

City of Concord

Technical Standards Manual

Article II

Streets & Pedestrian Paths



TABLE OF CONTENTS

Article II

TABLE OF CONTENTS

Article II

1.0	PURPOSE	1
2.0	BASIC DESIGN CONSIDERATIONS	1
	2.2 – Traffic Volumes	1
	2.3 – Functional Classifications	1
	2.4 – Service Classifications	2
	2.5 – Terrain Classifications	3
	2.6 – Design Speeds	3
3.0	CROSS-SECTION STANDARDS	4
	3.1 – Widths	4
	3.2 – Materials	5
4.0	CUL-DE-SAC STANDARDS	9
	4.2 – Design Standard Exceptions	9
5.0	SLOPE STANDARDS	10
	5.1 – Longitudinal Grade	10
	5.2 – Transverse Grade	10
6.0	CURVE STANDARDS	11
	6.1 – Horizontal Centerline Curve Radius	11
	6.2 – Tangent Between Reverse Curves	12
	6.3 – Vertical Centerline Curves.....	12
7.0	INTERSECTION STANDARDS	13
	7.1 – Angles of Intersection	13
	7.2 – Corners	13
	7.3 – Backs of Curbs	13
	7.4 – Distances Between Intersections.....	14
	7.5 – Sight Triangle Easements	15
	7.6 – Sight Distance	17
	7.7 – Roundabouts/Traffic Circles	18
8.0	MEDIAN AND ISLAND STANDARDS	19
	8.1 – Where Required	19
	8.2 – Size.....	19
	8.3 – Contents	19
	8.4 – Specifications	19
9.0	DRAINAGE STANDARDS	19

9.1 – Curbs and Gutters	19
9.2 – Catch Basins.....	20
9.3 – Pipes.....	20
10.0 SIDEWALK STANDARDS	21
10.1 – Locations.....	21
10.2 – Specifications.....	21
10.3 – Transitions to Street Grade	22
11.0 CURB AND GUTTER, AND SIDEWALK EXCEPTIONS.....	22
12.0 GUARDRAILS.....	22
12.1 – Applicability	22
13.0 STREET AND SUBDIVISION NAMING STANDARDS	22
13.1 – Uniqueness.....	22
13.2 – Labels.....	22
14.0 SIGN STANDARDS	23
14.1 – Signage Plan.....	23
14.2 – Standard Signs	23
14.3 – Decorative Sign Treatments.....	23
15.0 PUBLIC STREET ACCEPTANCE.....	24
15.1 – Minimum Requirements	24
15.2 – Newly Constructed Streets Platted for City Maintenance	24
15.3 – Existing Private Streets	25
15.4 – Dedication of Public Streets on a Final Plat	25
15.5 – City Council Acceptance	26
16.0 UNOPENED, DEDICATED STREET STANDARDS.....	26
17.0 CLUSTER MAILBOX UNIT STANDARDS.....	27
17.1 – Arrangement	27
17.2 – Location	28
17.3 – Signs and Markings	28
17.4 – Lighting.....	28
17.5 – Maintenance.....	28
17.6 – Signs on CBUs.....	28
17.7 – Construction of CBUs.....	29
17.9 – CBU Parking Requirements.....	29
18.0 REFERENCES.....	30

TABLES AND FIGURES

TABLES

2-1 – Functional Classifications.....	2
2-2 – Minimum Design Speeds.....	3

3-1 – Minimum Right-of-Way Widths	4
3-2 – Minimum Pavement Widths	4
3-3 – Base, Intermediate, and Surface Courses	7
4-2 – Maximum Lengths for Cul-de-Sacs	9
5-1 – Maximum Longitudinal Grades.....	10
5-2 – Maximum Superelevation Transverse Slope for Minimum CL Radii	11
6-1 – Minimum Horizontal Centerline Curve Radii	11
6-2 – Minimum Tangent Between Reverse Curves	12
6-3 – Rate of Vertical Curvature (K)	12
7-1 – Min. & Max. R/W Curve Radii at Intersections.....	13
7-2 – Minimum Corner Radii for Backs of Curbs at Intersections.....	14
7-3 – Sight Triangle Leg Length Along R/W	15
7-6 – Minimum Intersection Sight Distance	18
17-1 – CBU Parking Requirements	29

FIGURES

7-1 – Two Streets Intersecting the Same Street	14
7-2 – Type 1 & 2 Sight Triangle Sample Illustration	16
7-3 – Type 3 Sight Triangle Sample Illustration	17
7-6 – Intersection Sight Distance	18

APPENDICIES

APPENDIX A – Application for New Street Maintenance Acceptance
APPENDIX B – PE Certification for Subdivisions and Streets
APPENDIX C – Private Street Maintenance Acceptance Petition

H-1— Purpose	
H-2— Basic Design Considerations	4
— Traffic Volumes	
— Functional Classifications	
— Terrain Classifications	
— Design Speeds	
H-3— Cross Section Standards	6
— Widths	
— Materials	

H-4	Cul-de-Sac Design Standards	187
	Service Limits	
	Lengths	
	Connectivity Provisions	
	Termini	
H-5	Slope Standards.....	198
	Longitudinal Grades	
	Transverse Grades (Superelevation)	
H-6	Curve Standards.....	2019
	Horizontal Centerline Curve Radius	
	Tangent between Reverse Curves	
H-7	Intersection Standards.....	221
	Angles of Intersection	
	Corners	
	Backs of Curb	
	Distances between Intersections	
	Sight Triangle Easements	
H-8	Median and Island Standards	276
	Size	
	Contents	
	Where Required	
	Specifications	
H-9	Drainage Standards	276
	Curbs and Gutters	
	Catch Basins	

Drop Inlets	
Junction Boxes	
Pipes	
Graded Channels	
H-10 Sidewalk Standards	298
Locations	
Specifications	
H-11 Curb and Gutter, Sidewalk Exemptions	3029
Applicability	
Conditions for Exemptions	
Processes	
H-12 Guardrails	3029
H-13 Street Naming Standards	3129
Uniqueness	
Labels	
H-14 Sign Standards	310
Standard Signs	
Custom Signs	
H-15 Unopened, Dedicated Street Standards	321
H-16 Alley Standard	32
H-17 Mixed Use Development Street Standards	343

~~0 c.CBU units or combination of 32 or less mail receptacles may be located along a _____ street, other than a thoroughfare, provided a separate pull-off area is provided and _____ all of the following are met:~~

1.0 Purpose

The purpose of this Article is to protect the safety of the traveling public in the City and to create a quality street network that will not require pre-mature maintenance. All public streets inside the municipal limits of the City must be constructed in conformance with City standards and specifications. If any conflicts arise between a City and North Carolina State Highway Commission standard, the more restrictive standard will apply.

- 1.1. The Director of Transportation, in consultation with other City departments and state agencies, may allow modifications to the design criteria. Modifications to the design criteria:
 - a. Must be based on sound engineering principles and practices,
 - b. Must not create an unsafe or hazardous situation,
 - c. Must be equivalent to the efficiency, functionality, durability, structural integrity, and long-term maintenance of the minimum criteria in this Article.
 - d. Classifications must be in conformance with the current City of Concord Transportation Plan.
- 1.2. The Director of Transportation is authorized to require studies or other pertinent information to help support or justify the modification.

2.0 Basic Design Considerations

Streets must be designed to accommodate the volume and type of traffic they are intended to serve and the geometry of the landscape on which they will be located.

A selection of standard details is provided in the City of Concord Manual of Standard Details to be used in conjunction with this Article. In the event of a conflict between the standard details and the provisions of this Article, the strictest standard will apply

~~2.1. **Traffic Volumes.** The Average Daily Traffic (ADT) volume is a measurement of the users' demand for a street. ADT is defined as the total volume during a given time period (in whole days), greater than 1 day and less than 1 year, divided by the number of days in that time period. The current ADT volume for a street can be readily determined when continuous traffic counts are available. When only periodic counts are taken, the ADT volume can be estimated by adjusting the periodic counts according to such factors as the season, month, or day of the week. If the ADT of a street is unknown, traffic count studies may be required to determine the design volume.~~

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STREETS & PEDESTRIAN PATHS

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~~season, month, or day of the week. If the ADT of a street is unknown, traffic count studies may be required to determine the design volume.~~

~~2.1.2.3. **Functional Classifications.** Individual streets do not serve travel independently of one another. Most vehicular travel involves movement through a network of streets. Therefore, the functional classification of a street must be determined before design criteria can be established for any proposed improvement. Functional classifications are based on the nature of the services streets are intended to provide, combined with the proposed layout and location of new streets. Known or estimated Average Daily Traffic (ADT) may be used to determine whether a street needs a higher classification than that based solely on function, and the average daily traffic (ADT) typically served. Table 2-1 identifies some general characteristics of each street classification along with the ADT volume thresholds for classification of new streets. To verify the functional classification of existing streets in the City’s transportation service area, please refer to the City’s Transportation Plan. For the purposes of the City’s ordinances and these technical standards, the highest classification for the same street between that of the City or the NCDOT shall be used to determine the appropriate standards which apply. *Functional classifications for proposed streets must be approved by the Director of Transportation prior to the final design of roadway layouts and preliminary plats.*~~

~~2.2. **Functional Classifications.** Individual streets do not serve travel independently of one another. Most vehicular travel involves movement through a network of streets. Therefore, the functional classification of a street must be determined before design criteria can be established for any proposed improvement. Functional classifications are based on the nature of the services streets are intended to provide and the minimum average daily traffic (ADT) typically served. Table 2-1 identifies each area street classification. To verify the functional classification of existing streets in City’s transportation service area, please refer to the City’s Transportation Plan. *Functional classifications for proposed streets must be approved by the Director of Transportation prior to the design of roadway layouts and preliminary plats.*~~

Table 2-1: Functional Classifications.

Classification	Function
Freeway or Expressway	Serves substantial statewide or interstate travel and exists solely to serve vehicular traffic; does not serve pedestrian and bicycle traffic
Major Thoroughfare (Includes Boulevard)	Provides for expeditious movement of high volumes of traffic within and through urban areas

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STREETS & PEDESTRIAN PATHS**

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Minor Thoroughfare	Collects traffic from local streets and collectors and carries it to the major thoroughfare system; supplements the major thoroughfare system by facilitating minor thru traffic movements; and sometimes serves adjacent property
Major Collector	Serves intra-county travel corridors and traffic generators and provides access to the thoroughfare system
Minor Collector	Provides service to small local communities and traffic generators and provides access to the major collector system
Local Street	Provides access to adjacent property over relatively short distances
Alley	Provides access to adjacent property, typically to the rear of the structures located on the property served, and usually serves as a route for utilities, garbage collection, and garage access in residential areas

~~*Classification of Minor Collectors and lower will be based on the proposed street network layouts.~~

2.3.2.4. Service Classifications. Major collectors, minor collectors, local streets, and alleys may also be categorized as residential or non-residential.

Residential Streets. Residential streets serve residential property. In general, 50% or more of the properties fronting a residential street are zoned for residential purposes.

~~a. *Non-Residential Streets.* When less than 50% of the street frontage is adjacent to residential property, the street is considered a non-residential street.~~

2.4.2.5. Terrain Classifications. Two terrain classifications are applicable to the Concord area. These classifications affect street design criteria. All streets should be designed in accordance with the level terrain classification unless the necessary supporting data is presented and approved by the Director of Transportation for each street section designed using rolling terrain classification. The term “slope” in this subsection includes the rise and fall of the existing topography measured both parallel and perpendicular to the centerline of the proposed street.

**CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS**

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- a. *Level.* Slopes in a level terrain range from 0% to 8%. In level terrain, horizontal and vertical street sight distances are generally long or can be designed to be so without construction difficulties ~~or major expense.~~
- b. *Rolling.* Slopes in a rolling terrain range from 8.1% to 15%. Natural slopes consistently rise above and fall below the street grade line, and occasional steep slopes offer some restriction to normal highway horizontal and vertical alignment.

Rolling Terrain Classification Request

1. Memo with reasoning for request that indicates the section of the proposed classification by the range of stations for each street included in the request.
2. Plan view showing the horizontal alignment with appropriate stationing, existing topography, and other pertinent plan view elements.
3. Profile view showing existing and proposed vertical alignment with the grades appropriately labeled and stationing corresponding with the plan view.

~~b. —~~

2.5.2.6. Design Speeds. Designers should use the highest design speed that is practical to attain the best possible degree of safety, mobility, and efficiency. The design speed of a city street should be ~~a minimum of~~ five (5) miles per hour (mph) above the anticipated posted speed. Geometric design features should be consistent with the selected design speed. ~~Minimum d~~Design speeds for each functional classification are provided in Table 2-2.

Table 2-2: ~~Minimum~~ Design Speeds.

Classification	Minimum Design Speed (mph)	
	Level Terrain	Rolling Terrain
Freeway or Expressway	70*	*65
Major Thoroughfare	60	55
Minor Thoroughfare	50	45
Major Collector	50	50
Minor Collector	40	40
Local Street	40 <u>30</u>	40 <u>30</u>
Alley	20	15

*Reference NCDOT Guidelines

~~0 e.CBU units or combination of 32 or less mail receptacles may be located along a _____ street, other than a thoroughfare, provided a separate pull-off area is provided and _____ all of the following are met:~~

3.0 Cross-Section Standards

3.1 Widths.

- a. *Rights-of-Way*. Right-of-way widths are based on the street ~~type~~classification. Rights-of-way must be at least as wide as the minimum widths provided in ~~Table 3-1~~the table below. Rights-of-way must be platted and dedicated in the location and at the width shown on the approved plans.

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STREETS & PEDESTRIAN PATHS**

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~~and~~
~~all of the following are met:~~

Table 3-1: Minimum Right-of-Way Widths.

Classification		Minimum Right-of-Way Width (feet)
Major Thoroughfare	All	100- 120
Minor Thoroughfare	All	80- 100
	Residential	60 65
Minor Collector	Non-Residential	80 71
	Residential	60 65 60 63
Local Street	All	50
Alley*	All	20
Cul-de-Sac	Non-Residential	80 67.5 70 -foot radius
	Residential	60 60-foot radius

*Alleys may be either R/W or Access Easement. Alleys will not be accepted by the City of Concord for maintenance.

- b. *Pavement.* Pavement widths are based on the street classifications and locations. ~~Fire, or other City codes may dictate different widths, the minimum width that satisfies all standards will apply.~~ The width from the edge of pavement perpendicularly to the edge of pavement must be ~~asat~~ least as wide as the minimum widths provided ~~in Table 3-2~~ below:

Table 3-2: Minimum Pavement Widths.

Classification		Minimum Pavement Width (feet)
Major Thoroughfare	All	24 for each of two divided sections
Minor Thoroughfare	All	24 for each of two divided sections or 36' non-divided
	Residential	34 24
Minor Collector	Non-Residential	36 30
	Residential with On-Street Parallel Parking	34
	Residential without On-Street Parking	24 22
Local Street	All	24 20
Alley	All	16
Cul-de-Sac	Non-Residential	46 48 -foot radius
	Residential	38.5 -foot radius

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

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3.2. **Materials.** All work and materials shall conform to the latest edition of the NCDOT Standard Specifications for Roads and Structures unless otherwise specified. The following material standards and thicknesses represent the minimum acceptable standards of the City. Pavement designs must consider existing soil types and geotechnical conditions. The Engineering Department will review pavement designs. Failure to meet the following requirements may result in the delay or prevention of street acceptance by the City of Concord or NCDOT.

3.2. All applicable compaction, soils, concrete, or other required tests will be performed at no cost to the City and by an inspector sufficiently certified to perform such tests. Results from all applicable tests, all pavement and concrete mix designs, and all other material specifications shall be provided to the City inspector. The developer shall maintain their own records of all tests and inspections throughout the construction period. These records shall, at a minimum and as applicable, include information such as dates inspections are requested and performed, inspector's name, results of inspections, re-inspections, dates and results of tests, and other applicable information as may be necessary.

a. **Subgrade.** Shape the roadway to conform to the lines, grades and typical sections shown on the plans. Strip all existing vegetation from the ground surface wherever shaping of the roadway is to be done. Use all suitable surplus material in the construction of the roadway or stockpile for use in shoulder construction. Dispose of surplus material in excess of that needed for roadway or shoulder construction as waste. Remove all unsuitable material, boulders and all vegetative matter and replace with suitable material. Obtain suitable material, when not available from the shaping or fine grading operation, from roadway excavation or borrow sources.

1. Preparation of Subgrade. Shape the subgrade to the lines, grades and typical sections shown on the plans.
2. Compaction of Subgrade. Compact all material to a depth of 8 inches below the finished surface of the subgrade to a density equal to at least 100% of that obtained by compacting a sample of the material in accordance with AASHTO T 99 as modified by NCDOT. These modified testing procedures can be found in the NCDOT Conventional Density Operator's Manual. Provide private lab soil compaction reports to the inspector for random subgrade tests every 200 LF, 3 minimum per street, and 2 per cul-de-sac, or as directed by the inspector. Proof Rolls may be required in addition to density tests as directed by the City inspector.
3. New densities may be required if it has been more than 7 days since the densities were performed or there has been a rain event greater than ½".
4. Contractor should perform a self-proofroll and repair deficiencies before calling for an inspection.

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

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5. Subgrade should be neat, clean, trimmed, and rolled down.
6. After all above items have been completed, then a subgrade proofroll can be scheduled and performed with the inspector.
7. Base Course must be placed within 7 days or before any ½” or greater rain event or another proofroll may be required.

a.b. Base Course. ~~Prior to the placement of the base course the subgrade shall be sufficiently compacted, inspected and accepted by the City inspector.~~ The material for the base course of the street must be crusher-run stone with aggregates ranging from one and one-half (1½) inch diameter particles to dust and must meet the standards of ~~the~~ NCDOT's latest edition NC DOT of Standard Specifications for Roads and Structures. ~~The City inspector shall be given a (24) twenty-four hour~~ twenty-four-hour notification to inspect the base course prior to the application of the intermediate course. All deficiency repairs are to be monitored by a City inspector and accepted prior to application of the intermediate course.

1. The material should consist of tough durable aggregate, containing sufficient fines to ensure a well-bonded and uniform base after compaction.
2. The aggregate must be free from an excess of flat, elongated, soft disintegrated pieces, and should not contain clay, silt, vegetative, or other objectionable matter.
3. The mixing and shaping of the base course material must be performed with a power-driven motor grader, equipped with a blade not less than ten (10) feet long, and equal to or equivalent to a ~~full-size~~ full-size motor grader with 125 horsepower or greater.
- 3.4. All edges and manholes are to be trimmed to the proper depth. Remove any loose stone. All manhole covers shall be adjusted to final pavement grade and slope.
5. The base shall be compacted to 100% of the maximum density obtainable with the Modified Proctor Test (AASHTO-T180) by rolling with ring or temping roller ~~or and~~ with pneumatic tired roller with a minimum weight of ten tons. When completed, the base course must be smooth, hard, dense, unyielding and well bonded. The procedures for the Modified AASHTO-T180 test can be found in the NCDOT Conventional Density Operator's Manual. Provide private lab stone base compaction reports to the inspector.
6. New densities may be required if it has been more than 7 days since the densities were performed or there has been a rain event greater than ½”.
7. Contractor shall perform a self-proofroll and repair deficiencies before calling for an inspection.
8. After all above items have been completed then a proofroll can be scheduled and

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

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~~performed with the inspector.~~

~~9. Intermediate Course must be placed within 7 days or before any ½” or greater rain event or another proofroll may be required.~~

~~4.c. Prime Coat. If application of the intermediate course is not completed within seven (7) days following stone base approval, a prime coat shall be applied. The material for the prime coat must be consistent with NCDOT Standard Specifications for Roads and Structures.~~

~~d. Intermediate Course. The material for the binder/intermediate course of the street must be consistent with NC-DOT’s Superpave Manual Standard Specifications for Roads and Structures. Asphalt plants providing the material for the binder/intermediate course must be certified by NC-DOT. The City inspector shall be given a (24) twenty-four hour/twenty-four-hour notification to inspect the intermediate course prior to the application of the first lift of the surface course. All deficiency repairs are to be monitored by a City inspector and accepted prior to application of the first lift of the surface course.~~

~~1. Compaction must meet NCDOT requirements. The contractor shall perform quality control on asphalt by performing random density tests every 200 LF, 3 minimum per street, and 2 in each cul-de-sac, or as directed by inspector. Superpave mixes are to be compacted 90.0% of the maximum specific gravity. Provide results to inspector the following day.~~

~~b.—~~

~~e. Surface Course. The material for the surface course of the street must be consistent with NC-DOT’s Superpave Manual Standard Specifications for Roads and Structures. Asphalt plants providing the material for the surface course must be certified by NC DOT. The City inspector shall be given a (72) seventy-two hour/seventy-two-hour notification to inspect the initial surface course lift prior to the application of the final lift. All deficiency repairs are to be monitored by a City inspector and accepted prior to the application of the final lift of asphalt surface course.~~

~~1. The surface lift should be installed in 2 separate lifts a minimum of 1” thick for Local Streets, and 1.5” thick for higher classifications. The first lift should be applied directly/immediately following the application, inspection, and acceptance of the intermediate course, and the second lift is to be installed after all other requirements for City acceptance have been met. All known base failures shall be repaired prior to the application of the final lift of asphalt surface course.~~

~~2. Compaction must meet NCDOT requirements. The contractor shall perform quality control on asphalt by performing random density tests every 200 LF, 3 minimum~~

**CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS**

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per street, and 2 in each cul-de-sac, or as directed by inspector. Superpave mixes are to be compacted 90.0% of the maximum specific gravity. Provide results to inspector the following day.

Table 3-3: Base, Intermediate, and Surface Courses

Classification		Base Course	Intermediate Course	Surface Course
Major Thoroughfare	All	*	*	*
Minor Thoroughfare	All	*	*	*
Major Collector	Non-Residential	*	*	*
	Residential	10" CABC or 5" B-25.0C	2.25" I-19.0C	3.0" S 9.5B
Minor Collector	Non-Residential	*	*	*
	Residential	10" CABC or 5" B-25.0C	2.25" I-19.0C	3.0" S 9.5B
Local Street	Non-Residential	*	*	*
	Residential	8" CABC or 4" B-25.0C	2.25" I-19.0C	2.5" S 9.5B
Alley	All	8"CABC		1.5" S 9.5B

* Pavement sections must be designed on a case by case basis with the residential specifications being the minimum requirements.

f. **Tack Coat.** The material for tack coats must be consistent with NCDOT Standard Specifications for Roads and Structures. Asphalt plants providing the material for tack coats must be certified by NC-DOT.

e. **Tack coats** must be applied between each layer of asphalt to be placed.

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

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~~Table 3-3: Base, Intermediate, and Surface Courses.~~

Classification		Base Course	Intermediate Course	Surface Course
Major Thoroughfare	All	*	*	*
Minor Thoroughfare	All	*	*	*
Major Collector	Non-Residential	*	*	*
	Residential	10" CABC or 5" B-25.0X	2.25" I-19.0X	23.0" SF 9.5X
Minor Collector	Non-Residential	*	*	*
	Residential	10" CABC or 5" B-25.0X	2.25" I-19.0X	23.0" SF 9.5X
Local Street	Non-Residential	*	*	*
	Residential	8" CABC or 4" B-25.0X	2.25" I-19.0X	12.5" SF 9.5X
Alley	All	8" CABC		1.5" SF 9.5X

* Pavement cross sections must be designed on a case-by-case basis.

d.g. Street Shoulder. Fill embankments must be formed of suitable materials placed in successive layers of not more than six (6) inches in depth for the full width of the cross section, including the width of the slope area. All materials for fill embankments must be consistent with NCDOT Standard Specifications for Roads and Structures.

1. No stumps, trees, brush, rubbish or other unsuitable materials or substances shall be placed in the embankments within any right-of-way or easement.
2. Each successive six-inch layer shall be thoroughly compacted by a sheepfoot tamping roller, ten-ton, three-wheel power roller, pneumatic-tired roller or other method approved by the Director of Engineering. Embankments over and around all pipes and culverts shall be of select material, placed and thoroughly tamped and compacted as directed by the Director of Engineering or their/his/her representative. Any soft spots or pumping areas must be removed and replaced in the manner stated above until satisfactory compaction is achieved.

h. Concrete. ALL concrete used for streets, curb and gutter, sidewalks and drainage structures multi-use paths, etc. 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 for Roads and Structures.

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

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and _____
~~all of the following are met:~~

The contractor shall prepare concrete test cylinders in accordance with section 1000 of the NCDOT 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 sufficiently certified to perform such tests, at no cost to the City. The contractor shall provide equipment and perform tests on concrete for a maximum slump and air content as defined in Section 1000 of the NCDOT Standard Specifications for Roads and Structures. These tests shall be performed at a frequency established by the inspector. Materials failing to meet the specifications shall be removed by the contractor.

1. 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 of one (1) gallon to 400 square feet within 24 hours of placement of concrete.

i. *Backfill.* 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.

1. Materials deemed by the inspector as unsuitable for backfill purposes shall be removed and replaced with select backfill material.

j. 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 NCDOT Standard Specifications for Roads and Structures when the air temperature is at or below 35 degrees F and the concrete has not obtained an age of 72 hours.

~~3. Any soft spots or pumping areas must be removed and replaced in the manner stated above until satisfactory compaction is achieved.~~

~~0-c.CBU units or combination of 32 or less mail receptacles may be located~~
along a ~~street, other than a thoroughfare, provided a separate pull-off area is provided~~
and ~~all of the following are met:~~

4.0—Cul-de-Sac Design Standards

4.0

4.1. ~~Where a turn-around is required on a public or private street, a properly dimensioned cul-de-sac should be provided. “Hammer-head” designs will not be permitted.~~

4.1.4.2. **Design Standard Exceptions.** Cul-de-sacs are subject to the same design guidelines as those given for the ~~appropriate local street~~ ~~et~~-classification, with the exception of the following design standards that are specific to cul-de-sacs.

a. *Service Limits.* A cul-de-sac can serve no more than twenty (20) residential units.

—*Lengths.* Cul-de-sacs must not exceed the lengths provided in Table 4-~~12~~. Length is measured from the center of the terminus to the centerline of the closest intersecting street providing access to the cul-de-sac.

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

~~0-c.CBU units or combination of 32 or less mail receptacles may be located along a _____ street, other than a thoroughfare, provided a separate pull-off area is provided and _____ all of the following are met:~~

Zoning District	Maximum Length (feet)
AG	1,000
B-1	500
C-1	500
C-2	500
CC	300
CD	1,500
I-1	1,500
I-2	1,500
O-I	500
PUD	500
RC	300
RE/RL	1,000
RE	1,000
RM-1	800
RM-2	800
RU	300
RV	600

Zoning District	Maximum Length (feet)
AG	1,000
B-1	500
C-1	500
C-2	500
CC	300
CD	1,500
I-1	1,500
I-2	1,500
O-I	500
PUD	500
RC	300
RE	1,000

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

~~0 c.CBU units or combination of 32 or less mail receptacles may be located~~
 along a _____
 street, other than a thoroughfare, provided a separate pull-off area is provided
 and _____
 all of the following are met:

RL	1,000
RM-1	800
RM-2	800
RU	300
RV	800/600

- b. Connectivity Provisions.** If the cul-de-sac is located along a corridor included in the City of Concord’s Transportation Plan or if the cul-de-sac is located along a corridor that will serve as a future thru street in accordance with a recorded subdivision plat or site plan, preliminary and final engineering plans must show a stub (extension of the street right-of-way) from the terminus of the cul-de-sac to the edge of the area being developed. Prior to final plat ~~T~~the stub must be duly signed in the field as to the potential for future extension.
- c. Termini.** The terminus of the cul-de-sac must be designed to allow vehicles to turn around and exit to the adjoining street.
1. *Radii.* The radius for the terminus (bulb or turnaround) must not be less than forty (40) feet to the face of curb as shown on the detail drawings.
 2. *Islands.* An island may be ~~located~~ proposed or required in the center of the terminus of the cul-de-sac. Islands- will be reviewed on a case-by-case-basis ~~must meet the design standards provided in Section 7.6.~~

~~0-c.CBU units or combination of 32 or less mail receptacles may be located along a _____ street, other than a thoroughfare, provided a separate pull-off area is provided and _____ all of the following are met:~~

5.0 Slope Standards

5.1. **Longitudinal Grade.** Longitudinal grades may range between one percent (1.0%) and twelve percent (12%). Table 5-1 identifies the maximum longitudinal grade for each functional classification.

Table 5-1: Maximum Longitudinal Grades.

Classification	Conditions (Terrain or Proximity to Intersection)	Maximum Grade
Freeway or Expressway		*
Major Thoroughfare		*
Minor Thoroughfare		*
Major Collector	Level Terrain	6%
	Rolling Terrain	9%
	Intersection in ≤ 100 feet	3%
Minor Collector	Level Terrain	6%
	Rolling Terrain	9%
	Intersection in ≤ 100 feet	5%
Local Street	Level Terrain	9%
	Rolling Terrain	12%
	Intersection in ≤ 100 feet	5%
Alley	Level Terrain	9%
	Rolling Terrain	12%
	Intersection in ≤ 100 feet	5%

* Consult the latest edition of AASHTO's *The Policy on Geometric Design of Highways and Streets*.

5.2. Transverse Grade.

- a. *Street Surface.* Transverse grades on the street surface must have a one-fourth (1/4) inch rise to one (1) foot run slope. Superelevation rates, minimum runoff lengths, and methods of distribution should be designed in accordance with AASHTO guidelines.

~~0 c.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:~~

Table 5-2: Maximum Superelevation Transverse Slope for Minimum Centerline Radius.

Classification	Maximum Superelevation Transverse Slope (feet/feet)	
	Level Terrain	Rolling Terrain
Freeway or Expressway	*	*
Major Thoroughfare	*	*
Minor Thoroughfare	*	*
Major Collector	0.04	0.04
Minor Collector	0.04	0.04
Local Street	normal crown	normal crown
Alley	N/A	N/A

* Consult the latest edition of AASHTO's *The Policy on Geometric Design of Highways and Streets*.

b. Street Shoulder.

1. *Minimum width.* The minimum shoulder width shall be 6 feet wide measured from the edge of pavement. The transverse grade for street shoulders shall be ¼" per foot.
 — *Fill/Cut Slopes.* The maximum transverse grade for ~~fill street shoulders slopes~~ is a one (1) foot rise to ~~threetwo (23)~~ **two (2)** foot run ~~slope.~~, **and one (1) foot rise to two (2) foot run for cut slopes.**

6.0 Curve Standards

- 6.1. **Horizontal Centerline Curve Radius.** Table 6-1 provides the minimum horizontal centerline curve radii for each functional classification.

Table 6-1: Minimum Horizontal Centerline Curve Radii.

Classification	Minimum Horizontal Centerline Curve Radii (feet)	
	Level Terrain	Rolling Terrain
Freeway or Expressway	*	*
Major Thoroughfare	*	*
Minor Thoroughfare	*	*
Major Collector	310	230
Minor Collector	310	230
Local Street	230	150
Alley	90	90

* Consult the latest edition of AASHTO's *The Policy on Geometric Design of Highways and Streets*.

0 e.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:

6.2. **Tangent Between Reverse Curves.** Table 6-2 provides the minimum tangent between reverse curves for each functional classification.

Table 6-2: Minimum Tangent Between Reverse Curves.

Classification	Minimum Tangent Between Reverse Curves (feet)
Freeway or Expressway	*
Major Thoroughfare	*
Minor Thoroughfare	*
Major Collector	200
Minor Collector	200
Local Street	100
Alley	0

* Consult the latest edition of AASHTO's *The Policy on Geometric Design of Highways and Streets*.

6.3. **Vertical Centerline Curves.** Table 6-3 provides the minimum Rates of Vertical Curvature (K) for each functional and terrain classification.

6.2.

~~Table 6-2: Minimum Tangent Between Reverse Curves.~~

Classification	Minimum Tangent Between Reverse Curves (feet)
Freeway or Expressway	*
Major Thoroughfare	*
Minor Thoroughfare	*
Major Collector	200
Minor Collector	200
Local Street	100
Alley	0

~~* Consult the latest edition of AASHTO's *The Policy on Geometric Design of Highways and Streets*.~~

~~0 e.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:~~

Table 6-3: Rate of Vertical Curvature (K)**.

Classification		Level Terrain	Rolling Terrain
Freeway or Expressway	Crest	*	*
	Sag	*	*
	Stop	*	*
Major Thoroughfare	Crest	*	*
	Sag	*	*
	Stop	*	*
Minor Thoroughfare	Crest	*	*
	Sag	*	*
	Stop	*	*
Major Collector	Crest	45	30
	Sag	45	30
	Stop	20	14
Minor Collector	Crest	45	30
	Sag	45	30
	Stop	20	14
Local Street	Crest	30	20
	Sag	30	20
	Stop	14	9
Alley	Crest	30	20
	Sag	30	20
	Stop	14	9

* Consult the latest edition of AASHTO's *The Policy on Geometric Design of Highways and Streets*.

** $K = (\text{Length of the Vertical Curve in Feet}) \div (\text{Percent Algebraic Difference in the Grades Before and After the Vertical})$

7.0 Intersection Standards

- 7.1. **Angles of Intersection.** When practical, streets must intersect at an angle of ninety (90) degrees. The centerlines of the intersecting streets should remain straight for a minimum of fifty (50) feet from the ~~point of intersection of the two streets edge of travel way of the intersecting street.~~ In no case should the angle of intersection be less than seventy (70) degrees.
- 7.2. **Corners.**
- a. *Quantity.* Intersections shall not have more than four (4) corners.

**CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS**

~~0 e.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:~~

- b. *Right-of-Way.* Property lines at intersections must be established so that the distance from the edge of pavement at the street turnout to the property line is at least as great as the distance from the edge of pavement to the property line along the intersecting streets.
 1. This property line can be established as a radius or as a sight triangle.
 2. Minimum and maximum street right-of-way curve radii are provided in Table 7-1.

Table 7-1: Minimum and Maximum Right-of-Way Curve Radii at Intersections.

Zoning District	Minimum Radii (feet)	Maximum Radii (feet)
AG	30	N/A
B-1	30	45
C-1	30	N/A
C-2	30	N/A
CC	30	45
CD	30	N/A
I-1	30	N/A
I-2	30	N/A
O-I	30	45
PUD	30	45
RC	30	45
RE	30	N/A
RL	30	N/A
RM-1	30	N/A
RM-2	30	N/A
RU	30	N/A
RV	30	45

7.3. Backs-of-Curb. Curbs must be rounded at the corners of intersections to facilitate the movement of traffic. The minimum corner radii for backs-of-curb at street intersections are provided in Table 7-2.

~~0 c.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:~~

Table 7-2: Minimum Corner Radii for Backs-of-Curb at Intersections.

Classification	Minimum Corner Radii (feet)
Freeway or Expressway	*
Major Thoroughfare	*
Minor Thoroughfare	*
Major Collector	30
Minor Collector	30
Local Street	30
Alley	20

* Consult the N.C. Department of Transportation Division of Highways' Transportation Plan.

7.3.7.4. Distances between Intersections. -Proposed streets that intersect opposite sides of the same street (either existing or proposed) should be designed to intersect directly opposite one another as shown in Figure 7-1a.

a. Minimum lengths for Local Streets and Minor Collectors.

1. A minimum length of 200 feet between street-centerlines must separate proposed streets that cannot be aligned to create a shared intersection as shown in Figure 7-1b.
2. A minimum length of 400 feet between centerlines must separate streets with opposing left-hand turns as shown in Figure 7-1c.

b. Minimum lengths for higher street classifications. Minimum lengths for higher street classifications must be reviewed and approved by the Director of Transportation, but in no case can the distance be less than 400 feet.

a.

- ~~1. A minimum length of 200 feet between street centerlines must separate proposed streets that cannot be aligned to create a shared intersection as shown in Figure 7-1b.~~
- ~~2.1. A minimum length of 400 feet between centerlines must separate streets with opposing left hand turns as shown in Figure 7-1c.~~

b. ~~Minimum lengths for higher street classifications. Minimum lengths for higher street classifications must be reviewed and approved by the Director of Transportation, but in no case can the distance be less than 400 feet.~~

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

0 c.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:

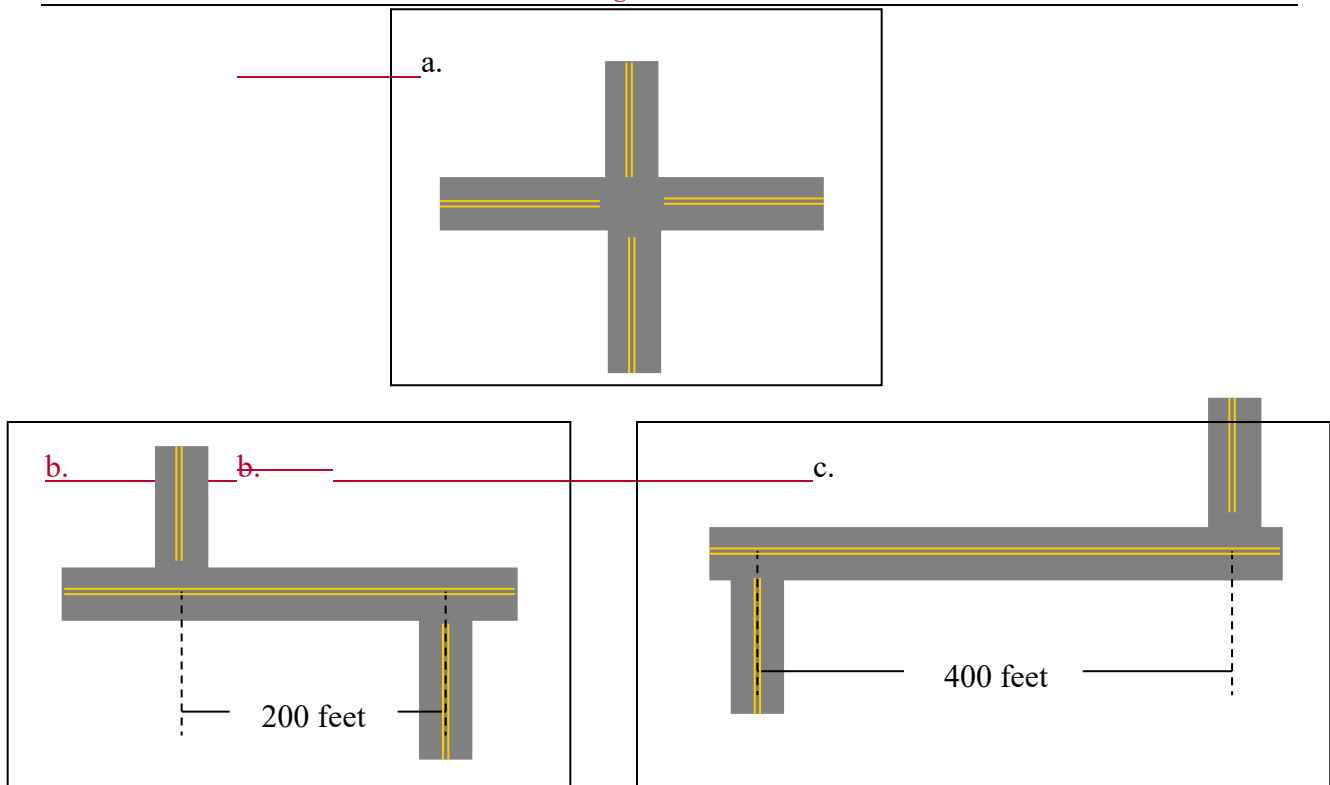


Figure 7-1: Two Streets Intersecting the Same Street.

7.5. Sight Triangle Easements. Sight triangle easements are required in every zoning district of the City except for the CC District. Sight triangle easements must be shown on all plans and recorded on a final plat. NCDOT may have separate and/or additional requirements regarding Sight Triangles, the strictest standard that satisfies all requirements will apply. Dimensions given in this section are the minimums, evaluation of sight distance may require larger sight triangle easements.

A. Type 1

a. Type 1 sight triangles must be maintained on property located at intersections of:

1. Two streets of any classification
2. A street and a railroad
3. A street and a non-residential driveway

b. Size and Measurement - A sample illustration is provided in Figure 7-2.

1. The lengths of the Type 1 sight triangle legs are based on the widths of the intersecting rights-of-way of the where the intersection occurs.

**CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS**

~~0-c.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:~~

**Table 7-3: Sight Triangle Leg Length along a Right-of-Way
Measured from the Point of Intersection**

Right-of-Way Width* (feet)	Length (F or G) (feet)
≤50	25
60	30
70	35
80	40
90	45
>100	50
*Or pavement width where no R/W exists.	

2. Type 1 Sight triangles are measured from the following three points as shown on Figure 7-2:

- a. *Point 1.* The point of intersection of two right-of-way lines or driveway pavement edge.;
- b. *Point 2.* The point along right-of-way one (1) a distance from Point 1 as determined by the width of right-of-way one (1) in accordance with Table 7-3, and
- c. *Point 3.* The point along right-of-way two (2) a distance from Point 1 as determined by the width of right-of-way two (2) in accordance with Table 7-3.

B. Type 2

1a. In addition to Type 1 sight triangles, Type 2 sight triangles must be maintained on property located at intersections of:

- 1. Any street with a street classified as a collector or higher.
- 2. Any non-residential driveway with a street classified as a collector or higher.

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

0-c.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:

2b. Size and Measurement - A sample illustration is provided in Figure 7-2.

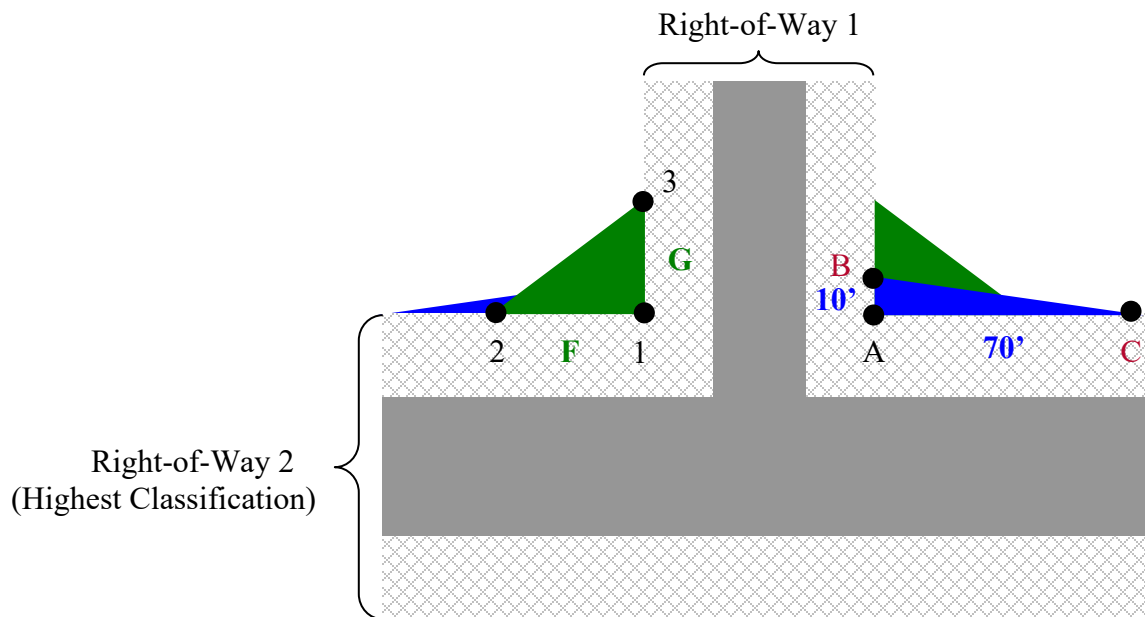
1. Type 2 Sight triangles are measured from the following three points as shown on Figure 7-2:

a. *Point A.* The point of intersection of two right-of-way lines or R/W and driveway pavement edge.;

b. *Point B.* The point along right-of-way one (1) a distance of 10 feet from Point A, and

c. *Point C.* The point along right-of-way two (2) a distance of 70 feet from Point A.

Figure 7-2: Type 1 & 2 Sight Triangle Sample Illustration



C. Type 3

a. Type 3 Sight Triangles must be maintained on property located at intersections of:

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

0-c.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:

a1. Residential driveways and streets

b. Size and Measurement - A sample illustration is provided in Figure 7-3.

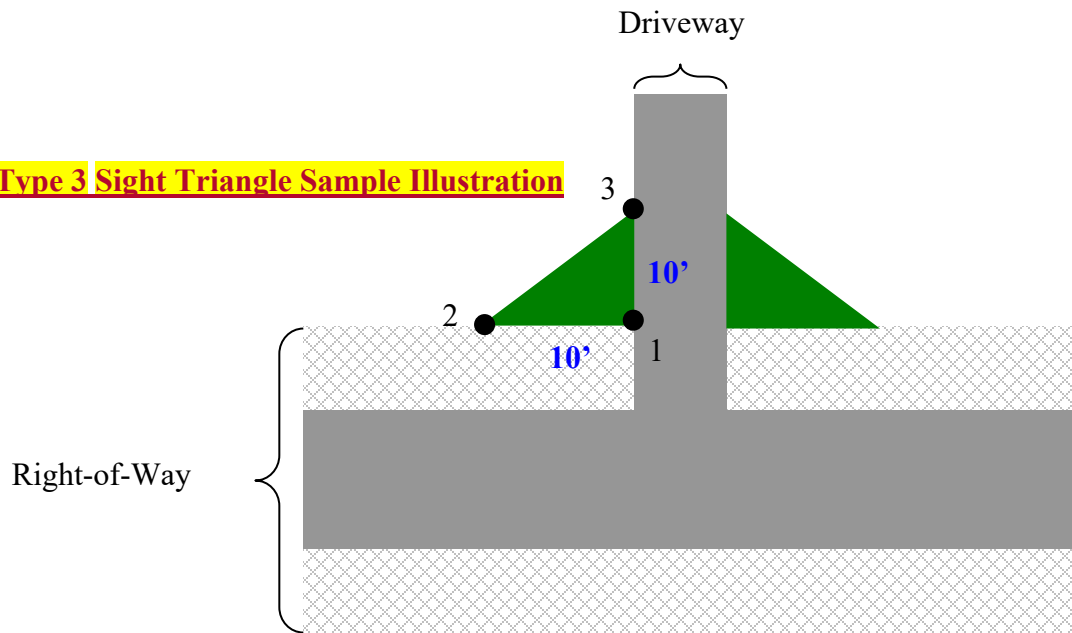
1. -Sight triangles are measured from the following three points:

1a. Point 1. The point of intersection of the street right-of-way line and the edge of the driveway pavement,

2b. Point 2. The point along the street right-of-way a distance of ten (10) feet from Point 1, and

3c. Point 3. The point along the edge of the driveway pavement a distance of ten (10) feet from Point 1

Figure 7-3: Type 3 Sight Triangle Sample Illustration



~~0-c.CBU units or combination of 32 or less mail receptacles may be located along a _____ street, other than a thoroughfare, provided a separate pull-off area is provided and _____ all of the following are met:~~

D. Objects Not Allowed within Sight Triangles. Objects within sight triangles must be restricted to give the users of the street or driveway an unobstructed view of oncoming vehicles and pedestrians. No structures, berms, vegetation, or other visual obstruction with a height equal to or greater than two (2) feet above the street surface elevation is allowed within the sight triangle, except those listed in the following subsection. The dimensions given represent the dimensions of the Sight Triangle Easements as measured at the R/W.

E. Objects Allowed within Sight Triangles. The following objects are allowed within sight triangles:

1. Public utility poles.
2. Official warning signs or signals.
3. Supporting members or appurtenances to permanent buildings lawfully existing prior to April 11, 1996.
4. Other signs that meet all of the following criteria:
 - a. Conform to the City's sign ordinance, and
 - b. Are mounted at a height equal to or greater than ten (10) feet above the street surface, and
 - c. Have supports that do not obscure the view of oncoming vehicles and pedestrians.

~~Supporting members or appurtenances to permanent buildings lawfully existing prior to April 11, 1996.~~

~~7.4. **Sight Triangle Easements.** Sight triangle easements are required in every zoning district of the City except for the CC District. Sight triangle easements must be shown on all plans and recorded on a final plat.~~

~~a. *Locations.* Sight triangles must be maintained on property located at the intersection of:~~

- ~~1. Two streets of any classification,~~
- ~~2. A street and a railroad, and~~
- ~~3. A street and a driveway.~~

~~b. *Size and Measurement.* A sample illustration is provided in Figure 7-2.~~

~~c. *Intersections of Two Streets or Streets and Railroads.* The lengths of the legs of a site triangle are based on the widths of the intersecting rights-of-way and the functional classification of the streets where the intersection occurs.~~

~~d. *Sight Triangle Measurements.* Based on Width of Right of Way. Sight triangles are measured from the following three points:~~

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

~~0 e.CBU units or combination of 32 or less mail receptacles may be located along a _____ street, other than a thoroughfare, provided a separate pull-off area is provided and _____ all of the following are met:~~

- ~~1. *Point 1.* The point of intersection of two right of way lines,~~
- ~~2. *Point 2.* The point along right of way one a distance from Point 1 as determined by the width of right of way one in accordance with Table 7-3, and~~
- ~~3. *Point 3.* The point along right of way two a distance from Point 1 as determined by the width of right of way two in accordance with Table 7-3.~~

Table 7-3: Sight Triangle Leg Length along a Right-of-Way Measured from the Point of Intersection

Right-of-Way Width (feet)	Length (feet)
50	25
60	30
70	35
80	40
90	45
≥100	50

~~e. **Functional Classification.** Additional site triangle easements are needed at the intersection of two streets if at least one of the streets has the following functional classification:~~

- ~~1. **freeway or expressway;**~~
- ~~2. **major thoroughfare;**~~
- ~~3. **minor thoroughfare, major collector; or**~~
- ~~4. **minor collector.**~~

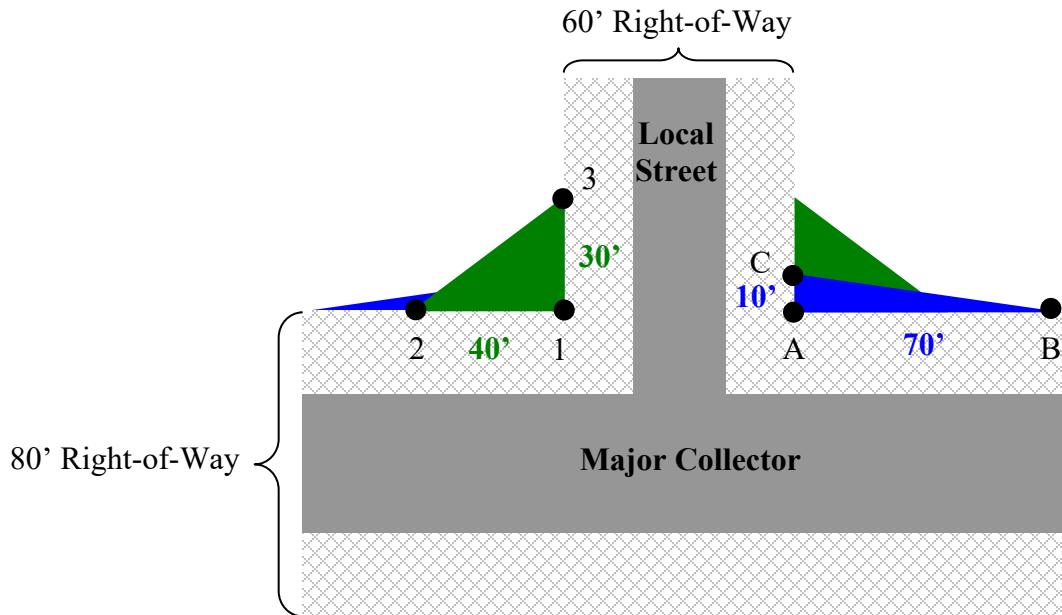
~~f. **Measuring.** Site triangles are measured from the following three points:~~

- ~~1. **Point A.** The point of intersection of the two street right-of-way lines,~~
- ~~2. **Point B.** The point along the right-of-way of the street with the highest functional classification (highest ADT) a distance of 70 feet from Point 1, and~~
- ~~3. **Point C.** The point along right-of-way of the intersecting street a distance of 10 feet from Point 1.~~

Figure 7-2: Sight Triangle Sample Illustration

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

~~0-c.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:~~



~~g. Intersections of Streets and Residential Driveways. Sight triangles are measured from the following three points:~~

- ~~1. Point 1. The point of intersection of the street right-of-way line and the edge of the driveway pavement,~~
- ~~2. Point 2. The point along the street right-of-way a distance of ten (10) feet from Point 1, and~~
- ~~3. Point 3. The point along the edge of the driveway pavement a distance of ten (10) feet from Point 1.~~

~~h. Intersections of Streets and Non-Residential Driveways. Site triangle requirements are addressed during the driveway permitting process.~~

~~i. Objects Not Allowed within Sight Triangles. Objects within sight triangles must be restricted to give the users of the street or driveway an unobstructed view of oncoming vehicles and pedestrians. No structures, berms, vegetation, or other visual obstruction with a height equal to or greater than two (2) feet above the street surface elevation is allowed within the sight triangle, except those listed in the following subsection:~~

~~j. Objects Allowed within Sight Triangles. The following objects are allowed within sight triangles:~~

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

~~0 c.CBU units or combination of 32 or less mail receptacles may be located along a _____ street, other than a thoroughfare, provided a separate pull-off area is provided and _____ all of the following are met:~~

- ~~1. Public utility poles,~~
- ~~2. Official warning signs or signals,~~
- ~~3. Other signs that meet all of the following criteria:~~
 - ~~(a) Conform to the City's sign ordinance, and~~
 - ~~(b) Are mounted at a height equal to or greater than ten (10) feet above the street surface, and~~
 - ~~(c) Have supports that do not obscure the view of oncoming vehicles and pedestrians.~~
- ~~4. Supporting members or appurtenances to permanent buildings lawfully existing prior to April 11, 1996.~~

~~7.6. Roundabouts/Traffic Circles. Roundabout/traffic circle designs must be reviewed and approved by the Director of Transportation based on current engineering standards. Sight Distance. Sight distance shall be measured at a height of 3.5' above the ground with a minimum of 1' vertical separation between the highest obstruction at ground level and the sight line, and 5' between the sight line and the bottom of tree canopies, or objects above the surface. Table 7-6 gives the sight distance for stop controlled intersections. Minimum Sight Distance should be provided as outlined in Article VIII, Appendix E of the TSM intersections.~~

Table 7-6

Design Speed (mph)	Minimum Intersection Sight Distance (ISD)*		
	Passenger Cars (ft.)	Single Unit Trucks (ft.)	Combination Trucks (ft.)
	Left / Right	Left / Right	Left / Right
20	225 / 195	279 / 250	337 / 310
25	280 / 240	348 / 315	422 / 385
30	335 / 290	418 / 375	506 / 465
35	390 / 335	488 / 440	590 / 540
40	445 / 385	557 / 500	675 / 620
45	500 / 430	627 / 565	759 / 695
50	555 / 480	697 / 625	843 / 770
55	610 / 530	766 / 685	927 / 850

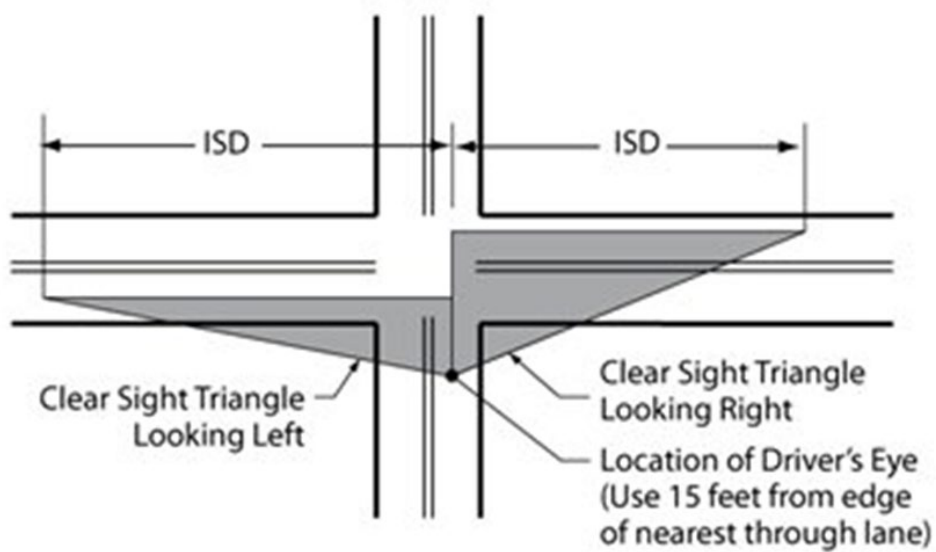
*Values are based on case B1 and B2 from AASHTO Policy on Geometric Design of Highways and Streets with base condition of two-lane highway with no median and grades <=3%. For conditions outside of the base conditions appropriate adjustments should be made in accordance with AASHTO

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

~~0-c.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:~~

Policy.

Figure 7-6



7.7. **Roundabouts/Traffic Circles.** Roundabouts may be required at certain intersections within developments proposing a new network of public streets to provide traffic calming and help create a safe environment for drivers and pedestrians. Locations of Roundabouts will be determined by the Planning and Transportation Departments. Designs must be reviewed and approved by the Director of Transportation or their his/her representative.

7.5. —

~~0-c.CBU units or combination of 32 or less mail receptacles may be located~~
along a ~~street, other than a thoroughfare, provided a separate pull-off area is provided~~
and ~~all of the following are met:~~

8.0 Median and Island Standards

- 8.1. *Where Required.* Entrance roads shall include a median in conformance with the City’s development ordinances, except that the Director of Transportation may waive this requirement if the Director determines that such a median is not ~~practical~~ **practical**, or such installation would create a hazard.
- 8.2. *Size.* Islands **must be a minimum of 75 square feet** and ~~entrance~~ medians must be a minimum **of one half the required stem length of the intersecting street(s) of 75 square feet in size** and at ~~least~~ **minimum of 4 feet wide. Lengths of non-entrance medians are to be approved by the Transportation Director.** Where median widths are specified, a median of not less than the designated width must be provided.
- 8.3. *Contents.* Structures, permanent materials or plantings within the island **or median** should not obscure the visibility of cars entering a cross street for a distance of 20 feet back from the curb face of the cross street, unless a larger setback is needed due to inadequate sight distance created by horizontal or vertical curve alignment. Islands **and medians must** ~~should~~ be landscaped at a density equivalent to a Class “A” buffer as set forth in the Landscaping Standards of in the City’s development ordinances.
- 8.4. *Specifications.* The nose of the median must be at least 6 feet from edge of ~~the~~ perpendicular thru lane. Standard **2’-6”** curb **and guttering should be used unless 1’-6” is approved** ~~must be used~~. A minimum 14-foot ~~travelway~~ **travel way** must be provided on each side of the median/island. **Medians and islands which encroach into NCDOT R/W must be approved by NCDOT.**

9.0 Drainage Standards

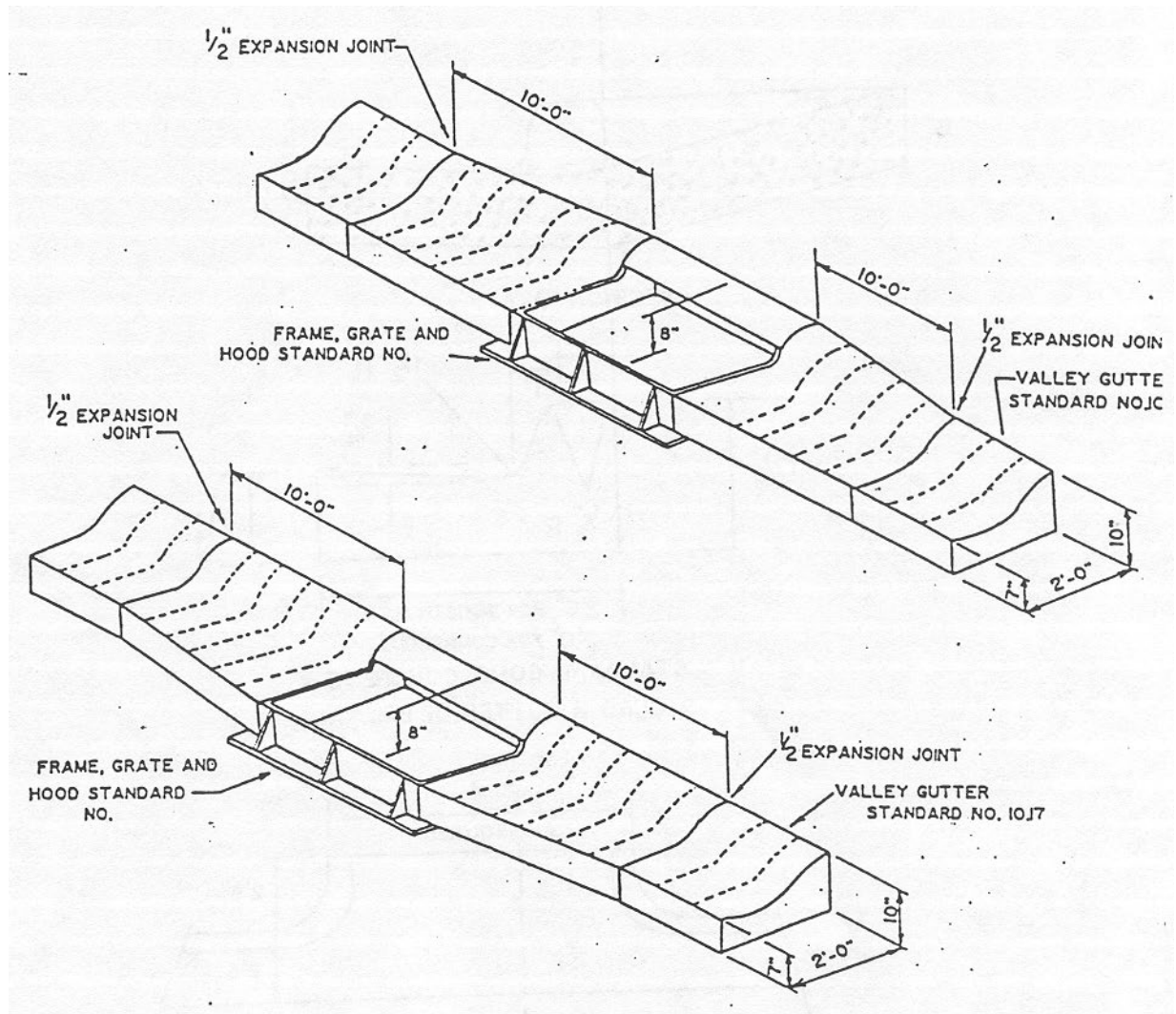
–A drainage system must be provided that adequately facilitates the movement of stormwater off and under streets. This drainage system may include curbs and gutters, catch basins, stormwater pipes, and graded channels. Each component of the drainage system should be designed by a registered professional engineer and installed in accordance to City construction specifications and standards. Please refer to Article 1 Section 3 of these Technical Standards.

9.1. Curbs and Gutters.

- a. *Required Locations.* Concrete curbs and gutters must be included on all new streets, ~~on and~~ all existing streets **which the property to be subdivided or developed fronts, and on all streets** that provide access to a new development or subdivision, except those listed in the following subsection.
- b. *Exemptions.* Concrete curbs and gutters are not required along the following streets:
1. Interstate highways,

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

0-c.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:



2. Numbered State highways with topography that does not allow for reasonable or practical installation, and
 3. Numbered State highways where the N.C. Department of Transportation ~~has not determined the ultimate right-of-way width~~ stipulates no curb and gutter should be installed.
- c. Specifications.

Figure 9-1: Curb and Gutter Detail.

1. Curbs and gutters must be built in accordance with City of Concord Standards and NCDOT Standards. ~~NCDOT Standard 846.01 for Standard 2'-6" curb and gutter~~ is to be used on all ~~major and minor collector streets~~ streets. Valley curb is allowed

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

~~0 c.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:~~

~~only~~ on local streets and alleys.

~~2. All excess concrete on the front edge (lip) of gutter shall be removed when curb and gutter is poured with a machine.~~

~~1.3. All curb and gutter shall be backfilled with soil approved by the inspector within 48 hours after construction to prevent erosion.~~

9.2. **Catch Basins.**

a. *Required Locations.* Catch basins shall be located:

1. ~~Aas~~ outlined in Article 1 ~~Section 3~~ of these Technical Standards, and
2. On both sides of the street at low points.

b. *Specifications.*

1. Catch basin frames and grates must be in accordance with NCDOT Standards. Improvised grates will not be acceptable.
2. Catch basin frames must be cast with the following statement: "Dump No Waste Drains to Stream" or a comparable statement as approved by the Director of ~~Environmental Services~~ ~~Engineering~~.
3. Catch basins must be built in accordance with NCDOT Standards.
- ~~4.~~ ~~Catch basins~~ walls must be built straight with inside joints struck smooth. Precast catch basins may be acceptable with the approval of the Director of Engineering.
- ~~4.5. Roll-over frame and grate inlets are not permitted within driveways.~~

9.3. **Pipes.**

a. *Stormwater.*

1. *Required Locations.* Stormwater pipes should be placed at all low points in the street grade to transmit storm water transversely across the street. Additionally, stormwater pipes should be parallel ~~to~~ the street, but not under the street, ~~when necessary to~~ ~~unless~~ transmitting stormwater from one catch basin to another ~~on the opposite side of the street.~~
2. *Size.* The minimum pipe diameter shall be fifteen (15) inches, regardless of the size of the drainage area.
3. *Depth.* The minimum cover for all pipe shall be two (2) feet, ~~or as otherwise approved for Class IV and V RCP in accordance with NCDOT Standards.~~
4. *Material.* All pipe must be concrete conforming to the ~~N.C.~~-DOT Standard

~~0-c.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:~~

Specifications of Road and Structures. For special conditions, alternative pipe materials recommended by the manufacturer for the type of installation ~~involved, and involved and~~ approved by the Director of Engineering will be considered. Any concrete pipe laid between the concrete curbs shall be reinforced.

- b. *Construction.* All pipe must be laid with the bell or groove upgrade and joint entirely interlocking.
- c. *Groundwater.* Subdrainage must be provided where the groundwater table is within two (2) feet of the subgrade. Subdrainage design must be approved by the Director of Engineering.
- d. *Graded Channels.* Ditches proposed within the street rights-of-way will need to be approved on a case to case basis. Ditches should be a minimum of thirty-six (36) inches deep and two (2) feet in width. Ditches, swales, or other drainage features shall not be designed or allowed to discharge concentrate water flow onto or across sidewalks.

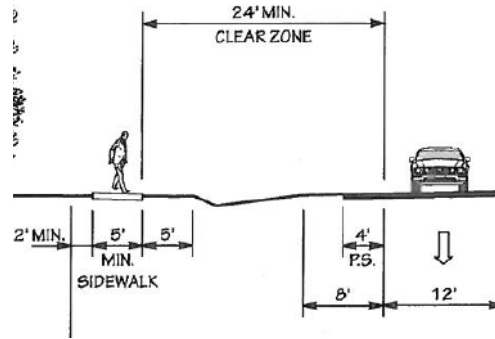
10.0 Sidewalk Standards

10.1. Locations. Sidewalks should be provided for the safe movement of pedestrians, separate from the movement of vehicular traffic, through residential, commercial, and industrial areas, as well as public places. Sidewalks must be constructed along both sides of all new streets in a subdivision, ~~and~~ along any street ~~that~~ which the property to be subdivided fronts and any street which provides access to the subdivision. ~~Multi-Family and Non-Residential developments shall provide sidewalk along the frontage of existing streets regardless of whether the site property is being subdivided.~~ Sidewalks ~~may~~will not be required along interstate highways (not designed for curb and gutter). Where identified in adopted City plans, Multi-Use paths will replace sidewalk where required.

- a. Except in unusual circumstances, sidewalk must be located a minimum of (8) eight feet from the back of the curb or at the back of the right-of-way. A recorded public sidewalk easement is required for all sidewalk located outside the 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 a minimum of two feet or to the face of building, whichever is less. The sidewalk easement must be recorded with the Cabarrus County Register of Deeds prior to issuance of a certificate of occupancy for the corresponding building(s).
- b. Along NCDOT highways where curb and gutter is not recommended or approved by NCDOT, the minimum clear zone for sidewalks and multi-use paths is 24' as measured from the edge of the closest parallel travel lane subject to approval by NCDOT.

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

~~0-c.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:~~



~~10.1.~~

10.2. **Specifications.** Sidewalks must:

- a. Have a minimum five (5) foot width;
- b. Be constructed of not less than three thousand **six hundred (3,0600)** pound-per-square-foot **inch** concrete;
- c. Be a minimum of four (4) inches thick when adjacent to standard 30" curb and gutter, the sidewalk must be six (6) inches thick when **placed** adjacent to valley curb and gutter **and no planting strip is present;**
- ~~e.~~ **d.** Be a minimum of six (6) inches thick at driveway crossings
- ~~d.e.~~ Be constructed on a ~~n adequately compacted and~~ properly graded base **with subgrade compacted to 95% of the maximum density obtainable with the Standard Proctor Test,**
- ~~e.f.~~ Have a lateral slope of one-quarter (1/4) inch per foot toward the street,
- ~~f.g.~~ Be steel-~~trowelled~~ **troweled** and light broom finished and cured properly,
- ~~g.h.~~ Have tooled joints at intervals of not more than five (5) feet and expansion joints at intervals of not more than forty (40) feet,
- ~~h.~~ Be separated from the back of curb by a six-foot planting strip, and
- ~~i.~~ Meet all current Americans with Disabilities Act (ADA) standards, **and,**
- ~~j.~~ **Meet NCDOT specifications for concrete sidewalks, stricter of any sapecification applies;**
- ~~i.k.~~ Be designed and located so as to prevent transmission of drainage water from swales, ditches or other graded channels across the surface.

10.3. **Transitions to Street Grade.** Access ramps must meet current **ADA and** NC-DOT standards and be constructed with materials that are approved by the Director of Transportation. **Truncated dome mats at all access ramps shall be red in color.**

~~0 c.CBU units or combination of 32 or less mail receptacles may be located along a _____ street, other than a thoroughfare, provided a separate pull-off area is provided and _____ all of the following are met:~~

11.0 Curb and Gutter, and Sidewalk Exemptions

Applicability. Refer to Article 10 of the UDO.

12.0 Guardrails

12.1. Applicability.

- a. Guardrails must be provided in all areas required in accordance with the NC-DOT Roadway Design Manual.
- ~~b. Additionally, guardrails must be provided along all areas, regardless of the design speed, where an eight foot or greater drop in elevation exists between the edge of pavement and the area extending 40 feet beyond the edge of pavement, unless:~~
 - ~~1. Greater than or equal to 13 feet of flat, unobstructed area exists beyond the edge of pavement, and~~
 - ~~2. A 3:1 or flatter unobstructed slope exists beyond the flat area, and~~
 - ~~3. At least 8 feet of flat, unobstructed area exists beyond the toe of the slope.~~

13.0 Street and Subdivision Naming Standards

13.1. Uniqueness.

- a. Proposed street and subdivision names must not duplicate nor too closely approximate phonetically the name of any street within Cabarrus County.
- b. Where proposed streets are extensions of existing streets, the existing street names shall be used except where a new name can reasonably be used to facilitate proper house numbering or to avoid further street name duplication.

13.2. Labels.

In addition to names to identify new streets, the following labels must be included:

- a. A street oriented in a general north-south direction must be labeled a “Street;”
- b. A street oriented in a general east-west direction must be labeled an “Avenue;”
- c. A street that changes direction may be labeled a “Drive,” “Lane,” or “Road;”
- d. A street that forms a loop where both ends intersect with the same street may be labeled a “Circle;” and

~~0-c.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:~~

- ~~e.~~ e. A cul-de-sac or street terminating in a similar dead-end must be labeled a “Place” if oriented in a north-south direction and a “Court” if oriented in an east-west direction.

~~e.—~~

14.0 Sign Standards

~~14.1. Standard Signs.~~ In all subdivisions that include public streets, except as provided below, standard street signs should be installed by the City of Concord. The developer must reimburse the City for the full cost of the installation. ~~Costs associated with signs requiring reinstallation due to damage or removal prior to City acceptance of the streets are the responsibility of the developer. The performance of installation, maintenance, and replacement of signs on public streets after the streets have been accepted by the City are the responsibility of the City.~~ **Signage Plan.** A separate signage plan should be included with the site plan showing the locations of all signs (stop, speed limit, street blades, no-parking, etc.). Signs should be indicated as standard or decorative.

~~14.1.~~14.2. **Standard Signs.** In all subdivisions that include public streets, except as provided below, standard street signs should be installed by the City of Concord. The developer must reimburse the City for the full cost of the installation. Costs associated with signs requiring reinstallation due to damage or removal prior to City acceptance of the streets are the responsibility of the developer. The performance of installation, maintenance, and replacement of signs on public streets after the streets have been accepted by the City are the responsibility of the City.

~~14.2.~~14.3. **Decorative Custom Signs Treatments.** [Encroachment process.] In subdivisions with architectural standards, restrictive covenants, and a property owner's association, **decorative custom street sign treatments s may shall may** be installed by the developer with all costs of installation, maintenance, and replacement paid by the developer. **Sign panels themselves shall be procured from the City of Concord for installation on the custom sign treatments. An encroachment agreement for the custom sign treatments must be completed prior to the installation approval of a site plan containing decorative signage.:**

a. Specifications.

~~14.3.~~ **Decorative Custom street signs treatments** must comply with the Manual on Uniform Traffic Control Devices (MUTCD) published by the U.S. Department of Transportation and **City of Concord standards**, ~~may be installed only after written approval by the City Director of Transportation.~~ Submission requirements for consideration of **custom street decorative signs treatments** shall include detailed color drawings, plans and specifications of the proposed street signs, **signage plan showing locations**, and a written statement describing funding for installation, maintenance, and replacement.

~~0 c.CBU units or combination of 32 or less mail receptacles may be located~~
along a ~~_____~~
~~street, other than a thoroughfare, provided a separate pull-off area is provided~~
and ~~_____~~
~~all of the following are met:~~

~~14.4.~~ **b. Replacement.**

- ~~1. _____~~ 1. ~~Regulatory and Warning Signs.~~ Replacement of lost or damaged regulatory or warning signs, as defined by the ~~Uniform Manual~~ MUTCD, must be accomplished ~~immediately~~ within mandated time periods by the City using standard street signs until the developer or property owner's association installs replacement ~~custom decorative street sign treatments~~. If the developer or property owner's association fails to install replacement ~~custom street decorative signs treatments~~ for regulatory and warning signs within ninety (90) days, the replacement by the City shall be considered permanent and the full cost must be paid by the developer or property owner's association.
- ~~2. _____~~ 2. Guide Signs. Replacement of lost or damaged guide signs, as defined by the MUTCD, on decorative sign treatments must be accomplished by the developer or property owner's association within ninety (90) days or the City shall install standard street signs with full costs paid by the developer or property owner's association.

~~14.5. _____~~

~~2. Guide Signs.~~ Replacement of lost or damaged guide signs, as defined by the Uniform Manual MUTCD, on decorative sign treatments must be accomplished by the developer or property owner's association within ninety (90) days or the City must install standard street signs with full costs paid by the developer or property owner's association.

~~14.6. _____~~

~~:~~

15.0 Public Street Acceptance

The City of Concord may consider the acceptance of streets/roads for maintenance upon written request. The City reserves the right to refuse acceptance of maintenance of streets which are not built to the standards outlined in the Technical Standards Manual or, upon inspection, are found to require redesign or extensive repair work to bring the street(s) up to current standards. Alleys will not be accepted by the City for maintenance.

15.1 A street must meet the following minimum requirements to be considered for public maintenance:

- a. Must be within City of Concord City limits,
- b. Shall be contiguous to streets currently maintained by the City or NCDOT. Streets which do not directly connect to an existing public street maintained by the City or NCDOT will not be accepted.

**CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS**

~~0-c.CBU units or combination of 32 or less mail receptacles may be located along a _____ street, other than a thoroughfare, provided a separate pull-off area is provided and _____ all of the following are met:~~

- ~~c. Must meet current standards as outlined in the City of Concord Technical Standards.~~
- ~~d. Must be platted with at least minimum Right-of-Way (R/W) required for the designated classification.~~
- ~~e. The Owner(s)/Applicant(s) must not otherwise be in default of any other obligation to the City of Concord.~~

15.2 Newly Constructed Streets Platted for City Maintenance

To initiate the acceptance procedure for newly constructed streets platted for City maintenance, the following information shall be submitted to the City Engineer:

- a. An Application for Street Maintenance Acceptance (Appendix A). The street(s) shall not have had the final surface lift of asphalt laid for more than 12 months.
- b. One (1) PE Certification for Subdivisions and Streets (Appendix B), including applicable reports and inspection data.
- c. One (1) Pavement Core Results Report. The report will include a cover letter, table of contents, project scope, data collection methodology, description of project limits, a map at a legible scale of the project limits containing street names, lengths, cross sections, and the location of the pavement core samples. The report will also include a core results table with street name, applicable City of Concord Technical Standards Manual Typical Section, core result material and thickness (in inches), and a statement of whether or not the core result meets the current minimum design standard per the applicable typical section. Pavement core samples shall be taken at 500' intervals (minimum of 1 core per street block), and no more than 4.0' from the centerline of the road. This report must be signed, dated, and stamped by a North Carolina registered professional engineer. The City may acquire its own pavement core samples as a quality control
- d. Copies of all soils, compaction, concrete, and other applicable inspection data and records for all streets included in the acceptance request.
- e. Upon receipt of the request, the City will perform an inspection of the subject street(s), and a review of all submitted materials. The City shall notify the owning entity of all construction deficiencies required to be corrected. Upon satisfactory inspection and/or completion of corrective measures, re-inspection, and final approval by the City Engineer, the street acceptance request will be presented to City Council for approval.
- f. All additional requirements of Section 5.7.8 thru 5.7.10 of the City of Concord Development Ordinance apply to street acceptance.

15.3 Existing Private Streets

To initiate the acceptance procedure for existing private streets for City maintenance the following information shall be submitted to the City Engineer by the Applicant(s):

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

~~0-c.CBU units or combination of 32 or less mail receptacles may be located along a street, other than a thoroughfare, provided a separate pull-off area is provided and all of the following are met:~~

- a. Private Street Maintenance Acceptance Petition (Appendix C), representing a minimum of 75% of the linear frontage of property owners (one per parcel) within the request area in favor of the request.
- b. One (1) map of the area with the subject streets identified.
- c. Copies of plats for all parcels with frontage along the subject street.
- d. Encroachment request information sheet for all non-city utilities.
- e. Upon receipt of the petition, the City Engineer or their representative will perform an inspection of the subject street(s), and review all submitted materials. The City shall notify the Applicant(s) of all deficiencies required to be corrected, and the Right-of-Way (R/W) that will be required to be dedicated for the subject street(s).
- f. Once the Applicant(s) receives notification of deficiencies and R/W requirements they should inform the City Engineer within one-hundred and twenty (120) days if they wish to continue the acceptance request.
- g. If the Applicant(s) wish to continue the request they will be responsible for correcting any identified deficiencies using a licensed contractor where applicable and ensuring the street(s) and related infrastructure meet current standards as outlined in the Technical Standards Manual (TSM). Where necessary, designs for the required work shall be prepared by a licensed professional engineer.
- h. If R/W is required for acceptance, the Applicant(s) will be responsible for having a Plat(s) prepared by a licensed professional land surveyor showing dedication of the required R/W. The Plat(s) should be accompanied by appropriate documentation from 100% of the landowners where the proposed R/W encroaches upon their property. The City of Concord will not provide compensation for any property dedicated as R/W as part of a voluntary request for acceptance of a private street for City maintenance.
- i. Upon satisfactory inspection and/or completion of corrective measures, re-inspection, approval of R/W dedication Plat(s), and final approval by the City Engineer, the street acceptance request will be presented to City Council for approval.

15.4 Dedication of Public Streets on a Final Plat

- a. When a *street* is dedicated in connection with a *subdivision*, the approval of a *final plat* shall not be deemed to constitute or effect the acceptance by the City of Concord of any *street* shown on the *final plat*. All streets proposed for public dedication are subject to acceptance for maintenance in accordance with Section 15 of this Article.

15.5 City Council Street Acceptance

Street acceptance requests must be approved by City Council during a regular council meeting. It is the applicant's responsibility to ensure the City Engineer has all documentation necessary for the request to be placed on the Council Agenda. No requests

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

~~0-c.CBU units or combination of 32 or less mail receptacles may be located along a _____ street, other than a thoroughfare, provided a separate pull-off area is provided and _____ all of the following are met:~~

~~_____ for street acceptance will be considered during the June council meeting.~~

~~15.0~~**16.0 Unopened, Dedicated Street Standards**

Streets for which right-of-way has been dedicated by subdivision plat or deed to the North Carolina Department of Transportation or the City of Concord and recorded with the Cabarrus County Register of Deeds, but have never been constructed ~~or accepted for public maintenance,~~ will not be constructed or maintained by the City until the following conditions have been met:

~~15.1.16.1. _____ Rights-of-way sufficiently wide for the street and utilities, as determined by the Director of Engineering, have been dedicated, and surveyed if necessary, sufficiently wide for the street and utilities, as determined by the Director of Engineering.~~

~~15.2.16.2. _____ Right-of-way has been cleared and graded to meet City standards for slope and drainage.~~

~~15.3.16.3. _____ Roadway shall be constructed or improved to the standards set forth in this Article of the Technical Standards Manual, with a surface of crusher-run stone to a depth of not less than eight (8) inches, two and a quarter (2.25) inches of intermediate course, and two (2) inches of surface course. Width of roadway shall be not less than eighteen (18) feet.~~

~~15.4.16.4. _____ The Director of Engineering or their/his/her authorized representative has inspected all work.~~

~~16.5. _____ The Director of Engineering or their/his/her authorized representative has issued a certificate of completion for the required improvements.~~

~~15.5. _____ City Council has approved the acceptance of the street(s) for public maintenance and the warranty period has passed.~~

~~16.0~~ **Alley Standard**

~~_____ For developments utilizing alleys in their design, the following standard shall be used. Alleys are private streets which will not be accepted by and the City does not accept for maintenance.~~

~~0-c.CBU units or combination of 32 or less mail receptacles may be located along a _____ street, other than a thoroughfare, provided a separate pull-off area is provided and _____ all of the following are met:~~

17.0 Cluster Mailbox Unit Requirement Standards

It is the responsibility of the Applicant to ensure that the appropriate method of mail delivery and locations are coordinated and approved with local USPS representatives for all proposed developments.

17.1 Site Plan Approval

A site plan will be required for review prior to approval of Cluster Mailbox Units (CBUs) associated with any subdivision or development application. If for any reason after approval of a site plan the location and other details pertaining to CBUs is altered, a revised site plan will be required to be submitted for review and compliance to all pertinent technical standards.

17.2 18.1—Arrangement

~~a. _____ a. _____~~ The location of CBU(s) is preferred to shall be located outside the public right-of-way _____ and located in a centralized common area(s) of the development. Sufficient parking should be provided to serve the location(s).

b. CBUs or combinations with 16 or less mail receptacles may be located along a local residential street outside of the R/W, provided all the following are met:

1. Posted speed limit on street is 25 mph or less.
2. Sidewalk must be located on the same side of the street as the CBU.
3. Access to the mailbox by users must be from the non-street side of the CBU.
4. The structure is located so that no conflicts with utilities, above or underground, exist.
5. At least one dedicated accessible parking space, on or off-street, is provided.

~~_____ CBUs or combinations of 32 or less mail receptacles may be located along a local or residential collector street provided all of the following are met:~~

~~a.c.~~

1. _____ 1. _____ Posted speed limit on the street is 35 mph or less.
2. _____ 2. _____ Sidewalk must be located on the same side of street as the CBU.
3. _____ 3. _____ Access to the mailbox by users must be from the non-street side of the CBU.
4. The structure(s) is located so that no conflicts with utilities, above or underground, exist.

CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS

~~0-c.CBU units or combination of 32 or less mail receptacles may be located along a _____ street, other than a thoroughfare, provided a separate pull-off area is provided and _____ all of the following are met:~~

- ~~5. _____ 4. AA separatededicated on or off street pull-off or parallel parking area is provided with an appropriate _____ amount of parking spaces.~~
- ~~d. CBUs or combinations of 33 or more mail receptacles require a separate lot with street type driveway access containing an appropriate number of dedicated parking spots.~~
- ~~e. CBUs or combinations of any number for non-residential or multi-family developments and/or subdivisions require a separate lot with street type driveway access containing an appropriate number of dedicated parking spots.~~

17.3 Location

All cluster mailbox units and associated on-street parking must be erected:

- a. No closer than 100 feet measured from the curb-line of intersecting streets.
- b. Away from any location whereby reason of the position of, shape or color, it may interfere with or obstruct the view of, or be confused with any authorized traffic sign, signal or device.
- c. So as not to obstruct sight distance along the roadway and at intersecting streets, driveways, greenways, or trail facilities.
- d. No closer than 10 feet away from a residential driveway serving a detached, semi-attached, or townhome dwelling.
- e. In common areas or near property lines rather than directly in front of a residence.
- f. Outside of public or private utility easements, public or private storm drainage easements, and at least 10 feet away from water meters and cleanouts.
- g. No closer than 500 feet, measured along the street, from another CBU.

17.4 Signs & Markings

In areas where parking is provided for CBU(s), permissible parking signs shall be installed on both ends of the defined parking area and designated specifically for mail parking. Signs R7-21a, shall be used that states "MAIL PARKING, 15 MINUTE LIMIT." Reserved accessible spaces shall be clearly marked with an international accessibility symbol marked on the pavement and signs R7-8 and R7-8a installed. All pavement markings and signs shall be in accordance with the Manual on Uniform Traffic Control Devices (MUTCD).

17.5 Lighting

Suitable and sufficient lighting to illuminate the CBU and associated parking areas (where applicable) should be provided for all CBU locations.

17.6 Maintenance

- a. The City does not have any responsibility for mail delivery; therefore, the city does not

**CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS**

~~0-c.CBU units or combination of 32 or less mail receptacles may be located along a _____ street, other than a thoroughfare, provided a separate pull-off area is provided and _____ all of the following are met:~~

~~own or maintain CBUs.~~

~~b. The City will not be responsible for clearing snow and accumulations from the sidewalk, designated parking areas (if applicable), and pad around the CBU. In addition, the area around the CBUs is to be kept clean from trash and debris and clear from any obstacles that could impede mail delivery or retrieval.~~

~~c. These responsibilities must be provided by mailbox users or a legally responsible organization (i.e. homeowner's association, other legally recognized association, etc.) as acceptable to the Administrator. Documents to assure private responsibility of maintenance and repair by a homeowner's association or other legally recognized entity shall be approved as to form by the City Attorney.~~

17.7 Signs on CBUs

~~Signage affixed to CBUs located along streets is prohibited.~~

17.8 Construction of CBUs

~~Materials and specifications for the installation of CBUs and concrete pads are to be in accordance with USPS requirements and their approved manufacturer list.~~

17.9 CBU Parking Requirements

~~_____~~

~~a. CBUs, or combinations of CBUs, require designated parking spots per Table 17-1.~~

~~_____~~

**CONCORD TECHNICAL STANDARDS MANUAL
STREETS & PEDESTRIAN PATHS**

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Table 187-1: CBU Parking Requirements:

CBU -Parking Requirements		
Number of Mail Receptacles	Accessible Parking Spaces*ets	Regular Parking Spacesets
0-16	-1	1
17-3248	1	-1
33-48	1	1
49-64	1	2
65-80	1	3
81-96	1	4
97-112	1	5
>112	**	**

*Where only 1 accessible space is provided, it must be van accessible.

**Requirements to be determined on a case by case basis.

18.0 ReferencesReferences

The following are publications, documents, models, etc. that were used as guidance or direct reference for developing this Article. -They are provided for citation and further review by the user of the contents of this article. Later editions and/or revisions of these references may be created in the future and shall be considered part of the standards in this manual where applicable.

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