		T	x		x		D

		Town Tree Ordinance Approved	CIP/ROW Approved	Twon Zoning Approved (Large or Small Maturing)	Duke Transmission Zone(T) or Distribution line(D) Approved		Shade Tolerant	Tolerates Poor Drainage	Native	Blooming	Foliage (Deciduous, Semi-deciduous, or Evergreen)
Common Name	Scientific Name										
SMALL MATURING TREES (UP-25'H) continued											
Fringetree	<i>Chionanthus virginiana</i>		X					X	X	X	D
Hawthorne, Washington	<i>Crataegus phaenopyrum</i>	X	X	S				X	X	X	D
Holly, Foster	<i>Ilex X attenuata 'Fosteri'</i>	X	X	S				X	X		E
Holly, Yaupon	<i>Ilex vomitoria</i>		X	S			X		X		E
Magnolia, Star †	<i>Magnolia stellata</i>	X	X	S	D			X	X	X	D
Magnolia, Lily Flowered	<i>Magnolia liliiflora</i>		X				X			X	D
Magnolia, 'Little Gem'	<i>Magnolia grandiflora 'Little Gem'</i>	X	X					X	X	X	E
Magnolia, 'Merrill'	<i>Magnolia X loebneri 'Merrill'</i>		X					X	X	X	D
Magnolia, Saucer	<i>Magnolia X soulangiana</i>	X	X	S	D			X	X	X	D
Maple, Armur 'Flame' †	<i>Acer tataricum ginnala 'Flame'</i>	X	X		D			X			D
Maple, Japanese	<i>Acer palmatum</i>	X	X				X				D
Maple, Purplebow/Shantung	<i>Acer truncatum</i>		X								D
Plum, Purpleleaf	<i>Prunus cerasifera 'Atropurpurea'</i>	X	X	S						X	D
Redbud, Eastern	<i>Cercis canadensis</i>	X	X	S	D		X	X	X	X	D
Serviceberry	<i>Amelanchier arborea</i>	X	X						X	X	D
Serviceberry, Shadbush †	<i>Amelanchier canadensis</i>	X	X	S	T		X		X	X	D
Waxmyrtle	<i>Myrica cerifera</i>	X		S				X			E

SHRUBS

Common Name	Scientific Name
Burford holly *	Ilex cornuta burfordi
Camellia *	Camellia japonica
Convex Japanese holly *	Ilex crenata `convexa`
Dwarf burford holly *	Ilex cornuta burfordi nana
Emily brunner holly *	Ilex "Emily Brunner"
English holly *	Ilex aquifolium
Evergreen euonymus *	Euonymus japonicus
Flowering quince	Chaenomeles speciosa
Forsythia	Forsythia intermedia
Glenn dale azalea *	Azalea hybrida
Glossy abelia *	Abelia grandiflora
Hetzi Japanese holly *	Ilex crenata `hetzi`
Hetzi jumper *	Jumperus chinensis hetzi
Indian azalea *	Azalea indica
Inkberry holly *	Ilex glabra
Japanese aucuba *	Aucuba japonica
Kaempferi azalea *	Azalea obtusum Kaempferi
Laurel *	Laurus nobilis
Loropetalum *	Loropetalum chinense
Lusterleaf holly *	Ilex latifolia
Oakleaf hydrangea	Hydrangea quercifolia
Perny holly *	Ilex pernyi
Pfizer juniper *	Juniperus chinensis pfizeriana

Common Name	Scientific Name
Roundleaf Japanese holly *	Ilex crenata `rotundifolia`
Sasanqua Camellia *	Camellia sasanqua
Witch-hazel	Hammamelis virginiana
Yaupon holly *	Ilex vomitoria
Wax myrtle *	Myrica cerifera
Wild olive *	Osmanthus americana
Chinese photinia *	Photinia serrulata
Mountain andromeda *	Pieris floribunda
Japanese andromeda *	Pieris japonica
Pittosporum *	Pittosporum tobira
English laurel *	Prunus laurocerasus
Podocarpus *	Podocarpus macrophyllus maki
Narrow leafed English laurel *	Prunus laurocerasus angustifolia
Scarlet firethorn	Pyracantha coccinea
Yeddo-hawthorn *	Raphiolepis umbellata
Reeves spirea	Spirea cantoniensis
Thunberg spirea	Spirea thunbergii
Bridalwreath spirea	Spirea prunifolia plena
Vanhoutte spirea	Spirea vanhouttei
Japanese yew *	Taxus cuspidata
Leatherleaf viburnum *	Viburnum rhytidophyllum
Laurestinus viburnum *	Viburnum tinus

* denotes evergreen

Other species may be allowed with Town approval.

List subject to change

V. REFERENCES

- North Carolina Department of Transportation, most recent edition, Standard Specifications for Roads and Structures.
- North Carolina Department of Transportation, most recent edition, Roadway Standards Drawings.
- City of Charlotte Department of Transportation, most recent edition, Work Area Traffic Control Handbook (WATCH)
- Charlotte-Mecklenburg Storm Water Design Manual.
- American Association of State Highway and Transportation Officials most recent edition, A Policy on Geometric Design of Highways and Streets.
- North Carolina Department of Transportation, Roadway Design Manual, latest edition.
- North Carolina Department of Environment Quality most recent edition, Erosion and Sediment Control Planning and Design Manual.
- NCDEQ, Storm Water Best Management Practices, latest edition.
- Charlotte-Mecklenburg SCM Design Manual NCDEQ, Storm Water Best Management Practices, latest edition.
- Mecklenburg County Storm Water Services, most recent edition, Administrative Manual for Implementation of the Post-Construction Storm Water Ordinance.
- Mecklenburg County Board of County Commissioners, most recent edition, Mecklenburg County Soil and Sedimentation Control Ordinance.
- Manual of Uniform Traffic Control Devices for Streets and Highways, Federal Highway Administration, latest edition.
- NCDOT Asphalt Quality Management System (QMS), latest edition.
- NCDOT Pipe Material Selection Guide, latest edition.
- Mecklenburg County Land Development Standards Manual, latest edition.
- North Carolina Department of Transportation Subdivision Roads Minimum Construction Standards Manual, latest edition.