

Appendix C

SPECIFICATIONS FOR DESIGN AND CONSTRUCTION (AMENDED 04/03/90)

C-1. Design Speed, Sight Distance, Centerline Radius

	25 MPH	25 MPH	30 MPH	30 MPH	15 MPH
	150'	150'	200'	200'	110'
	150'	150'	200'	230'	90'

(AMENDED 09/27/94; 11/28/06; 11/27/07)

(a) The design speed, sight distance and centerline radii shall be constructed according to the table above. For stop conditions, sight distance may be designed per the criteria listed in the NCDOT Subdivision Roads Minimum Construction Standards manual (2000) or the most recent version of that document, so long as such standards will result in a street layout with a demonstrable environmental benefit. (AMENDED 11/27/07)

C-2. Cut and Fill Slopes

Cut and fill slopes on any street right-of-way may not exceed 2:1.

C-3. Sight Distances at Intersections

- (a) At non-stop intersections, the intersection shall be constructed so that a person standing at a location on the centerline of any street 90 feet from the intersection of the street centerlines has an unobstructed view to a point located on the centerline of the intersecting street 90 feet (in either direction) from the intersection of the street centerlines. See Standard Diagram No. 1.
- (b) Subject to subsection (c), at stop intersections, the intersection shall be constructed so that a person standing 10 feet back of the intersection of right-of-way lines on the stop street has an unobstructed view to a point on the right-of-way line of the intersecting through street located 70 feet from the intersection of the right-of-way lines. See Standard Diagram No. 2.
- (c) At stop intersections where a residential street intersects with a state-maintained primary road (U.S. or N.C.), the intersection shall be constructed so that a person standing 30 feet back of the intersection of right-of-way lines on the stop street has an unobstructed view to a point on the centerline of the through street located 150 feet from the intersection of the street right-of-way lines. See Standard Diagram No. 3.

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C-4. Radius at Street Intersections

At street intersections, the intersections of the paved surfaces shall be rounded with a minimum radius as shown in Standard Diagram No. 4 and No. 5. Where streets intersect at less than right angles, a greater radius may be required.

C-5. Clearing and Grubbing

Clearing and grubbing shall be performed within the limits shown on the plans. All timber, brush, roots, stumps, trees, or other vegetation cut during the clearing operations shall become the contractor's responsibility to dispose of, and shall be either removed from the project by him, or satisfactorily disposed of on-site (See Carrboro Fire Department for burning permit).

C-6. Grading and Compaction

Streets shall be graded in accordance with the lines and grade set by the engineer. Before placing curb and gutter or base on the graded subgrade, the subgrade shall be compacted to 100% ASSHO T99 for a depth of 6 inches and then shall be proof rolled in the presence of the engineer. Places that are found to be loose, or soft, or composed of unsuitable materials, whether in the subgrade or below it, must be dug out and refilled with suitable material. All embankments or fills shall be made in one-foot horizontal lifts of suitable material. The fill shall be rolled with a sheepsfoot roller after each lift, followed by a wheel roller, each weighing not less than eight tons.

C-7. Street Base

Base course for streets shall generally be 8 inches thick, unless otherwise directed by the public works director, and shall be crushed stone conforming to N.C. DOT Type ABC stone. The stone base course shall be placed in 4 inch layers watered as necessary, and compacted to 100% AASHO T99. The contractor shall be responsible for keeping the stone base free of contamination from clay or other foreign materials. Handling and placement of stone base shall all be in accordance with N.C. DOT specifications.

C-8. Street Surfaces.

The asphalt surface course shall meet N.C. DOT specs for Type I-2 asphalt. The asphalt shall be placed in one 2-inch layer, and shall be handled and placed in accordance with N.C. DOT specifications.

C-9. Pavement Section Variations

Sections C-6, C-7, and C-8 set the standards that shall apply under normal soils conditions. However, where soils are unusually good or unusually unstable, the public works director may allow or require the developer to have soil tests run and a pavement design made by a qualified soils engineer. Under these circumstances, the public works director may allow

APPENDIX C SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

pavement sections constructed to lesser standards than those set forth above (for good soils) or require pavement sections constructed to greater standards than those set forth above (for unstable soils).

C-10. Street Cross Sections

Streets shall be constructed and utilities located in accordance with Standard Drawing No. 6 or No. 7.

C-11. Curb and Gutter

- (a) The concrete curb and gutter shall be constructed according to the lines and grades established by the engineer. The concrete shall meet the N.C. State Highway requirements, Section 900. The curb and gutter shall be 30 inches wide, and shall have a vertical curb face. The forms shall be of metal, free of marks or kinks, and shall be rigidly held in position. The engineer shall approve the positioning of the forms before concrete is poured. The concrete shall be placed in the forms in a manner to prevent segregation, and tamped or vibrated sufficiently to prevent honeycombs. The concrete shall be finished smooth and even by means of rollers or floats. Expansion joints shall be provided every 300 feet, and false joints every 10 feet.
- (b) Curb and gutter shall be constructed in accordance with Standard Drawing No. 8.

C-12. Sidewalks (AMENDED 08/27/96)

CONCRETE

Concrete sidewalk construction standards shall be similar to street construction standards, with subgrade compacted to 100% AASHTO T99. Concrete sidewalks shall be 4 inches thick (increasing to 6 inches thick at driveway entrances), with alternative paving surfaces constructed to withstand 3000 to 5000 psi. The minimum width of sidewalk shall be constructed to standards as addressed in Article XIV. Expansion joints shall be provided every 30 feet, either side of driveway connections and permanent structures with false joints at 5 foot intervals. **(AMENDED 12/08/98)**

BRICK

Requirements for mortarless laid brick pavement construction, when deemed necessary by the Director of Public Works, shall be modified to accommodate the anticipated usage of the facility. All driveway connections shall be a minimum of 6 inches thick - 3000 psi concrete to the required driveway dimensions from the pavement edge to the extent of the right-of-way and/or property line. A minimum 24 inch flare shall be required at the driveway intersection with the roadway pavement edge, where there is no curb.

The sidewalk sub-grade shall be shaped to conform to the lines, grades and typical sections shown on approved plans. All existing vegetation shall be stripped from the ground surface wherever shaping of the sidewalk sub-grade is required. All unsuitable materials,

APPENDIX C SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

boulders, and all vegetative matter shall be removed and replaced with suitable materials. "Soft spots", such as utility trenches or other detected unsuitable load supporting soils shall be removed and refilled with suitable compacted material. The entire sub-grade shall be compacted to a density equal to at least 100 percent of that obtained by compacting a sample of the material in accordance with AASHTO - T99 as modified by the North Carolina Department of Transportation.

Wherever sub-surface drainage problems are anticipated or discovered during construction, the developer/contractor shall provide adequate sub-surface drainage. The trench shall be excavated to the dimensions, depth, line and grade established by the engineer or as directed by the Director of Public Works. Perforated piping shall be laid, coupled securely and backfilled cover and around the pipe with #67 stone or other approved fine aggregate.

Where drainage is to be piped away from the sub-surface drainage system, then a solid pipe without perforations shall be used to the outlet. At locations shown on the plans or as directed by the engineer or the Director of Public Works, the sub-drain system shall be connected to the existing drainage structures or the concrete pads at the outlet end of the sub-drain. Where corrugated plastic pipe is to be used and the outlet is to be through the curb face or to a concrete pad, a minimum 3 feet length of equal diameter PVC piping shall be connected to the corrugated plastic pipe with a suitable fitting. Care shall be taken when backfilling so as to not disturb the installing piping. All earthen backfill shall be firmly tamped.

A minimum 4 inches thick aggregate base course (ABC) shall be applied to all sidewalk paver sub-grade placement areas. The aggregate material shall be placed carefully to minimize segregation of stone and fines. The aggregate base course shall be either watered or dried to obtain optimum moisture content and compacted to at least 100 percent of that obtained by compacting a sample of material in accordance with AASHTO - T180 as modified by the North Carolina Department of Transportation. The aggregate base course surface shall be shaped with a minimum $\frac{1}{4}$ inch to $\frac{1}{2}$ inch per foot cross slope from the back edge of the sidewalk to the curb edge or if a shoulder/swale constructed roadway, the slope would then be directed to the drainage swale.

The use of edge restraints are necessary with mortarless brick pavements as they hold the pavers together, prevent spreading and movement of pavers due to horizontal surface loading. Only brick or stone embedded in concrete or cast-in-place concrete shall be used for edge restraints conforming to the finished sidewalk surface elevation. All edge restraints shall be installed perpendicular to the brick paver surface. Intermediate restraints shall be used at all interruptions of the brick paver surface and where there are sloped or curved locations. Where mortared brick pavers are required, expansion joints shall be provided every 20 linear feet and along fixed objects such as walls or where directed.

Brick pavers are to be set in a 1 to 1.5 inch compacted sand setting bed over the compacted aggregate base course. The finished brick surface shall have a minimum $\frac{1}{4}$ inch to $\frac{1}{2}$ inch per foot cross slope from the back edge of the sidewalk to the curb edge. If it is a

APPENDIX C SPECIFICATIONS FOR DESIGN AND CONSTRUCTION

shoulder/swale constructed roadway, the slope shall then be directed to the drainage swale. The brick paver surface pattern shall be of the running bond type and perpendicular to the edge restraints. After brick pavers have been laid between the edge restraints, sand shall be broadcast over the paver surface. The loose sand and brick pavers shall be compacted with a vibratory plate tamp to lock-in paver joints with sand and to set the brick pavers in the underlying sand sitting bed. The remaining sand on the paver surface should be broomed into any other remaining open joints or voids and excess removed.

All brick pavers shall be solid red common wire cut units with a dimension of 2.25 inches x 3.75 inches x 7.5. Reference: Brick Sidewalk Standard Drawings No. 24 and No. 25.

C-13. Wheel Chair Ramps

Where required, wheel chair ramps shall be constructed in accordance with Standard Drawing No. 9.

C-14. Storm Water Runoff Control

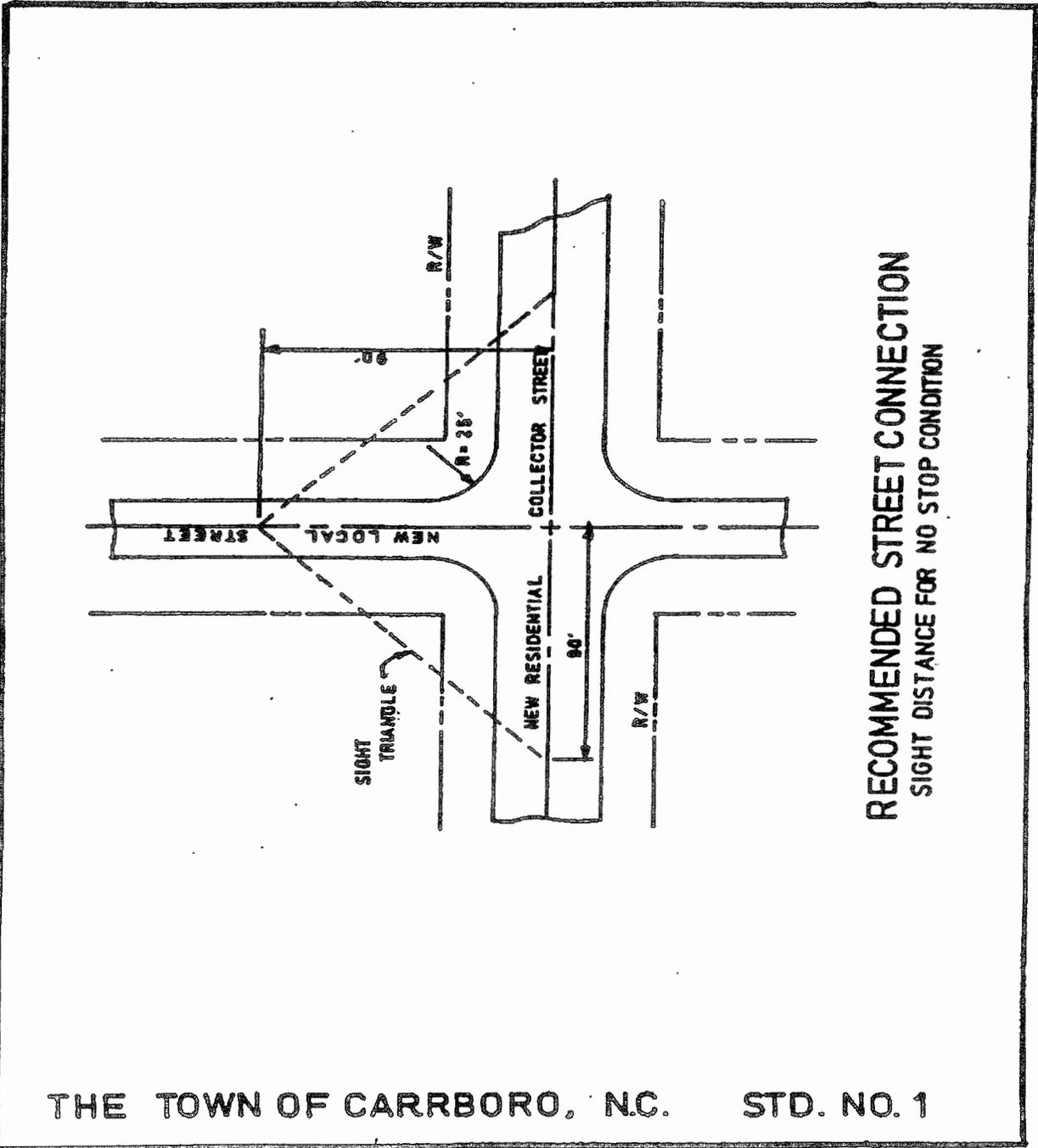
(a) All stormwater drainage facilities other than building foundation and roof drain pipes shall be constructed of materials that meet minimum standards contained in the current version of the N.C. Department of Transportation's Standard Specifications for Roads and Structures, except that culverts described in subsections 1032-1(A) (Plain Concrete Culvert Pipe) and 1033-7 (Vitrified Clay Culvert Pipe) shall not be permitted. **(AMENDED 04/03/90)**

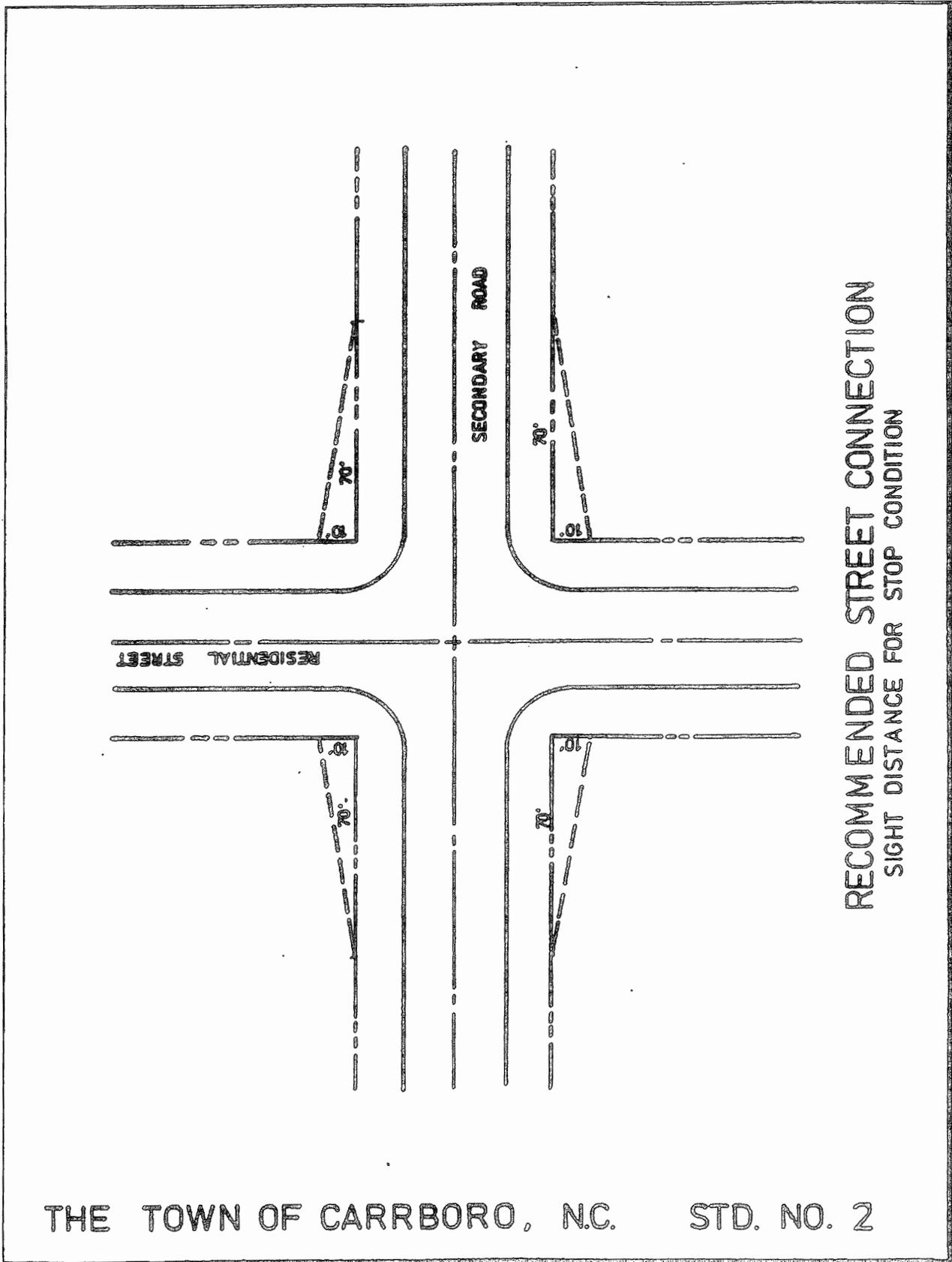
(b) All stormwater drainage facilities shall be designed and installed in accordance with the N.C. Department of Transportation's specifications and the standard specifications and drawings contained herein. In case of conflict, the more stringent specifications shall prevail. **(AMENDED 04/03/90)**

(c) With the exception of building foundation and roof drain pipes, all stormwater drainage culverts, when installed, shall have a minimum cover of 12 inches, unless the town engineer and public works director allow less extensive cover. **(AMENDED 04/03/90)**

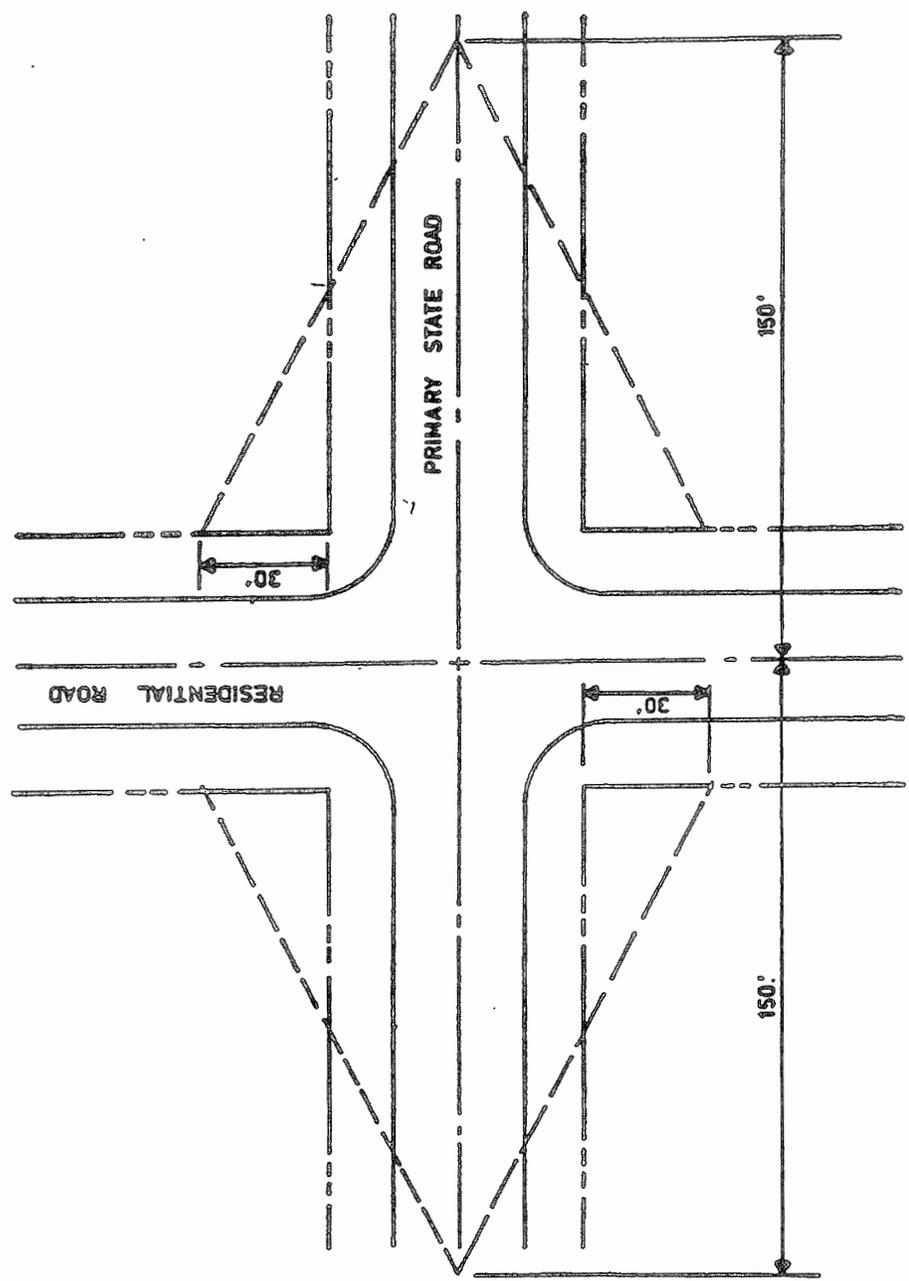
C-15 Sedimentation Control

Road shoulders, swales, back-of-curbs, and cut and fill banks shall be completely dressed up by the contractor and seeded as soon as possible. The seeding mixture and application rate shall be approved by the Orange County Erosion Control Officer.



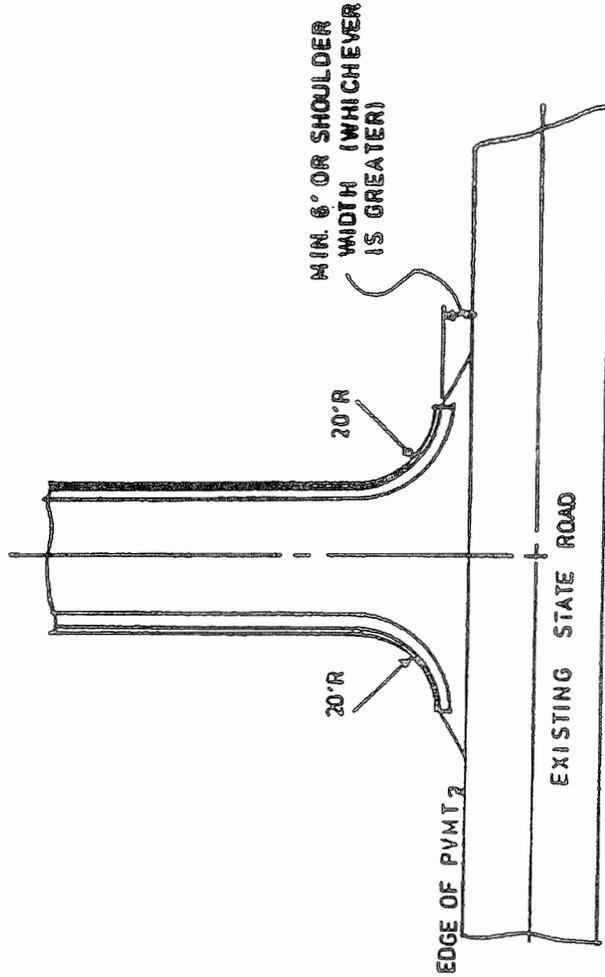


THE TOWN OF CARRBORO, N.C. STD. NO. 2



RECOMMENDED STREET CONNECTION
SIGHT DISTANCE FOR STOP CONDITION

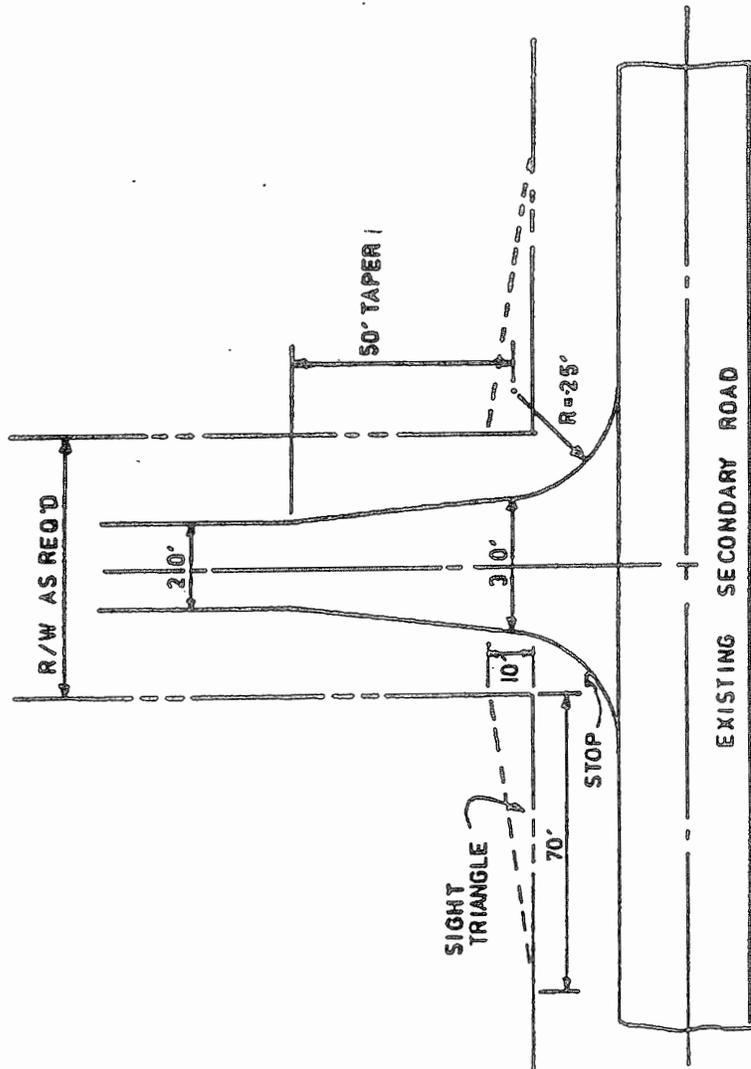
THE TOWN OF CARRBORO , N.C. STD. NO. 3



RECOMMENDED STREET CONNECTION
CURB & GUTTER

THE TOWN OF CARRBORO, N. C.

STD. NO. 4



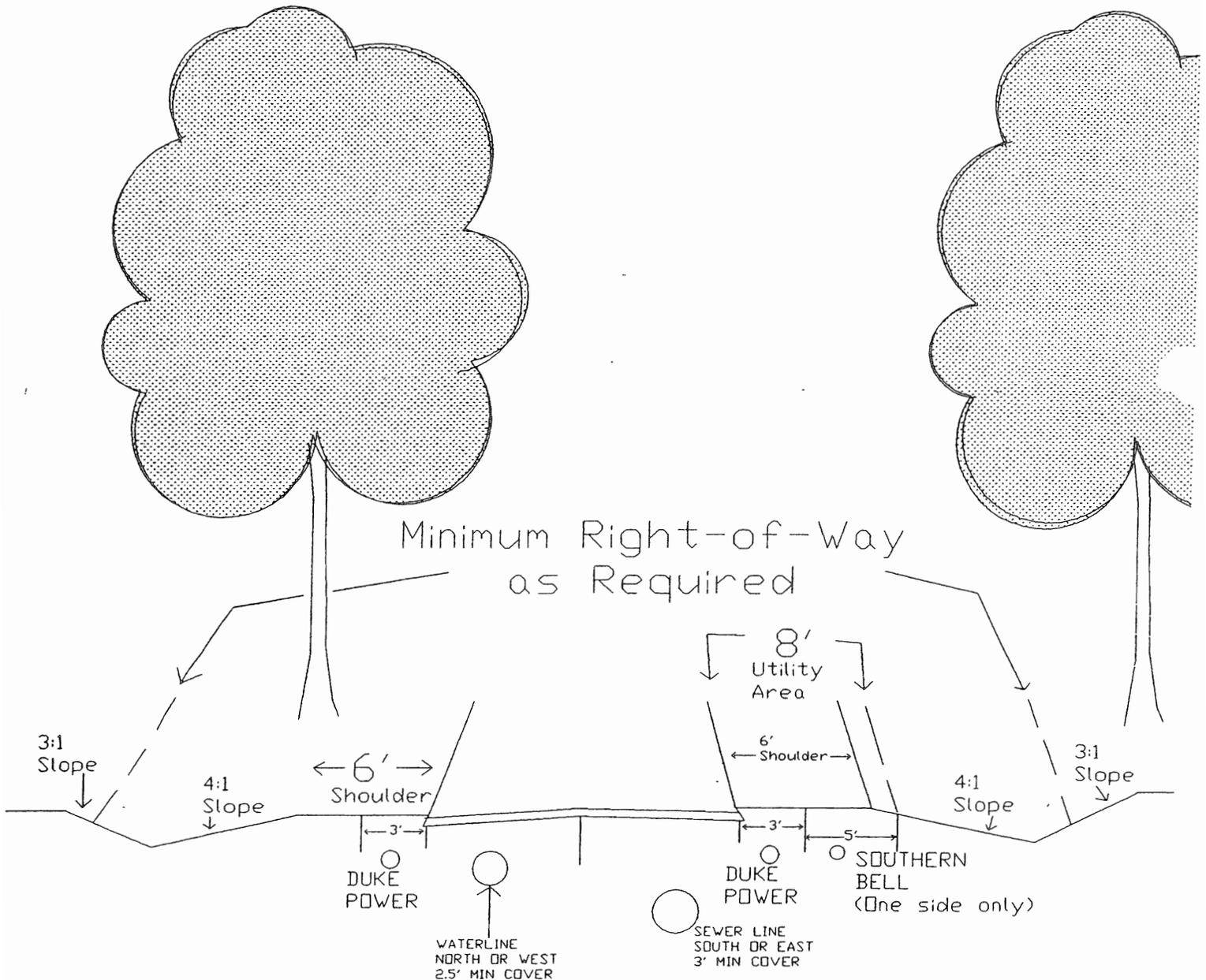
RECOMMENDED STREET CONNECTION
NO CURB & GUTTER

THE TOWN OF CARRBORO, N. C.

STD. NO. 5

STANDARD DRAWING NO. 6 RESIDENTIAL STREET

with Swales

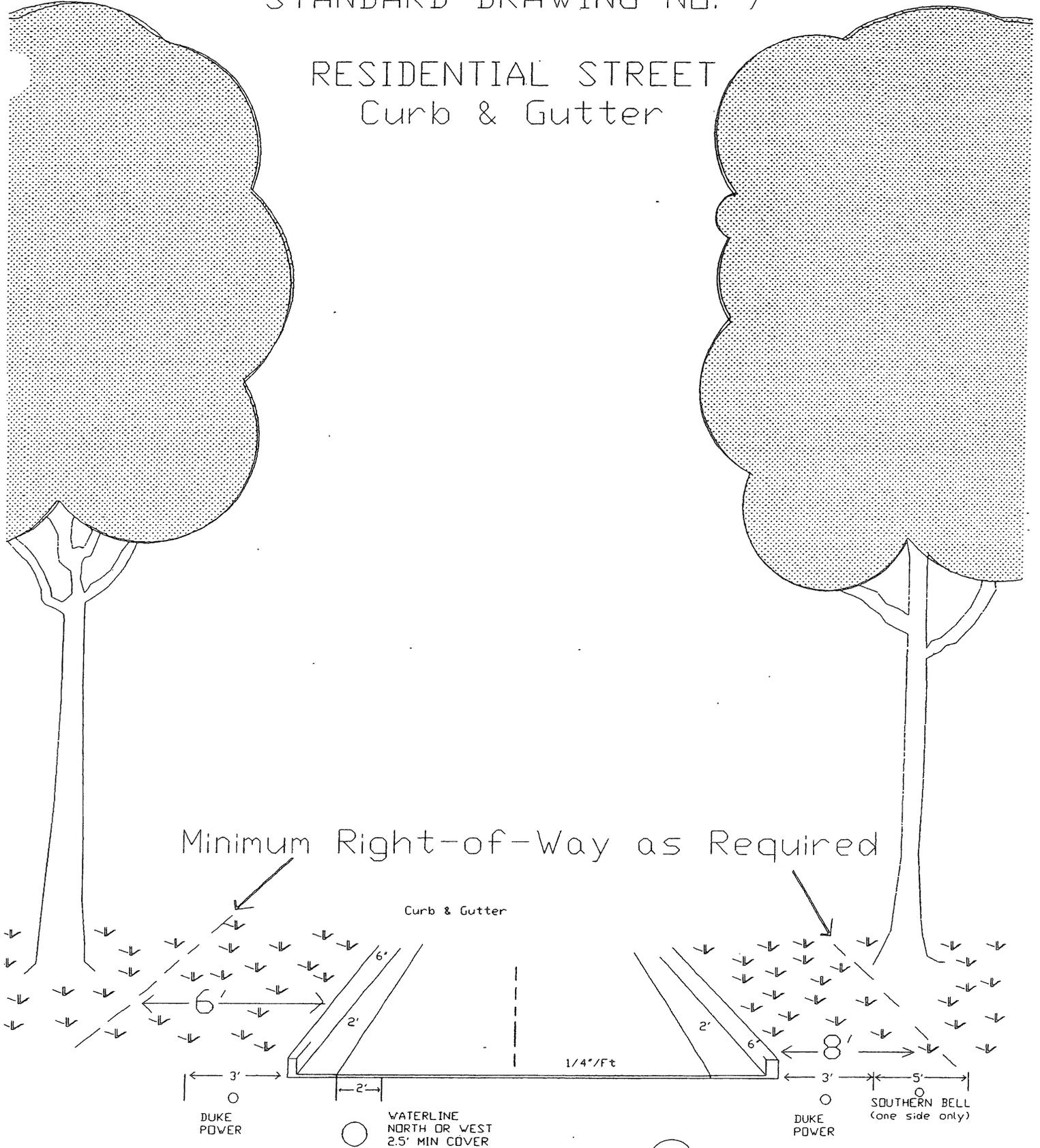


Shoulder will be stabilized with 3" Type ABC Stone, Scarified into soil, compacted & seeded

TERRAIN	MAX SLOPE
Level	2:1
Rolling	2:1
Hilly	1 1/2:1

STANDARD DRAWING NO. 7

RESIDENTIAL STREET Curb & Gutter



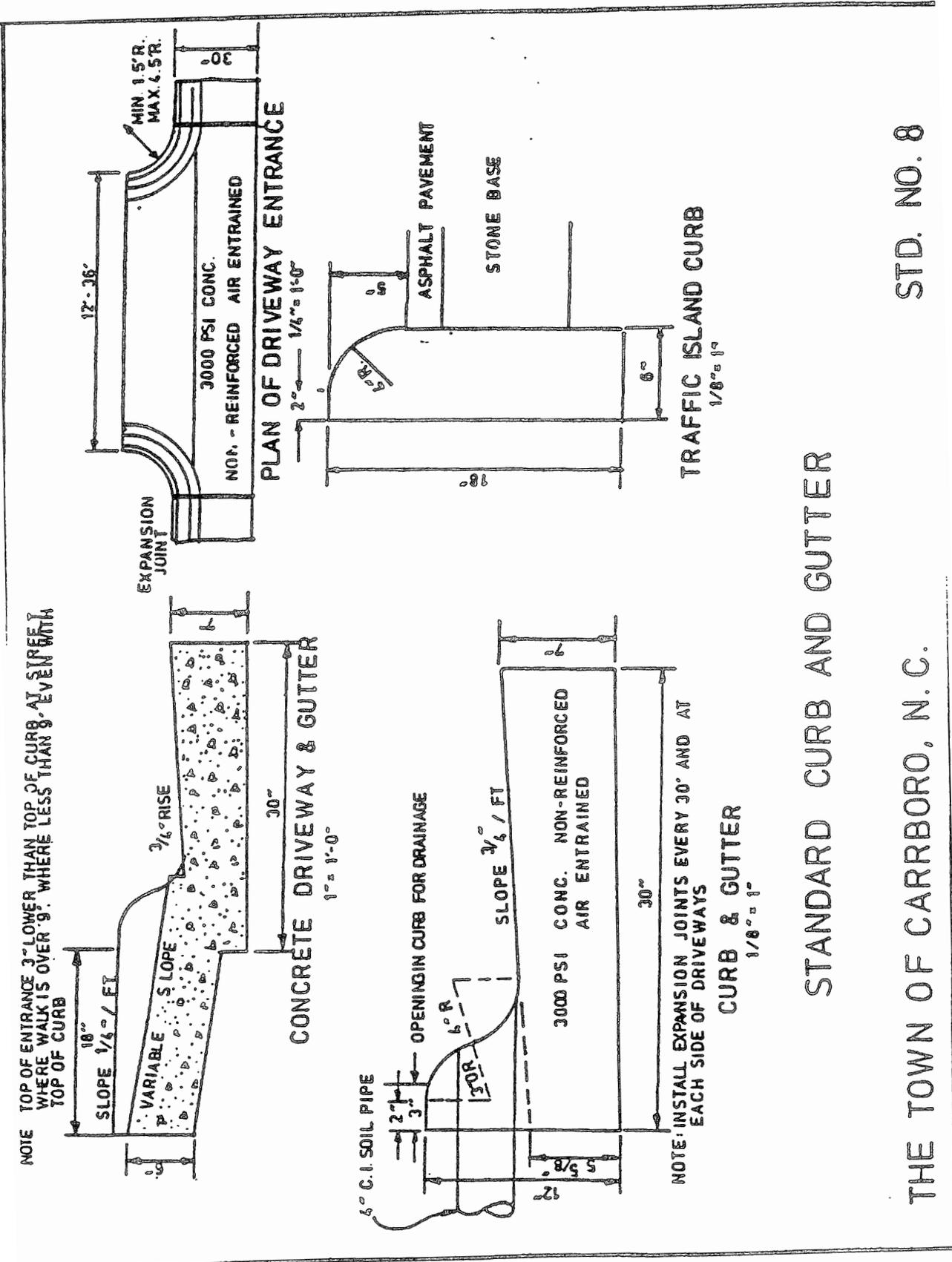
Minimum Right-of-Way as Required

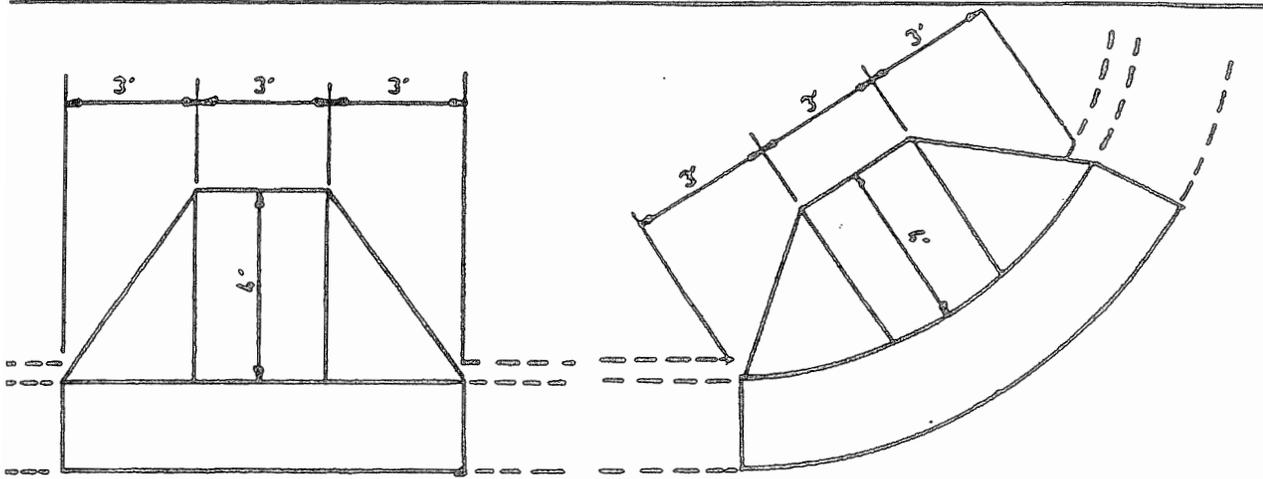
Curb & Gutter

3' DUKE POWER
 2' WATERLINE NORTH OR WEST 2.5' MIN COVER
 1/4"/Ft
 3' DUKE POWER
 5' SOUTHERN BELL (one side only)

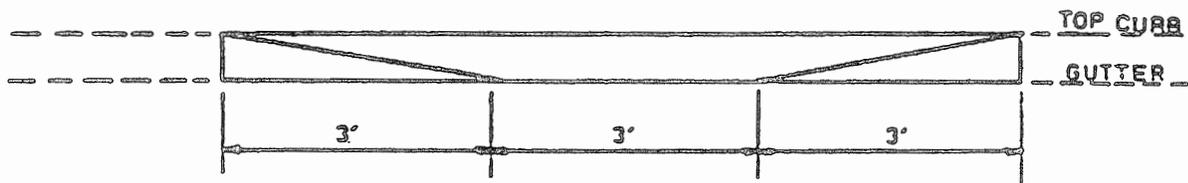
RAIN
 vel 2:1
 lling 2:1
 ly 1 1/2:1

SEWER LINE
 SOUTH OR EAST
 3' MIN COVER

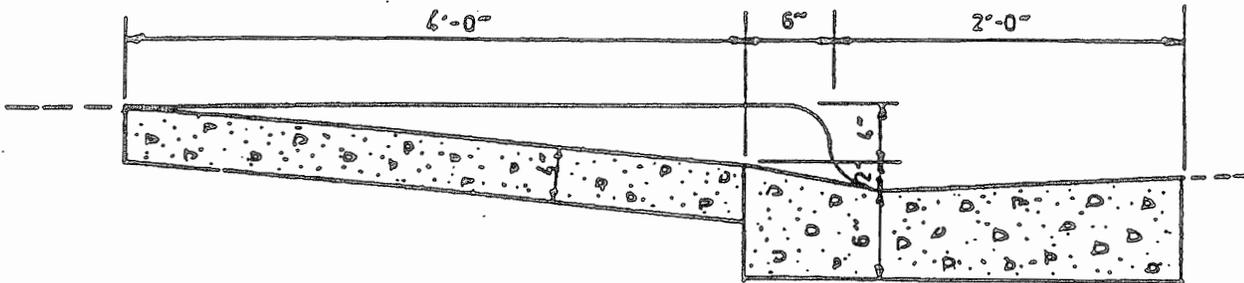




PLAN

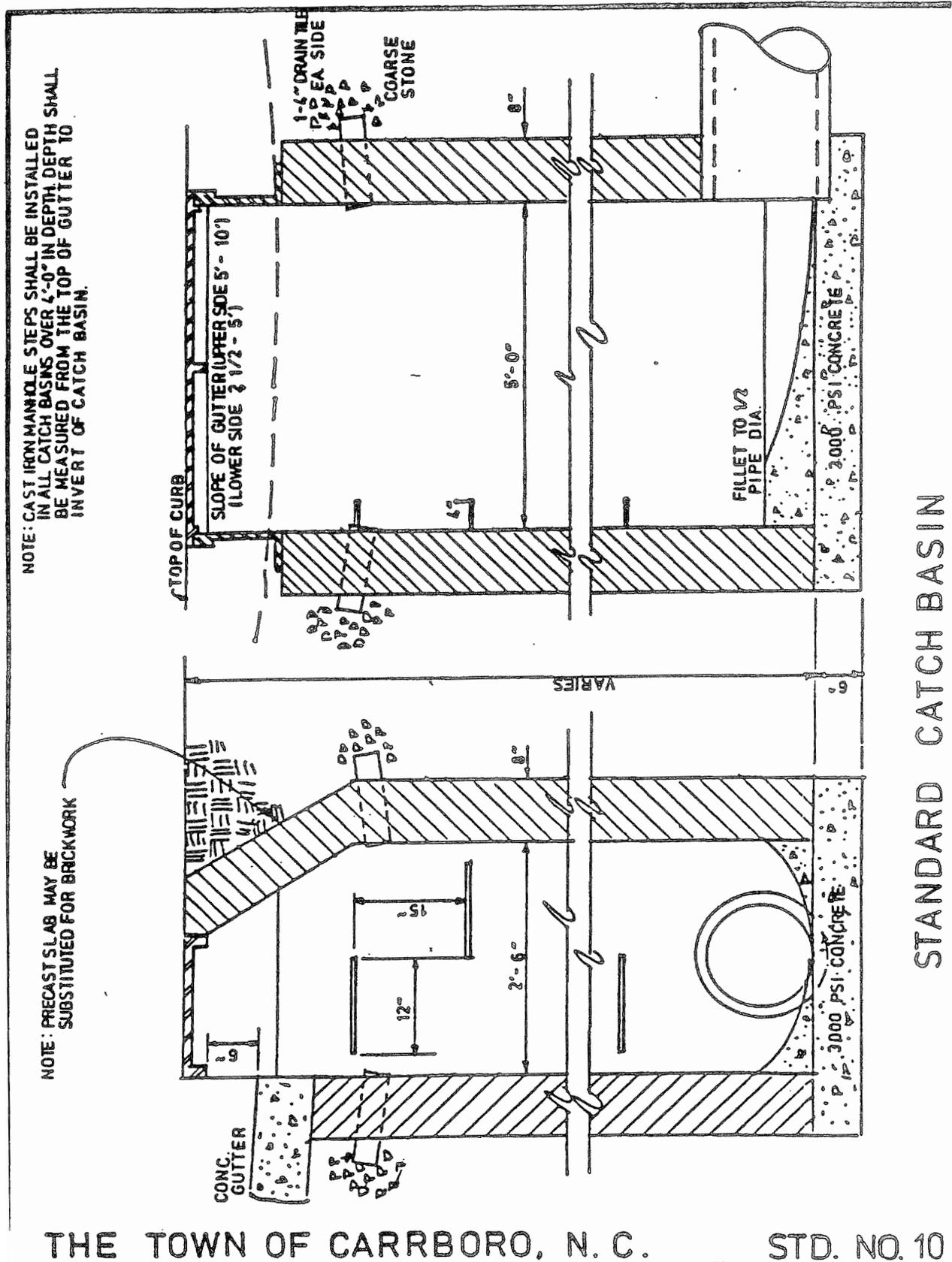


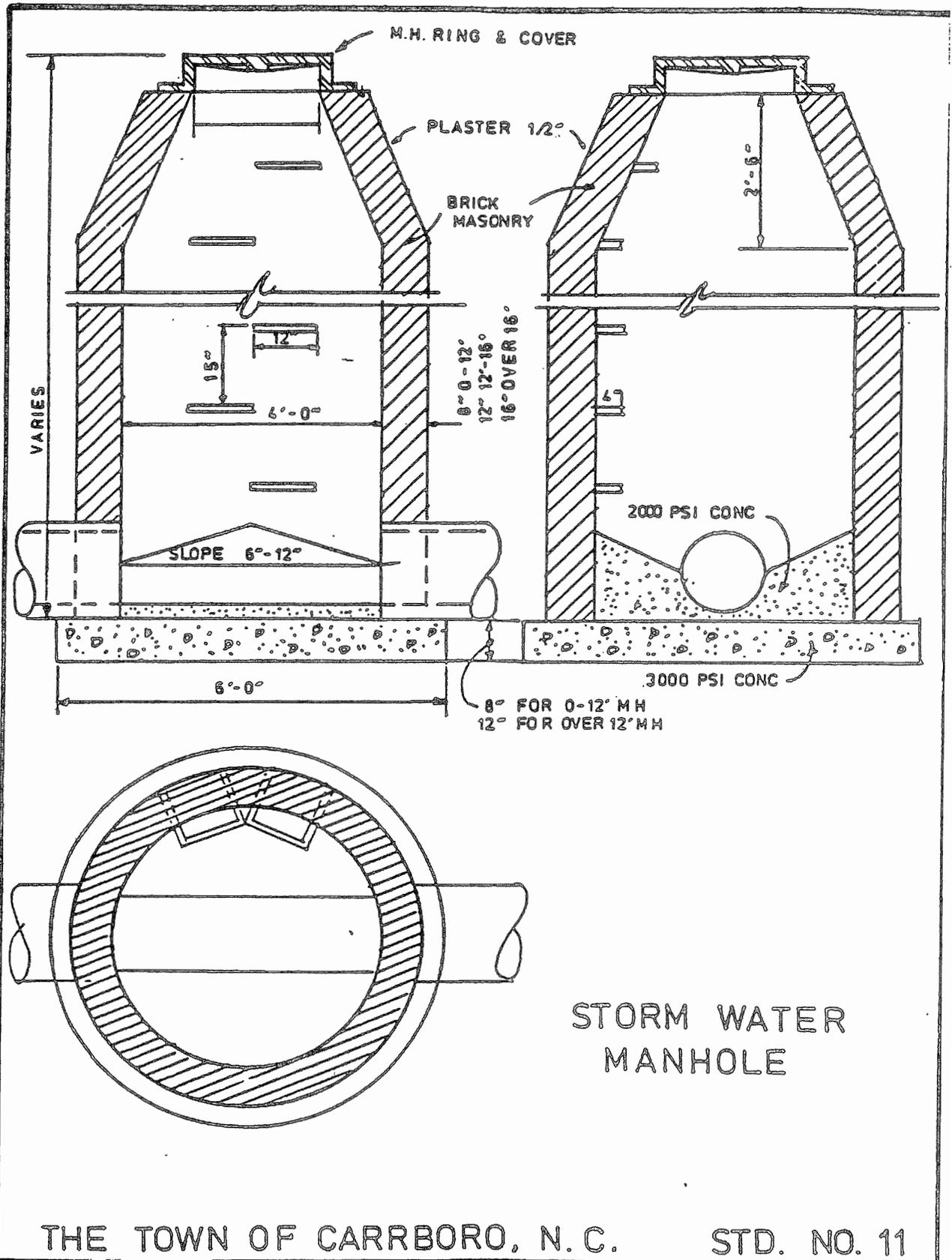
FRONT ELEVATION

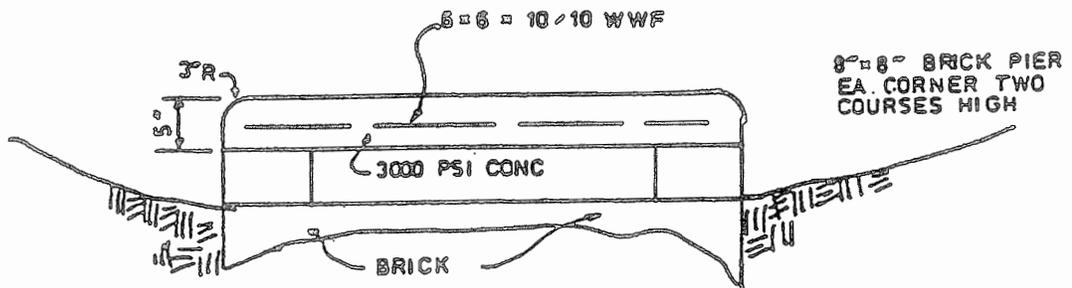
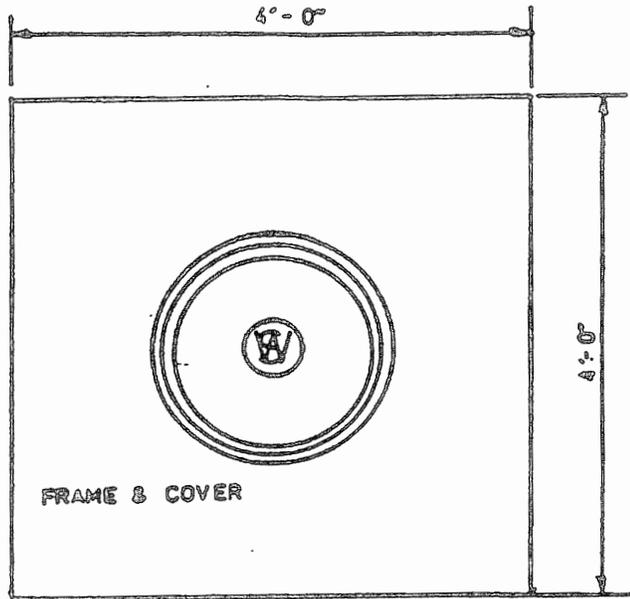


SECTION THRU RAMP

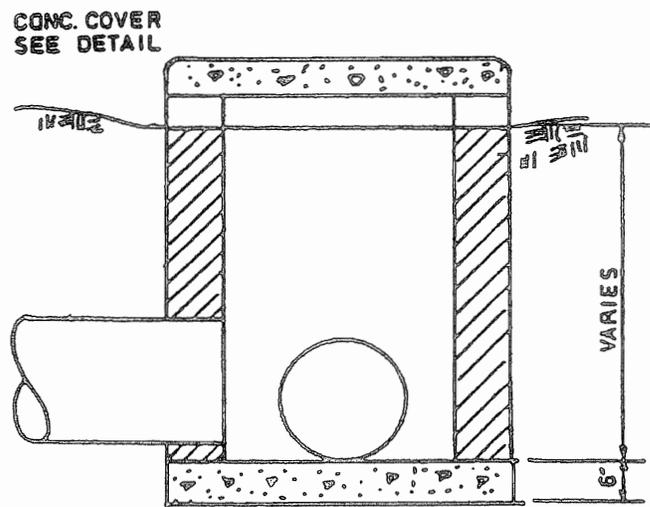
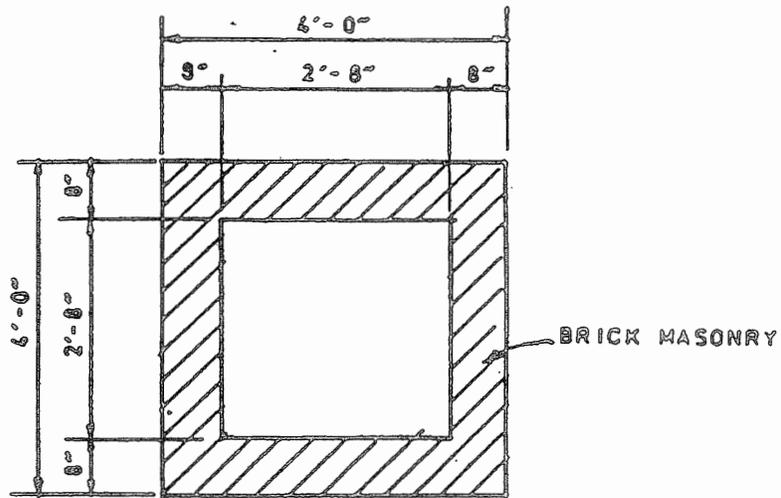
STANDARD WHEEL CHAIR RAMP







YARD INLET . COVER

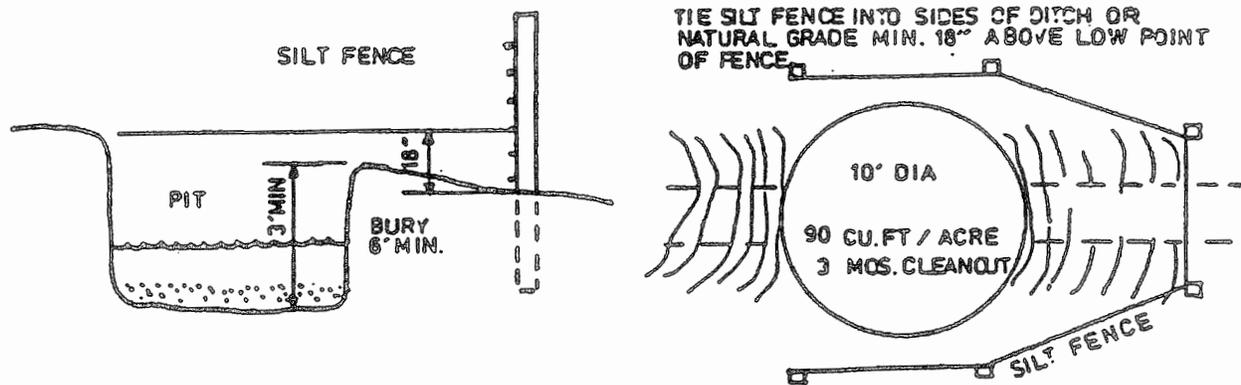


3000 PSI CONC.

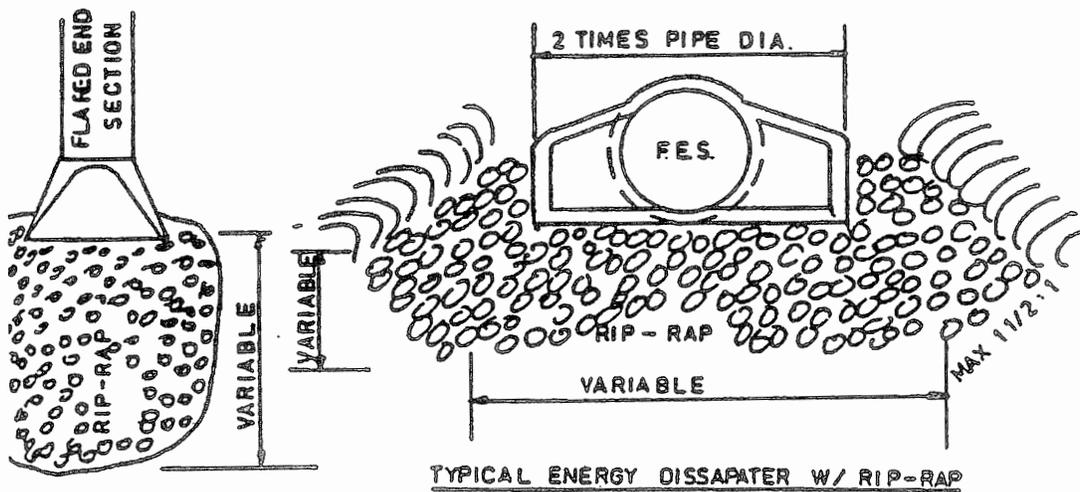
YARD INLET

THE TOWN OF CARRBORO, N.C.

STD. NO. 13



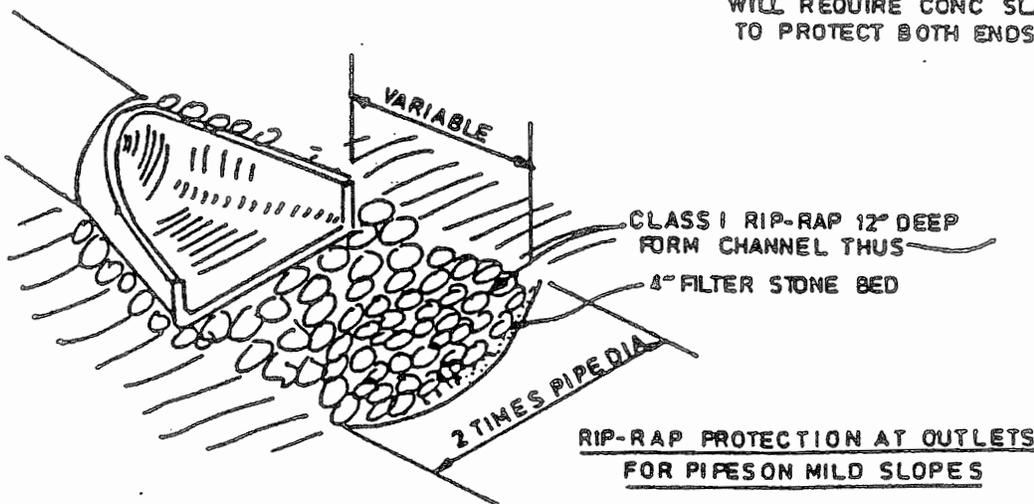
FENCE AND SEDIMENT PIT FOR POINTS OF CONCENTRATED DRAINAGE



TYPICAL ENERGY DISSIPATER W/ RIP-RAP

NOTE :

FLARED END PIPES GREATER THAN 36" WILL REQUIRE CONC SLAB AND/OR RIP-RAP TO PROTECT BOTH ENDS OF PIPE



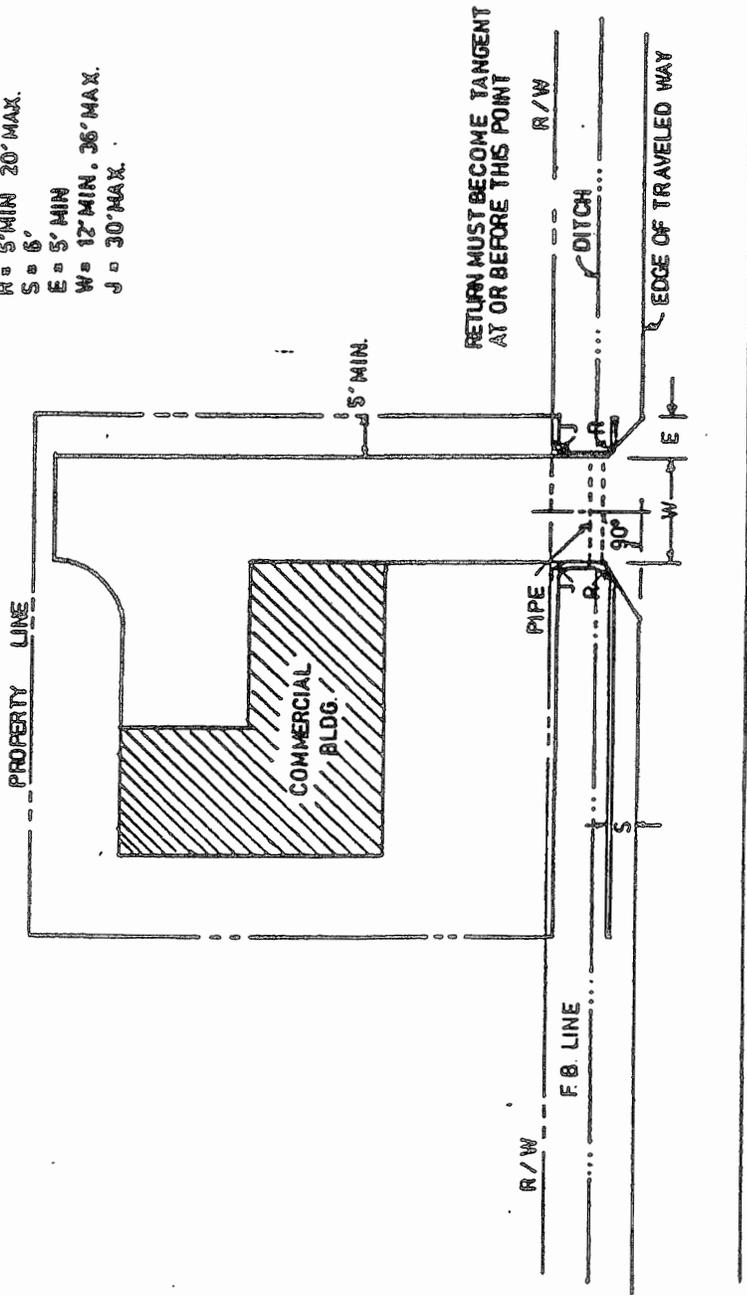
RIP-RAP PROTECTION AT OUTLETS FOR PIPES ON MILD SLOPES

SEDIMENTATION CONTROL

THE TOWN OF CARRBORO, N. C.

STD. NO. 14

R = 5' MIN 20' MAX.
 S = 6'
 E = 5' MIN
 W = 12' MIN. 36' MAX.
 J = 30' MAX.



SINGLE DRIVEWAY - OPEN DITCH

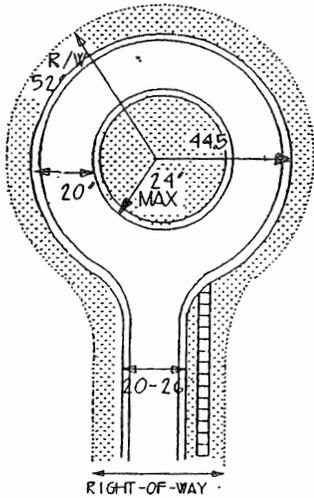
THE TOWN OF CARRBORO, N.C.

STD. NO. 15

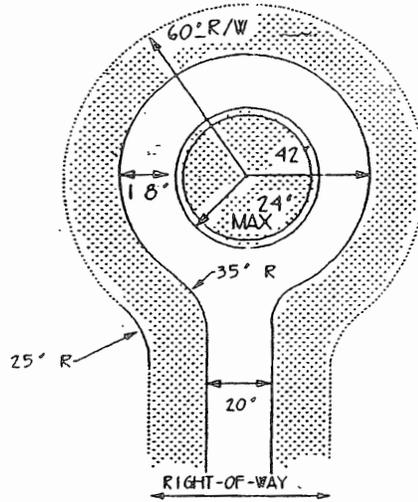
TOWN OF CARRBORO

STANDARD DRAWING NO. 16

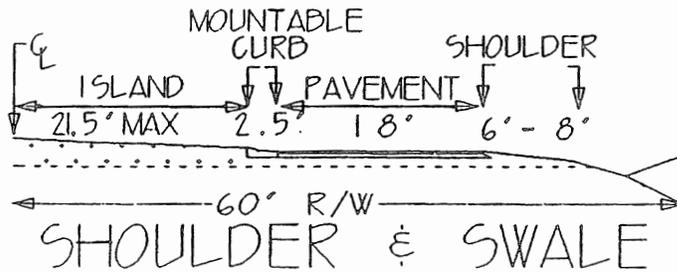
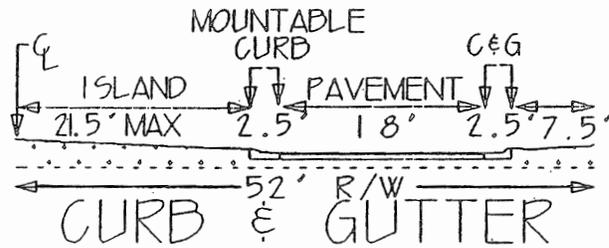
**SYMMETRICAL CUL-DE-SAC
WITH CENTER ISLAND**

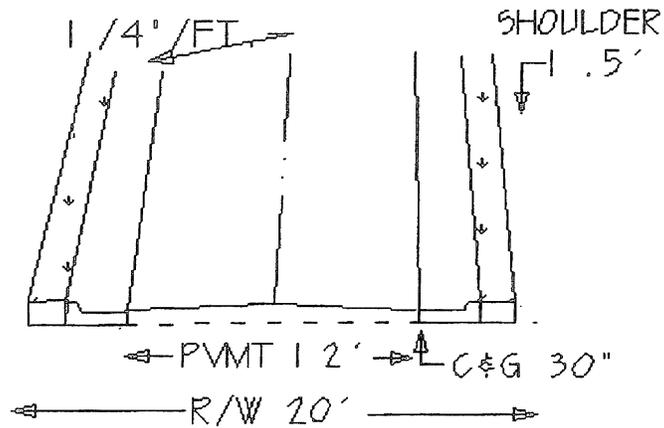


CUL-DE-SAC
WITH CURB & GUTTER



CUL-DE-SAC
SHOULDER & SWALE



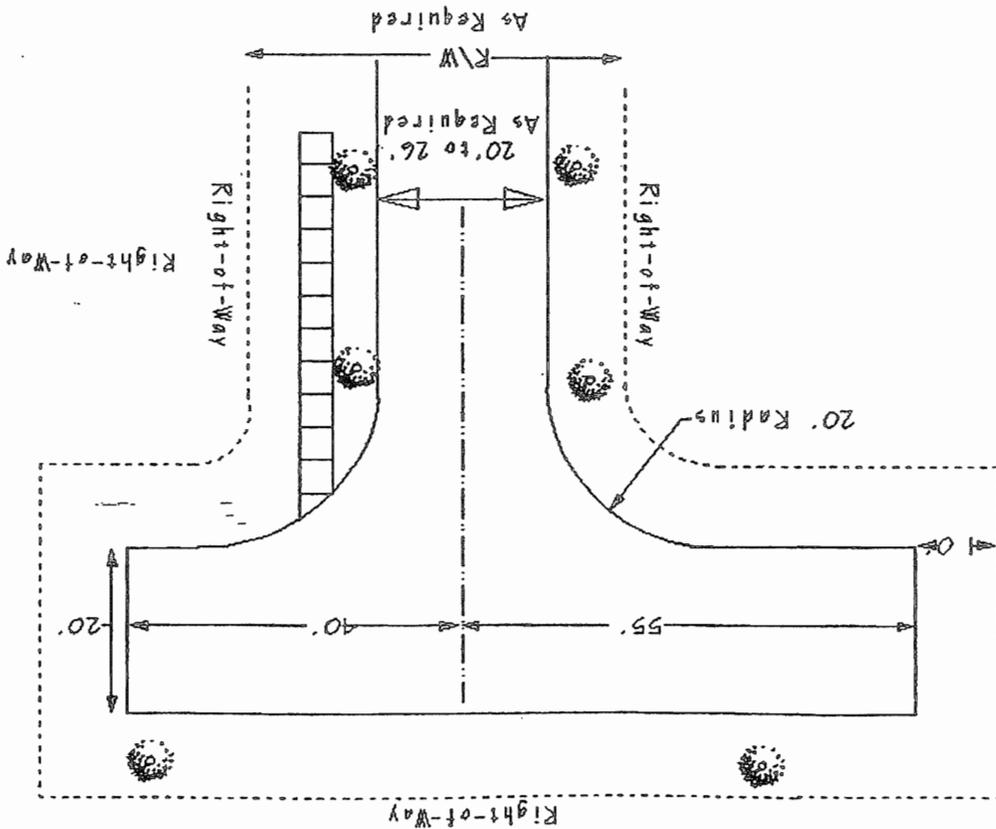


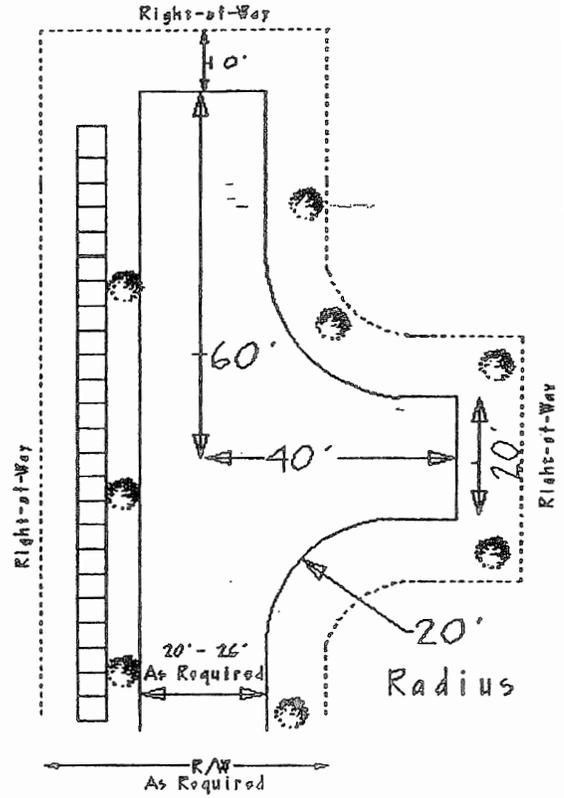
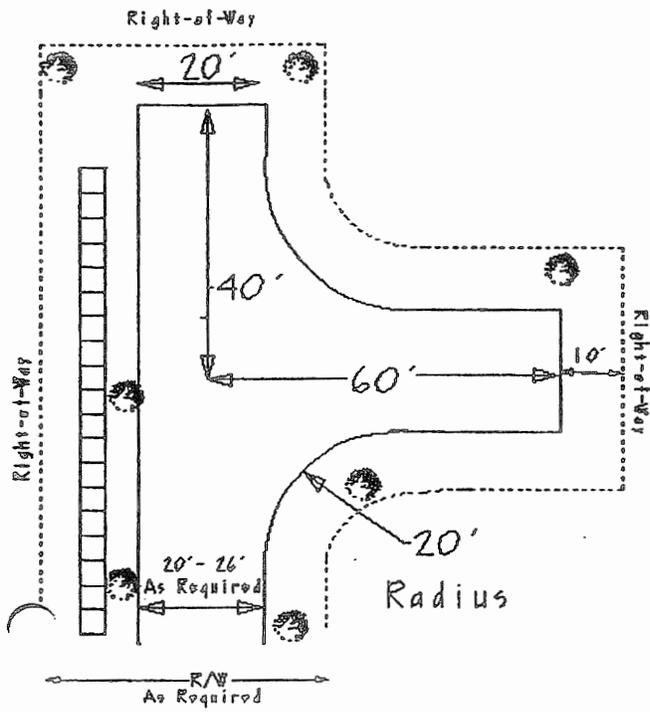
ALLEY W/CURB & GUTTER

TOWN OF CARRBORO

STANDARD DRAWING NO. 18

T-TURNAROUND
TOWN OF CARBORO
STANDARD DRAWING NO. 19
NOTE: LEGS CAN BE REVERSED
IF A LEFT TURN IS DESIRED

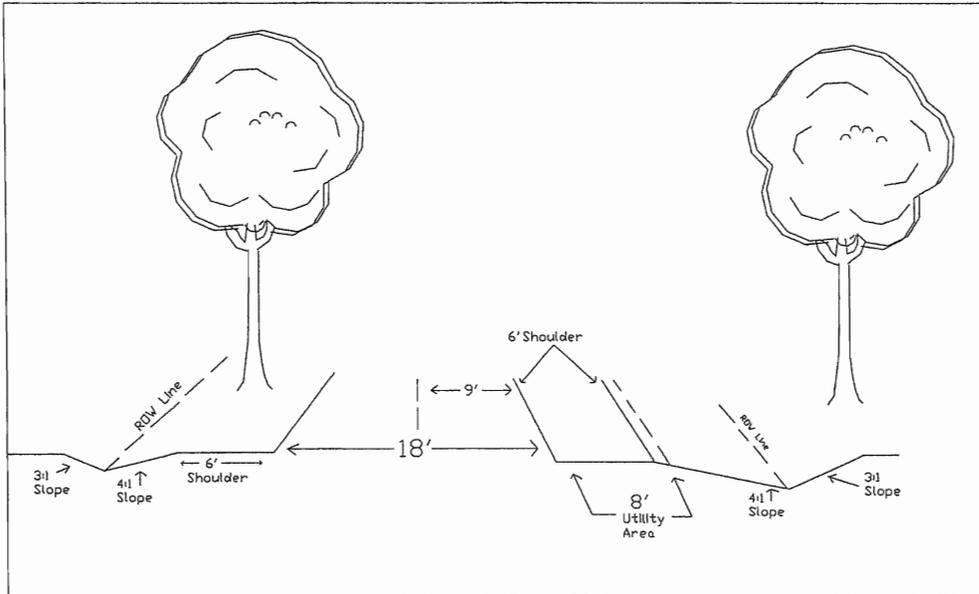




BRANCH TURNAROUNDS

TOWN OF CARRBORO
STANDARD DRAWING NO. 20

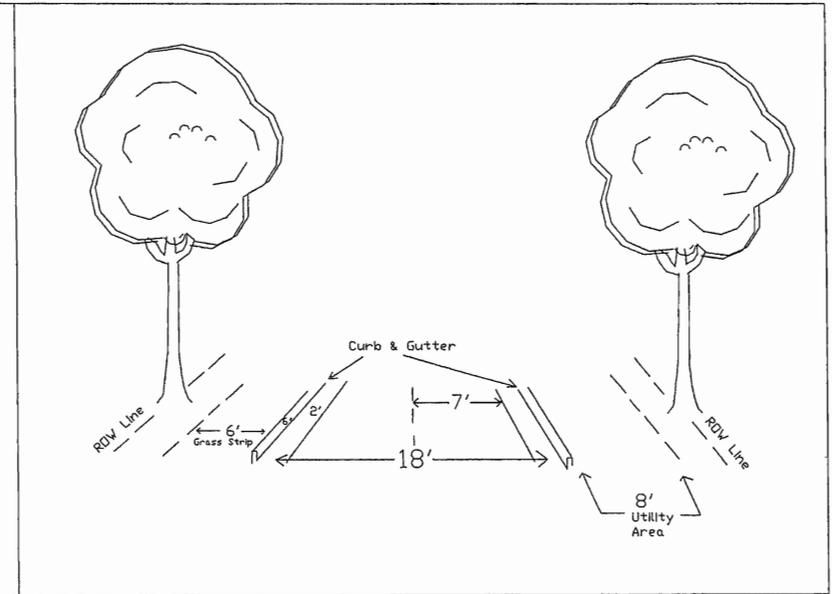
NOTE: No Sidewalk, No Bike Lane



**Minimum 47' Right -of-Way
Minimum 18' Pavement**

MINOR STREET - NO CURB & GUTTER

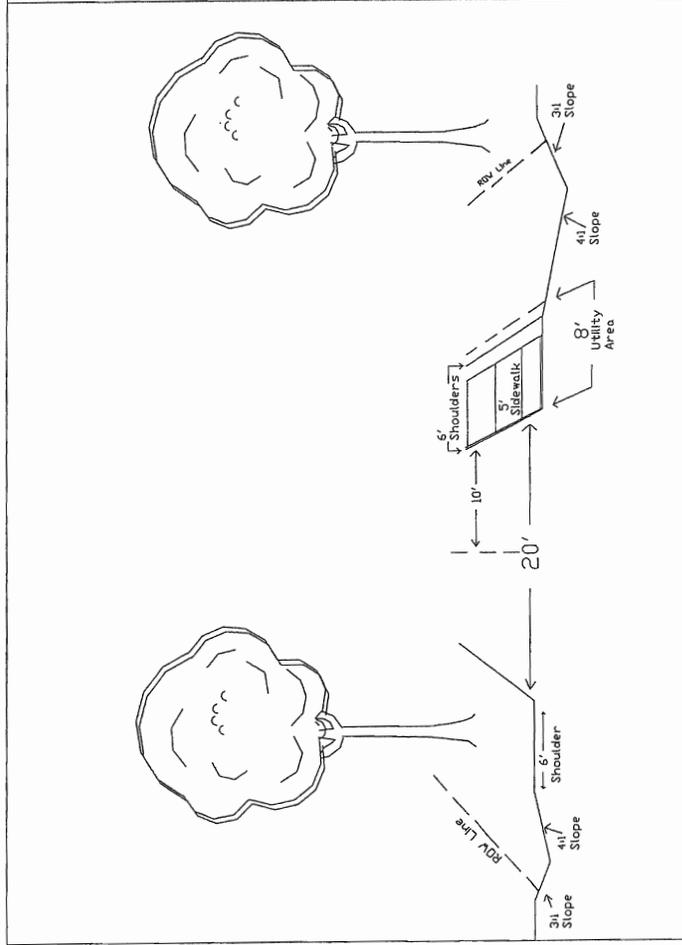
NOTE: No Sidewalk, No Bike Lane



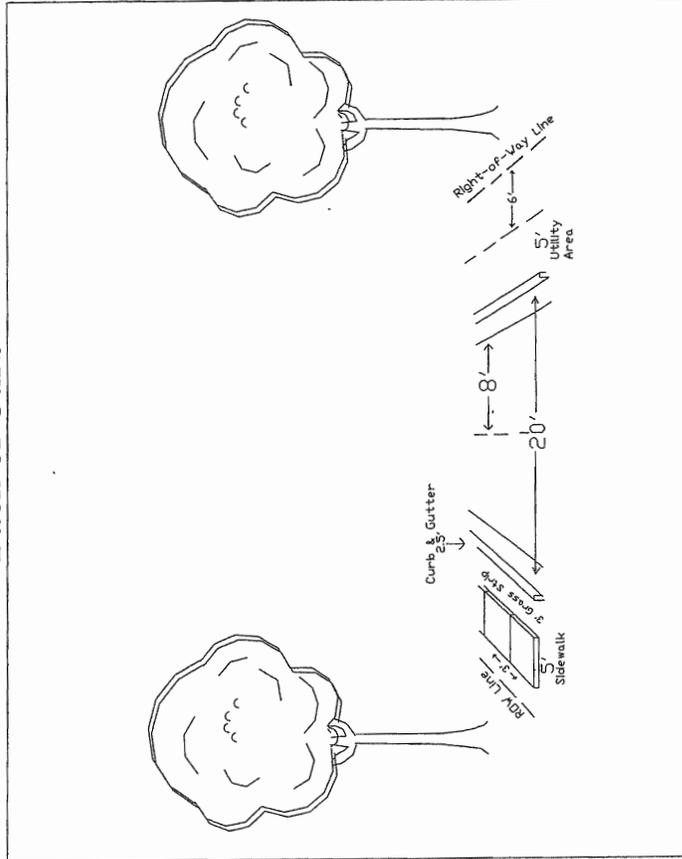
**Minimum 37' Right -of-Way
Minimum 18' Pavement**

MINOR STREET - CURB & GUTTER

NOTE: Sidewalk Required on One (1) Shoulder



NOTE: Sidewalk Required on One (1) Side Back of Curb



**Minimum 47' Right -of-Way
Minimum 20' Pavement**

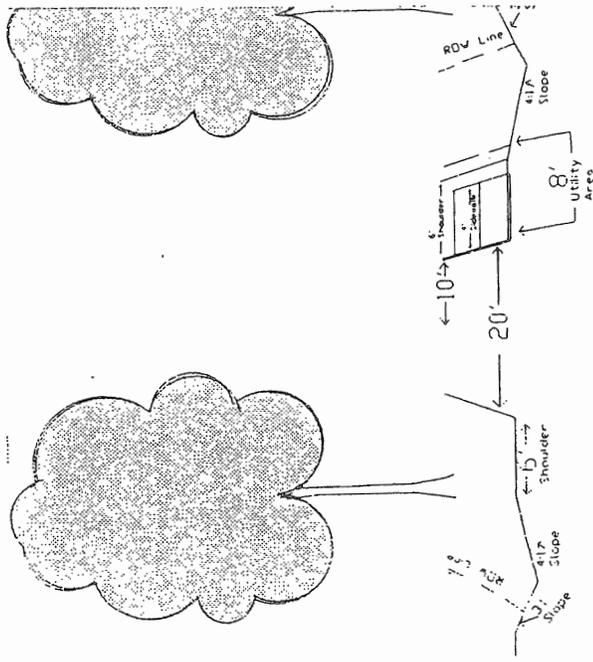
LOCAL STREET - NO CURB & GUTTER

**Minimum 43' Right -of-Way
Minimum 20' Pavement**

LOCAL STREET - CURB & GUTTER

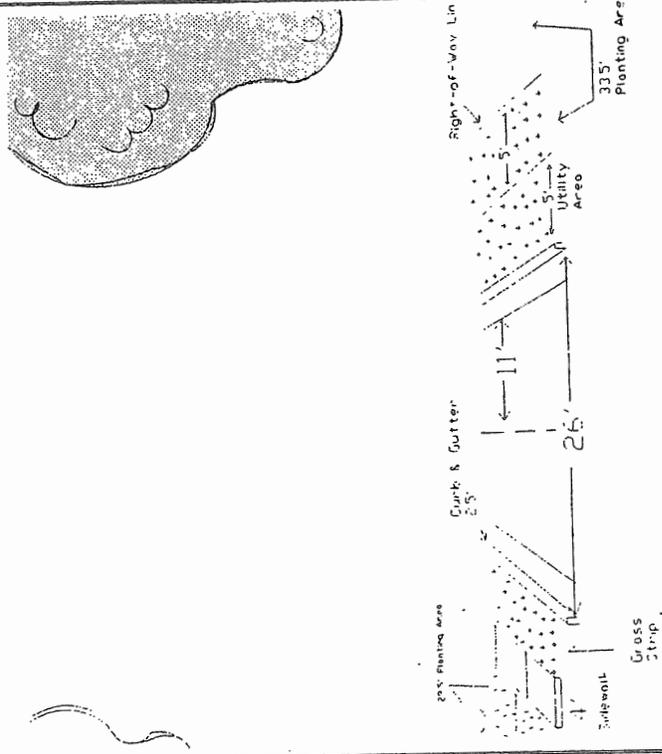
1-23 ROADWAY DESIGN SPECIFICATIONS

NOTE: SIDEWALK REQUIRED ON ONE SIDE ALONG ROAD;



Minimum 50' Right-of-Way
 Minimum 20' Pavement
 SUBCOLLECTOR STREET - NO CURB & GUTTER

NOTE: SIDEWALK REQUIRED ON ONE SIDE BEHIND CURB;



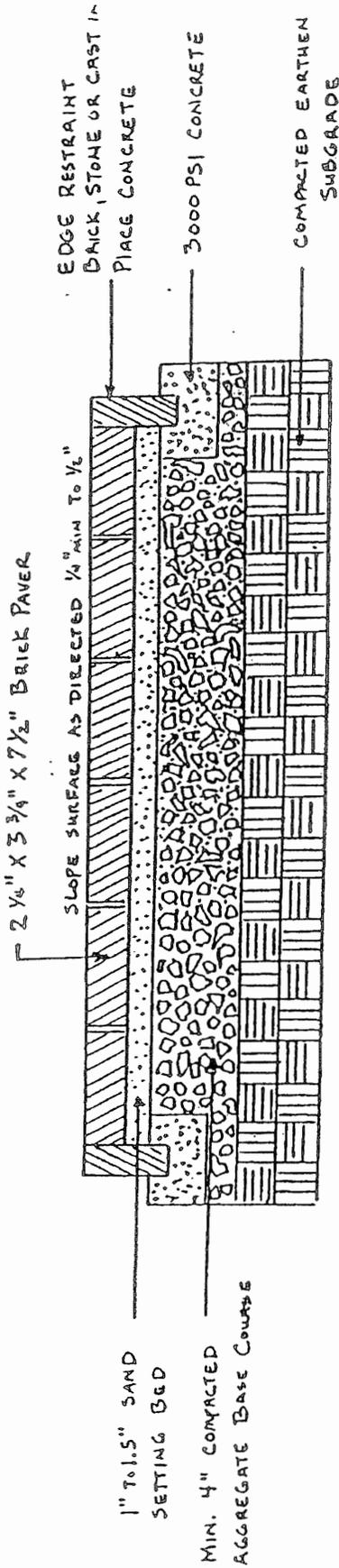
Minimum 50' Right-of-Way
 Minimum 26' Pavement
 SUBCOLLECTOR STREET - CURB & GUTTER

THE TOWN OF CARRBORO, N.C.

STANDARD DRAWING NO. 23

STANDARD DRAWING NO. 24

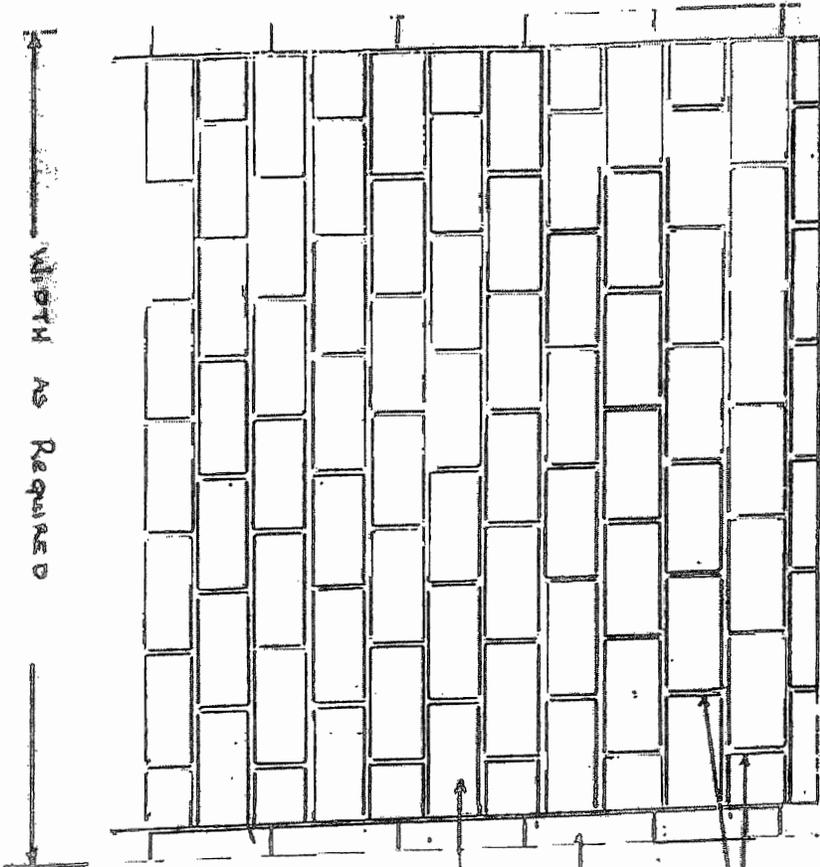
MORTARLESS LAID BRICK PAVERS FOR SIDEWALKS



TYPICAL CROSS SECTION
N.T.S.

STANDARD DRAWING NO. 25

MORTARLESS LAID BRICK PAVERS FOR SIDEWALKS



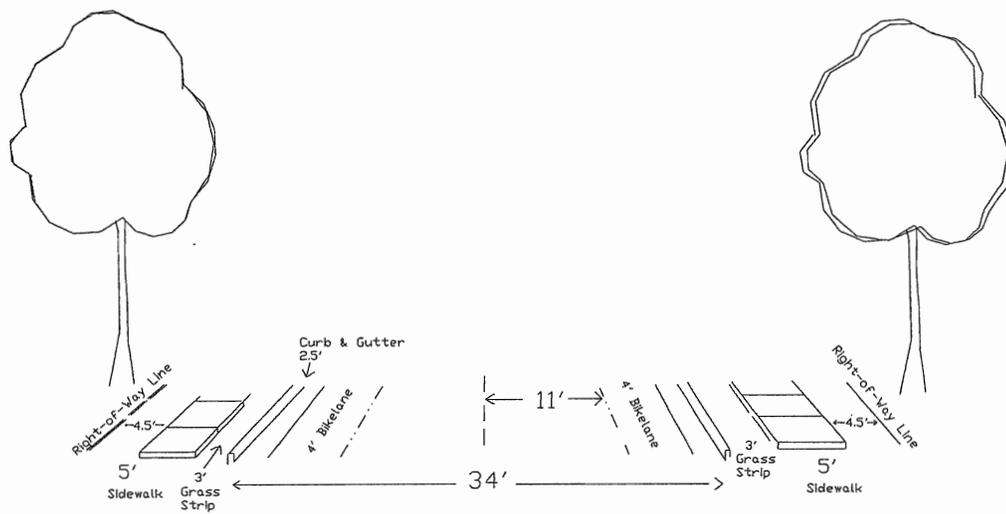
PATTERN SHALL BE RUNNING BOND TYPE
AND PERPENDICULAR TO EDGE RESTRAINTS

BROADCAST SAND OVER ENTIRE PAVER SURFACE AND COMPLETE PAVERS TO FINISHED SURFACE ELEVATION. SWEEP AWAY SAND INTO ANY REMAINING OPEN JOINTS OR Voids.

Only BRICK OR STONE EMBEDDED INTO 3000 PSI CONCRETE OR CURT IN PLACE CONCRETE SHALL BE USED AS EDGE RESTRAINTS.

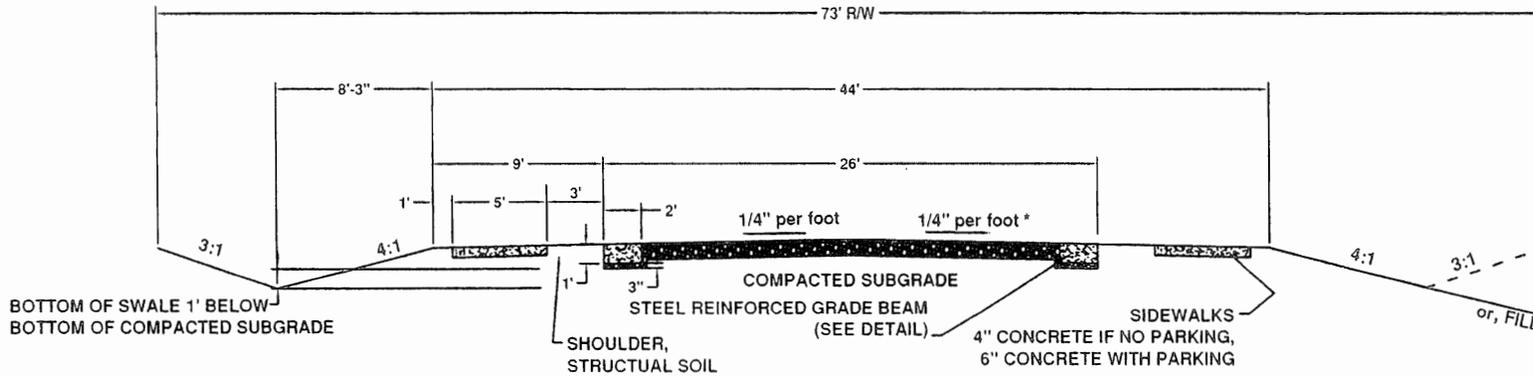
Solid RED WIRE CUT BRICK PAVERS
2 1/4" X 3 3/4" X 7 1/2"
SLOPE FINISHED SURFACE AS DIRECTED
MIN. 1/8" TO 1/4" SLOPE

NOTE: Sidewalk Required on Both Sides Behind Curb

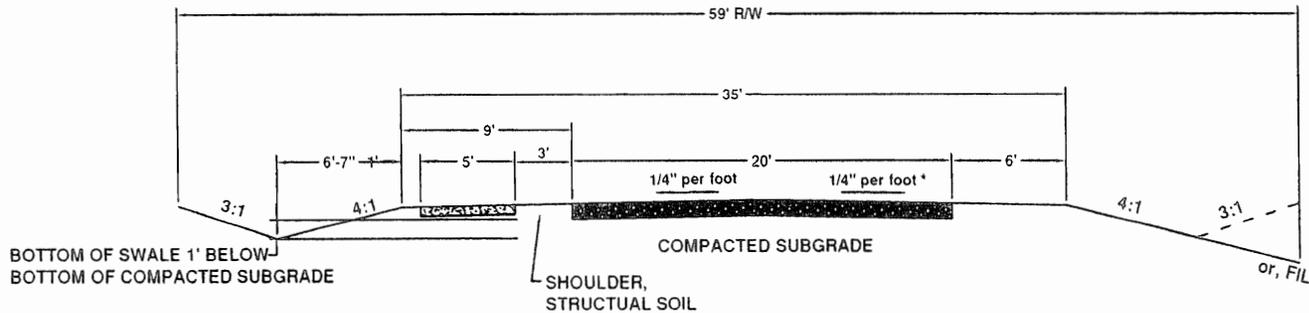


**Minimum 60' Right -of-Way
Minimum 34' Pavement**

COLLECTOR STREET - CURB & GUTTER



Subcollector (parking may be permitted on one side)



Local (no parking permitted)

NOTES:

1. Super-elevation on the road cross-section may be permitted at the discretion of Public Works and the Town Engineer in such cases that no concentrated or overland flow crosses the road from the high side of the super-elevation.
2. Permit issuing authority may eliminate sidewalk requirement on either side (not both) of subcollector. R/W width may be reduced so long as uniform R/W includes sufficient area for the standard shoulder and swale and so long as a uniform R/W is maintained.

