# DRIVEWAY MANUAL

City of Greensboro Department of Transportation

(336) 373-2332


Revisions 7/86, 2/94, 8/2004 by

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# PART I: DRIVEWAY DESIGN POLICY

## A. PURPOSE OF DRIVEWAY POLICY

The safety and efficiency of public streets is dependent upon the magnitude and type of interference encountered by vehicles moving along the street. This interference may come from vehicles moving in the same direction or from those approaching in an opposite direction, but most interference is normally that of vehicles entering, leaving, or crossing the street.

As traffic generators, commercial, industrial, institutional, and multi-family developments can significantly affect the safety and efficiency of roadways. In order to safeguard the traveling public and fully utilize the potential capacity of existing and future streets, it is necessary to regulate vehicle movements entering and leaving roadside development so as to reduce interference with the traffic flow. At the same time, it is necessary to recognize the right of the property owner or developer to have reasonable ingress and egress to their property.

The City has the responsibility to make the movement of traffic safe and efficient, within reasonable and prudent expectations. As part of that responsibility, balancing the conflicting rights and interests of property owners and the needs of the traveling public for safe and efficient roadways in the critical area of driveway location and operation must be resolved. Therefore, this policy and the regulations included herein have been established to meet the following objectives:

1. To enhance public safety and the functional efficiency of the highway transportation network through the orderly control of traffic entering and exiting public streets;

2. To provide uniform criteria for the design and construction of new driveways, and an administrative means for consistent application and enforcement of the established regulations; and

3. To provide a policy that addresses and satisfies to the greatest extent possible the needs, rights, and expectations of both property owners and the traveling public.

## B. PROCESS OF DRIVEWAY PLANNING AND APPROVAL

### i. General Requirements

Driveways and driveway entrances hereafter constructed in the City of Greensboro and its jurisdictional boundaries on public street rights-of-way shall be designed, located and constructed in conformance with the regulations and guidelines set forth in this Manual.

Any driveway constructed on a state maintained roadway must also conform to the requirements of the current "Policy on Street and Driveway Access to North Carolina Highways" by the North Carolina Department of Transportation. Where it is more restrictive, the NCDOT Driveway Manual will take precedent on these state maintained roadways.

It shall be unlawful for any person to construct or alter a driveway entrance into a public street or alley, or to cut, break out or remove any curb along a street or alley except as authorized by provisions of this Manual.

All driveways constructed on City street rights-of-way shall be reviewed and approved by the Director of Transportation, or a designated representative, prior to the issuance of any building permit for the erection, construction, remodeling, or change in the use of the building, structure, or property. This provision shall apply to all driveways generating in excess of 50 daily trips, but shall not apply to sites for individual single-family detached residences and duplexes, or other developments generating less than 50 daily trips.

It shall be the responsibility of the property owner to maintain the driveway through its operational lifetime.

Persons seeking to construct a new driveway, modify an existing driveway, *or* replace/maintain an existing driveway shall fully complete and submit a driveway permit application to the City Department of Transportation for review and approval. Failure to secure a permit prior to the construction or change in the use of the property owner may result in closure of the driveway and/or removal of the driveway at the expense of the property owner.

### ii. Permits & Fees

No person, firm, or corporation shall remove, alter or construct any driveway, curb, gutter or pavement, or perform any other improvement on any public street or dedicated street right-of-way without permits authorizing such improvements. (A sample of to the city's driveway permit application is included in the Appendix to this Manual.)

Before the permit is issued, a concrete contractor licensed by the City of Greensboro shall pay the required fee(s).

The driveway permit and attached plan shall be posted at the construction site.

iii. Submittal Requirements

No driveway permit shall be issued until two copies of the approved plans showing the location and dimensions of all proposed improvements are filed with the Greensboro Department of Transportation. Plans should identify the site by address, adjacent properties, and the approximate distance to the nearest intersecting street.

Six copies of the approved plans will be required for driveways on the North Carolina Department of Transportation system streets.

Information required on the plans submitted shall include:

1. A complete plan view of the site (drawn to engineering scale between a 1:20 and 1:50) showing existing and proposed buildings with interior parking layout and traffic circulation patterns;

2. Existing and proposed driveway locations and dimensions, including but not limited to:

    - Distance from other streets and driveways on both sides of the roadway

    - Width at the public right-of- way

    - Curb radii

    - Profile of Estimated entrance and exit grades when grades exceed 5%

- Proposed pavement markings

3. Maintenance of traffic plans for proposed roadway improvement construction that requires overnight closures or lane shifts;

4. Horizontal and vertical sight distance information;

5. Existing and/or proposed sidewalks, bicycle paths, or other multi-modal features;

6. Street names, primary or secondary road numbers (when applicable), right-of-way and pavement widths and location of street return on corner lots;

7. Proposed location of off-street loading and unloading facilities; and

8. Retaining walls, drainage structures, utility poles, fire hydrants, traffic control cabinets, and other physical features which affect the driveway location and sight distance.

iv. Inspection

Each proposed driveway must be inspected by a representative of the Engineering and Inspections Department of the City after concrete forms are set to final grade, but before any concrete or asphalt is placed. The contractor is required to call the Engineering and Inspections Department *(373-2155)* to schedule this inspection. Next day inspections are available and same-day inspections are possible if the Inspections Department receives the telephone request between 8:00 a.m. and 9:00 a.m. Monday through Friday. No inspections will be scheduled if the proper permit has not been issued.

In case of failure of the contractor or property owner constructing the driveway to conform to the requirements of this Manual, the inspector or other official of the Engineering and Inspections Department exercising supervision over the work shall have the authority to stop the work immediately and cause the driveway to be barricaded.

That official shall have authority to and shall require the removal or alteration of any driveway which does not conform to the requirements documented in the Manual. Both the property owner

and the contractor shall be liable for the removal or alteration and/or cost of removal or alteration of such defective driveway.

Additionally, the contractor shall obtain a street closure permit from the Greensboro Department of Transportation prior to the closure or blockage of any public travel lanes or sidewalks. Any closure or blockage of any public travel lane shall be performed according to the standards set forth in the Federal Highway Administration's *Manual on Uniform Traffic Control Devices*, Part 6., Standards and Guides for Traffic Controls for Street, Highway Construction, Maintenance, Utility and Incident Management Operations.

v. Protecting the Public from Injury

Whenever any person shall do or undertake to do any of the things set forth in this Manual, it shall be the responsibility of such person to protect from harm and damage all persons who may be using any street or sidewalk or other public place where such activity is in progress; and to that end such person shall erect and maintain suitable signs, lights, barricades and other traffic control devices at the proper location where such work is in progress. These safeguards shall be applied in accordance with the current ***Work Area Traffic Control Handbook*** (WATCH) available from the Greensboro Department of Transportation.

vii. Administrative Controls

The Greensboro Department of Transportation recognizes that not all driveways will be able to conform to every regulation set forth in this document. Any driveways needing special attention due to exceptional conditions will be handled on a case by case basis. The GDOT reserves the right to override the standards set forth in this document should the driveway necessitate such action.

If there is a question as to whether or not a site will qualify for a variance in any regulations documented in this manual, the City of Greensboro should be contacted to discuss that potential variance.

C. DRIVEWAY DESIGN

i. General Requirements

All driveways shall be constructed in conformance with the construction plans and specifications approved by the Director of Transportation or a designated representative. When applicable,

driveways must conform to watershed regulations and any conditional uses or zoning restrictions placed on the property during the zoning or subdivision process.

The choice of proper location for a driveway(s) must involve consideration of vehicular and pedestrian conflicts which can be expected both within the parking area and on the abutting street(s). The overriding principle to be applied is one which seeks to reduce the number of driveways to a practical minimum, thus providing fewer locations where conflicts may occur.

Driveways shall cross the sidewalk at the sidewalk grade established by the City. Driveways shall be constructed as nearly as possible to a right angle to the street. A lesser angle should not typically vary more than 15° from the right-angle. Approval for a lesser angle can be granted by the Director of Transportation or a designated representative.

The area to which the driveway provides access shall be of a size sufficient to allow for the necessary loading, unloading, and parking maneuvers to be accommodated on private property. All loading, unloading and parking maneuvers shall be performed completely outside of the public street right-of-way and on private property. Under no circumstances shall any new driveway be allowed which requires motorists to back into or from a public street right-of-way.

Driveways shall be constructed to conform to the existing paved street grade; for unpaved streets, to a grade approved by the Engineering and Inspections Director or a designated representative.

Where special pedestrian and vehicular hazards may be encountered, driveways may be restricted to one-way operation. Proper signs and pavement markings shall be put in place and maintained by the person or persons having control over such driveways, instructing drivers about the direction of the driveways. All signs and pavement markings shall conform to the latest edition of the *Manual of Uniform Traffic Control Devices* (MUTCD). These signs shall be located in a manner that shall not obstruct the visibility of motorists or pedestrian using the driveway (Figure 2). Failure to install or maintain such signs and pavement markings or failure to use such driveways in accordance with the proper signs and pavement markings shall be considered a violation of this Manual.

Driveways shall be designed and constructed to contain or catch surface drainage before it enters the street. In areas where access to

the storm drainage system is impractical, this may be accomplished by using a flume or swale to divert drainage to the street gutter line. The design standard is a 10 year storm or greater.

Parking areas shall be designed to provide for safe and orderly movement and storage of expected vehicles. All required stacking for drive-up windows, parking gates, fuel pumps, etc. shall be contained completely internal to the site without blocking driveways, required parking spaces, or circulation aisles.

All costs of any change proposed in any physical improvements originally installed by the City and all costs of the installation of any driveway or necessary signing shall be borne by the property owner or developer.

Minimum width for interior circulation aisles shall be as follows (unless additional width is required by public safety officials): two-way circulation *20'*, one-way circulation *10'*, drive through lane *9'*. Where applicable, a minimum of 10' must be provided in addition to the 9' drive through lane to allow circulation around a queue in the drive-through lane. Parking abutting these aisles may dictate a greater dimension. Further design consideration should be given to areas providing access for environmental and emergency services.

The minimum distance from the street right-of-way line at any ingress or egress driveway to any interior circulation aisle, service drive, or parking space with direct access to such driveway shall be twenty-five (25) feet, or greater than the expected peak hour queue at the location. If a traffic impact study has been performed the queue length will be determined by the results of the study rather than the formula listed below.

The minimum length may be estimated by the following formula:

$$L=(5/6)*x$$

L = length required (rounded up or down to the nearest 25 foot increments)
x = the number of vehicles entering a driveway in an hour.
In the absence of a Traffic Impact Analysis as required by section 30-3-20 of the City of Greensboro Code, the minimum distance from the street curb line on any major ingress or egress driveway to any interior circulation aisle, service drive, or parking space having direct access to such driveway shall be determined using the aforementioned queue length formula. The "Policy on Street and Driveway Access to North Carolina Highways", July 2003, developed by the North

Carolina Department of Transportation shall also be consulted on all driveways intersecting a state facility.

ii. Control of Access

No portion of a driveway shall be permitted to encroach upon a control of access area, as legally defined by the City of Greensboro, the State of North Carolina Department of Transportation, or the Federal Highway Administration.

Control of access agreements exist in perpetuity and therefore apply not only to the property owner at the time the agreement was obtained, but also to any subsequent property owners or heirs to the property as well. This remains true whether or not the original parcel of land remains intact or is later subdivided into smaller parcels.

iii. Sight Distance

In addition to the placement standards set forth in Table 1, driveways should be located in a manner that affords adequate ingress and egress to the street as safely as possible. Adequate sight distance is a key consideration in determining the appropriate locations of driveways. In order to achieve this appropriate location, the property owner shall be required to maintain a sight distance triangle of 20 feet (represents one typical vehicle), measured laterally along the centerline of the proposed driveway from a projection of the curbline or edge of pavement of the intersecting street, by the stopping sight distance recommended by American Association of State Highway and Transportation Officials (AASHTO) for the design speed of the intersecting street, measured along the curbline intersecting the proposed driveway to a point adjacent to the center of the nearest approach lane carrying through traffic in each direction, as shown in Figure 3 in the Appendix. An offset greater than 20 feet may be required when the placement of pedestrian crosswalks result in an additional setback of the marked or implied vehicle stopping point.

AASHTO guidelines also apply to vertical stopping sight distances. When conditions merit, the Owner may be required to submit roadway and driveway profiles demonstrating that adequate vertical sight distance also exists. In lieu of providing vertical sight distance profiles, a note placed by a licensed Professional Engineer may be placed on the plans stating that the proposed driveways have been designed and located to provide adequate horizontal and vertical sight distance in accordance with AASHTO standards. A figure included in

the appendix depicts an example of the vertical sight distance requirements.

To provide and maintain an adequate "window of visibility" for the motorist, no object, planting, structure, or sign shall be placed within this triangle at a height between 2.5 feet and 10 feet above the finished grade of the proposed driveway.

iv. Joint Driveways

Joint driveways are encouraged wherever they will improve safety. They may also enable adjoining properties to be developed more advantageously. Consult Greensboro Development Ordinance.

Landowners of adjacent property may, by written mutual agreement, construct a joint driveway to service both properties, subject to the following:

1. All requirements of this Manual shall be met wit the exception that the side clearance restriction shall not apply.

2. In the event that the driveway does not conform with the requirements of this Manual, the driveway shall be corrected to conform with these requirements by and at the expense of the landowners. Failure to do so shall result in the City doing such work and billing each of the landowners 50% of the cost of such work.

v. Areas of limited Driveway Improvements

To prevent vehicle overhang on private property in the vicinity of driveways, parking areas, and loading areas, a 6-inch raised concrete curb and/or concrete parking stops shall be constructed or installed with its face a minimum distance of 3 feet inside the property line unless a greater distance is required by the Greensboro Development Ordinance.

No driveway shall be permitted to include any municipal or state-owned feature, such as traffic signal standards, curb inlets, fire hydrants, utility poles, fire alarm supports or other similar type structures. No driveway shall be located nearer than 5 feet to these features or structures. Any existing feature located within 5 feet of a proposed driveway must be relocated or removed upon agreement of the feature owner at the expense of the developer.

Upon approval of Greensboro Department of Transportation and the North Carolina Department of Transportation (where applicable), a private driveway may be approved to align opposite an existing or proposed signalized intersection. The Greensboro Department of Transportation will be responsible for installing and maintaining all signal equipment at the developers' expense in accordance with the City of Greensboro policy for signalization of private driveways. In these instances the 5' concrete band in the driveway should be removed.

All driveway entrances shall be constructed so that the driveway curb return adjacent to the travel lane will not encroach on the adjacent property frontage.

vi. Number and Location of Driveways

The number and location of driveways shall be regulated according to the size of the property being served and the amount of public street frontage available to that property. The approval of more than one (1) driveway serving a single tract with frontage on a public street shall be contingent upon a review of site plans for the proposed development. For this purpose the City of Greensboro has developed three (3) basic street classifications, as follows:

Class A – Thoroughfares

Major and minor arterial routes as defined by the City's Thoroughfare Plan, and approved amendments. These are typically divided or undivided multi-lane facilities serving a variety of land uses and carrying high traffic volumes. Such facilities may be state-owned and often feature extensive traffic control measures, including traffic signals and turn restrictions. The design/posted speed limit for these routes may range from 40 to 60 miles per hour. The adopted Greensboro Urban Area Thoroughfare Plan should be consulted to determine the characteristics of streets in question. The designation of any roadway not listed can be verified with the City of Greensboro Department of Transportation.

Class B – Collectors and Subcollectors

Collector routes are defined by the City's Collector Street Plan, and approved amendments. Although some collectors may be divided multi-lane facilities, most are typically undivided three-lane or two-lane routes with provisions for turn lanes at significant intersections. Like thoroughfares, they serve a variety of land uses, but volumes are

lower and they are generally designated as city streets. Traffic control measures are generally less restrictive, and the range of design/posted speed limits for these routes is lower, from 30 to 50 miles per hour. The designation of any roadway can be verified with the City of Greensboro Department of Transportation.

Subcollectors provide a necessary link between the thoroughfare and collector street network and local streets. They are primarily two lane streets associated with the collection and dispersion of residential within a limit area of influence. Design/posted speeds are below 40 miles per hour. The designation of any roadway can be verified with the City of Greensboro Department of Transportation.

Class C – Locals

Although most local streets feature primarily single-family residential development, some may provide access to a variety of other uses, including multi-family and low-intensity commercial and business uses. Local streets may occasionally intersect directly with thoroughfares, but more often transition to subcollector and/or collector facilities. Design/posted speeds are 35 mph or less.

Class D – Central Business District (CBD)

Requirements for driveways proposed within the defined limits of the Greensboro Central Business District will vary as appropriate for the streets to be accessed. Design guidelines will be determined on a case by case basis by the City of Greensboro Department of Transportation.

vii. Turn Lanes

Turn lanes will be required for ingress and egress into a proposed site when the proposed turns and anticipated background adjacent street traffic indicate their necessity. Eight charts are included in the appendix that indicate the volume warrants for left and right turn lanes. These guidelines shall be used to determine when a turn lane is appropriate. The tables included in the appendix are intended for use with two-lane roadways. For multi-lane roadways, the average through volume per lane should be multiplied by 1.05 and used as the through volumes on the chart to determine whether a turn lane is warranted at the location. In the event of a planned, or on-going, roadway project in the proximity of a development, the City may delay the required construction of any auxiliary turn lane(s) a maximum of six months to assure design continuity with the planned

project, or accept a fee-in-lieu of construction to incorporate the turn lane(s) into the road project.

The North Carolina Department of Transportation publishes a chart in the NCDOT Driveway Manual that recommends storage lengths for left and right turn lanes based on the number of turns versus the opposing volume of traffic. This chart should be used as a basis for determining the storage length required for turn lanes into a site. The chart is included in the Appendix. Figure 3 depicts the deceleration and storage lengths for right and left turn lanes. Deceleration lengths are a function of design speed and AASHTO recommended deceleration lengths are listed on the figure.

viii. Gate Policy

The City of Greensboro Department of Transportation in response to new and existing developments constructing gates at their entrances has formulated this gate policy in the interest of public safety.

The purpose of this policy is to ensure that the safety of the public will. Not be hampered by the installation of gates into residential developments and that the developer's plan for providing a sense of security is not compromised.

The concern of GDOT is that gates placed too close to a public street may cause traffic attempting to enter a residential development to stack or store in the public street, thus creating capacity and safety problems.

Elements of GDOT's Driveway Manual have been incorporated in the formation of this policy.

The detailed policy and accompanying figure is attached in the Appendix of this manual.

Applying these street classifications, the number and location of permissible driveways shall be regulated as shown on Table 1:

**TABLE 1**

| | **Street Classification** | **Thoroughfare** | **Collector** | **Local** |
|---|---|---|---|---|
| | **Functional Requirement** | | | |
| | Driveway Type Required | Street-type only | Street-type unless design speed < 40 and peak hour trips < 100 | Apron or Street –type permitted |
| | Number of driveways permitted, based on available frontage[1] | <300′ = 1<br>300-500′ = 2<br>>500′ = 3 | <200′ = 1<br>200-350′ = 2<br>>350′ = 3 | <100′ = 1<br>100-200′ = 2<br>>200′ = 3 |
| A | Corner clearance (distance from a public street intersection) | 100′ or 25′ from the end of intersection radius, whichever is greater | 75′ or 25′ from the end of intersection radius, whichever is greater | 50′ or 25′ from the end of intersection radius, whichever is greater |
| B | Separation between adjacent existing or proposed driveways onsite | 100′ | 75′ | 50′ |
| C | Separation from adjacent property line* | 50′ | 38′ | 25′ |
| D | Minimum/Maximum Allowable Width | 25′ – 40′ | One-way – 14′ – 25′<br>Two-Way – 25′ – 40′ | 10′-24′ |
| E | Minimum/Maximum Allowable Radii | Min = 25′<br>Max = 45′ | Min = 20′<br>Max = 45″ | Min = 15′<br>Max = 45′ |

* Exceptions to this spacing will be reviewed on a case by case basis.

[1] Regardless of available frontage, the approval of multiple driveways and driveway types are subject to site plan review by GDOT. One driveway is typically permitted. Class D (CBD Streets) will be handled on a case-by-case basis according to the variance procedure (See Section B viii).
[2] Higher street classification governs for corner parcels.

## General Notes for Table 1

1. One (1) driveway shall be permitted for ingress and egress purposes to a single property or development, provided that said property has been created as a separate tract in conformance with the Greensboro Development Ordinances or was in existence prior to the adoption of this manual. Two (2) one-way driveways have the same consideration as one two-way driveway, provided that site design and circulation clearly defines and promotes a one-way pattern and that appropriate signing and pavement markings are used to reinforce the intended traffic pattern.

2. Up to three (3) driveways accessing a single property from the same street may be permitted only if reasonably necessary to serve the intended use(s), and only if the frontage requirements set forth in Table 1 and all other requirements of this Manual are met.

3.Four (4) or more driveways entering a single property or development shall not typically be permitted regardless of the amount of street frontage and number of streets fronted. The decision to allow four or more driveways shall be based on information contained in a traffic impact analysis, specified in section 30-3-20 of the Greensboro City Code and approved by the Director of Transportation, or a designated representative.

D. DEFINITIONS

For the purpose of this policy, the following definitions shall apply:

1. Background adjacent street traffic – existing traffic on the street adjacent to the driveway.

2. Construction Permit - Authorization for a licensed concrete or paving contractor to proceed with driveway construction in accordance with an approved plan that was that was submitted with the driveway permit application to the Department of Transportation. The construction permit is obtained from the Building Inspections Division.

3. Corner Clearance – The distance measured along a projection of the nearest through-lane curbline or edge of pavement of an intersection to the nearest edge of a proposed driveway.

4. Curb Transition – Sloped area of drop curb or flared area of the ramp design.

5. Driveway - The improved area between a public street and private property intended to provide ingress and egress for vehicular traffic from the street to a definite area on the private property. Driveways are classified as either single family residential or commercial, with subtypes (multi-family, industrial, institutional, etc.) falling under the commercial classification.

6. Driveway Angle – The angle between the proposed driveway centerline and the centerline of the existing street.

7. Driveway Permit Application - The standard form requesting approval of proposed plans for driveway access to private property from a public facility. This shall include a scaled site plan showing existing and proposed data as required in the Manual. This is submitted to and approved by the Department of Transportation.

8. Driveway Width – The perpendicular width of the proposed driveway measured at either the end of the radius returns or the right-of-way line, whichever is furthest from the intersecting street.

9. Frontage – The width of a single property tract of street side development as measured along the street right-of-way line. This dimension is typically a recorded feature of a survey and legal description of the property, and may be the sum of several measurements. Corner properties at street intersections have separate frontage along each street.

10. Frontage Boundary Line – A line, perpendicular to the street centerline, at the each end of the frontage, extending from the intersection of the property line with the right-of-way line to the nearest back of curbline or edge of pavement.

11. Grade – the slope parallel to the intended path of travel.

12. Private Street – A vehicular travelway not dedicated or offered for dedication as a public street but otherwise resembling a street by carrying traffic from a series of driveways to the public street system.

13. Public Street – Street shall include avenue, boulevard, court, expressway, highway, lane, parkway, place, road, terrace, or other descriptors which are dedicated to the City for public use.

14. Radius Return – Curved arc between intersecting street and / or driveway curblines or edge of pavements.

15. Ramp or Apron Type – A driveway constructed with drop curb transition on a curb and gutter section.

16. Right-of-Way (R/W) – Land conveyed or dedicated to the City or State to be used for a street, alley, walkway, drainage facility or other public use.

17. Sidewalk – An area on public or private property where pedestrians walk or stand, generally parallel to the street curbline or edge of pavement.

18. Side Clearance – The distance measured along the street right-of-way line from the property line to the near edge of the driveway.

19. Service Drive – A driveway typically used for delivery vehicles and service vehicles that may have a loading dock.

20. Street Type – A driveway constructed with radius returns; similar in appearance to a street intersection.

21. Swale or Flume – a low lying or depressed area.

22. Window of Visibility – An area around the driveway between 2.5 feet and 10 feet above the finish grade free of obstructions within the sight triangle.

# APPENDIX

## Checklist for Driveway Construction

The following list is provided to give a summary of all the necessary steps to construct and operate a driveway along a roadway maintained by the Greensboro Department of Transportation.

1. Submit driveway permit application with appropriate plans to the City of Greensboro Department of Transportation.

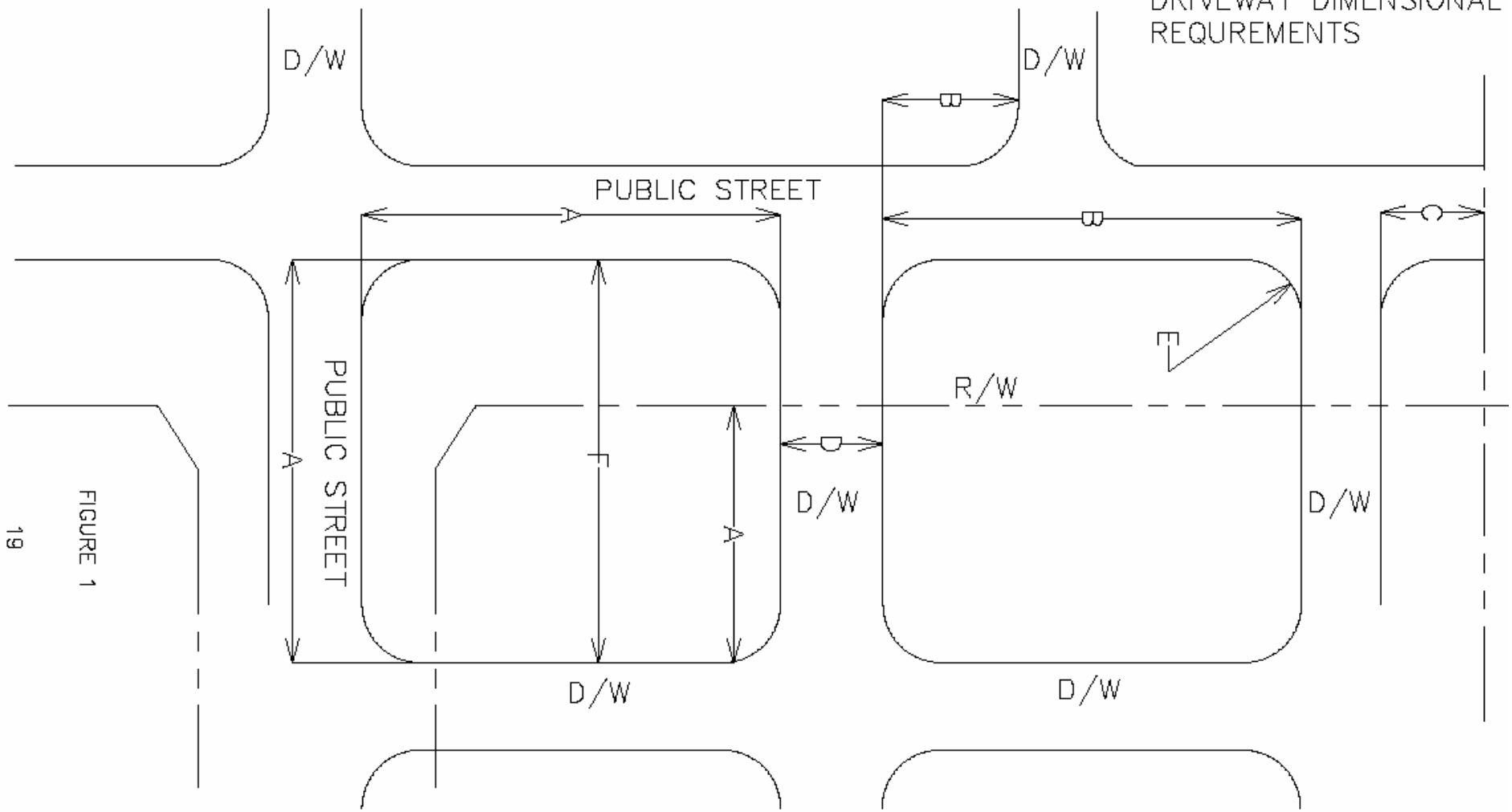
2. Retain the services of a licensed concrete contractor for construction of the driveway. The contractor shall secure a construction permit from Inspection Services prior to removing any existing driveway(s) or curb and gutter section(s). The contractor shall also obtain any necessary lane closure or encroachment permits prior to beginning construction within any existing right-of-way.

3. Post and maintain an approved permit at the construction site.

4. The contractor shall request an inspection before ordering or placing concrete.

5. The driveway will be constructed and maintained in accordance with all of the safety measures set forth in the WATCH handbook.

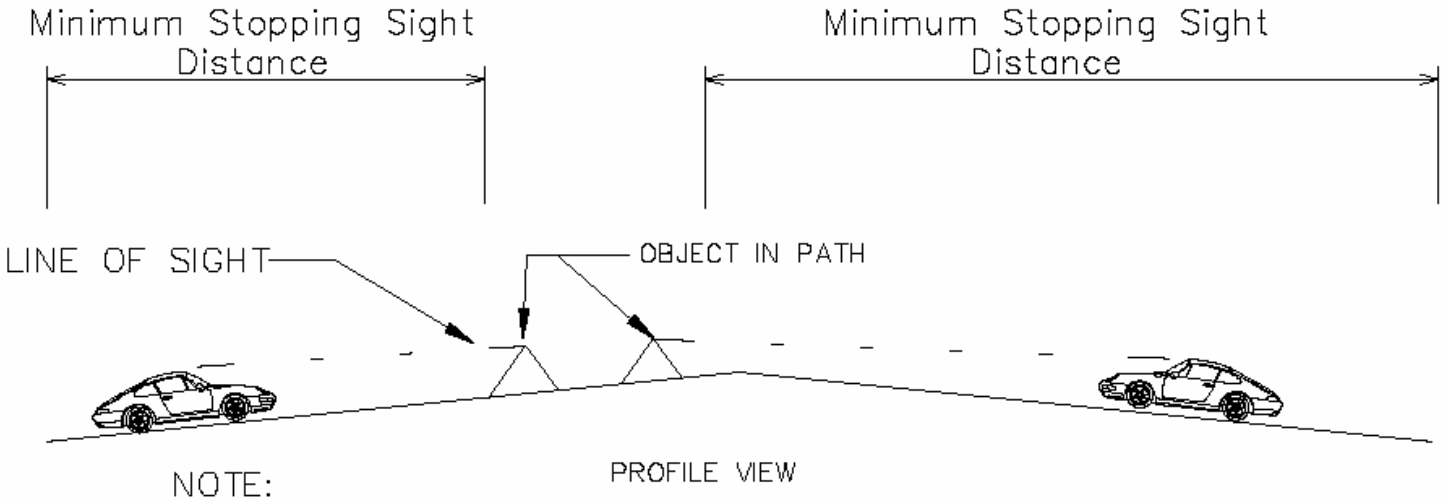
FIGURE 1
DRIVEWAY DIMENSIONAL
REQUREMENTS




SEE TABLE 1 FOR DESCRIPTIONS AND DETAILS.
ALL DIMENSIONS ARE FROM FACE OF CURB
OR EDGE OF PAVEMENT.
PRIMARY CLASSIFICATION DIMENSONS/REQUIREMENTS
SHALL ALSO APPLY TO SECONDARY CLASSIFICATION
FOR CORNER LOT DEVELOPMENT.

| Minimum Stopping Sight Distance (in Feet) Street Grade in Percent | | | | | | | |
|---|---|---|---|---|---|---|---|
| Operating Speed | Upgrades | | | Flat | Downgrades | | |
| | 9% | 6% | 3% | 0% | −3% | −6% | −9% |
| 25MPH | 140 | 145 | 150 | 150 | 155 | 160 | 165 |
| 30MPH | 180 | 190 | 200 | 200 | 210 | 220 | 230 |
| 35MPH | 225 | 235 | 245 | 250 | 265 | 280 | 300 |
| 40MPH | 295 | 305 | 315 | 325 | 345 | 365 | 395 |
| 45MPH | | 375 | 385 | 400 | 425 | 455 | |
| 50MPH | | 445 | 455 | 475 | 505 | 545 | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

SOURCE: A Policy on Geometric Design for Highways and Streets, American Association of State Highway and Transportation Officials, 2001



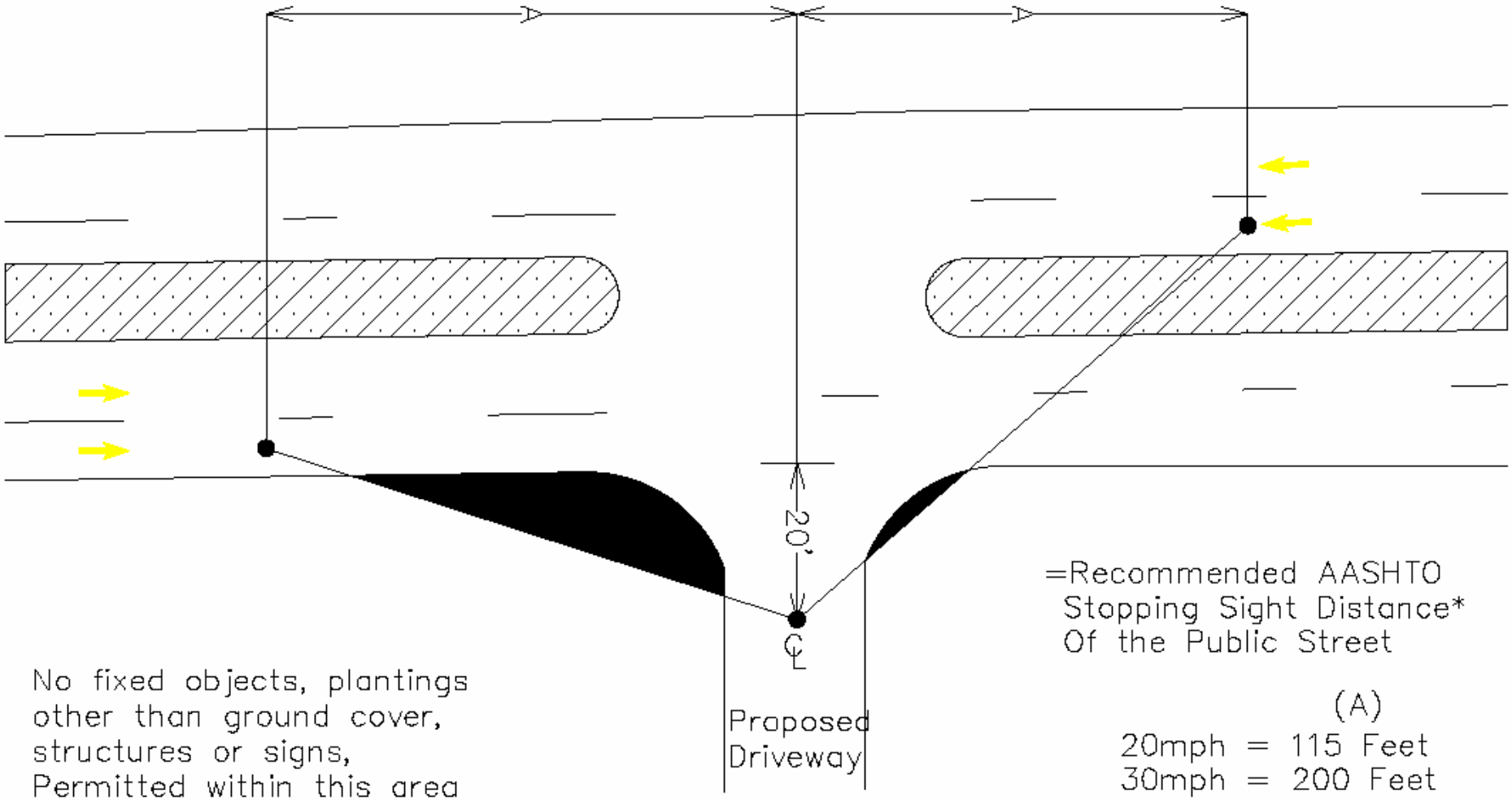

PROFILE VIEW

NOTE:

1. Drivers eye height shall be 3.5 feet above pavement.
2. Object height shall be 0.5 feet above center of traffic lane.

FIGURE 2

# HORIZONTAL SIGHT DISTANCE TRIANGLES




No fixed objects, plantings other than ground cover, structures or signs, Permitted within this area regardless of location Of Row.

=Recommended AASHTO Stopping Sight Distance* Of the Public Street

(A)

20mph = 115 Feet
30mph = 200 Feet
40mph = 305 Feet
50mph = 425 Feet
60mph = 570 Feet

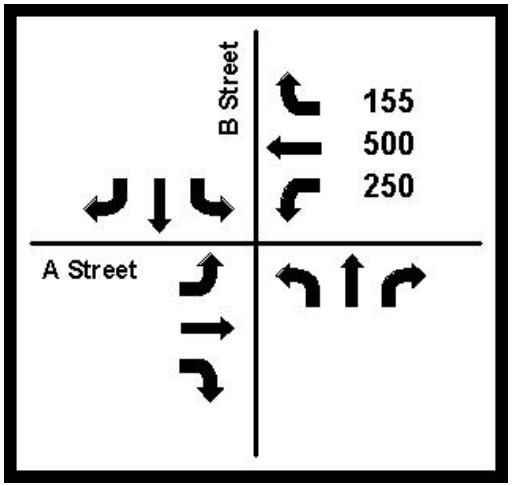
* Adjust for grades and other prevailing conditions

FIGURE 3

# Right-Turn Lane Volume Warrant Table - EXAMPLE

Two-Lane Roadways with a Prevailing Speed of 35 MPH or Less

| Right-Turn Volume | <100 | 100-199 | 200-249 | 250-299 | 300-349 | 350-399 | 400-449 | 450-499 | 500-549 | 550-599 | 600 or More |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Through Volumes Plus Left-Turn Volume* | | | | | | | | | | |
| Fewer than 25 | | | | | | | | | | | |
| 25-49 | | | | | | | | | | | Yes |
| 50-99 | | | | | | | | | | Yes | Yes |
| 100-149 | | | | | | | | | Yes | Yes | Yes |
| 150-199 | | | | | | | | Yes | Yes | Yes | Yes |
| 200-249 | | | | | | | Yes | Yes | Yes | Yes | Yes |
| 250-299 | | | | | | Yes | Yes | Yes | Yes | Yes | Yes |
| 300-349 | | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 350-399 | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 400-449 | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 450-499 | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 500-549 | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 550-599 | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| More than 600 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |




Example:

Determine whether a right turn lane is needed on A Street, given 35 MPH speed limit.

Through Volume Plus Left-Turn Volume = 500 + 250 = 750
Right-turn volume = 155

Find the row under the heading "Right-Turn Volume" that the right-turn volume falls into.
Find the column under the Heading "Through Plus Left-Turn Volume" that the volume falls into.

Read left along the row selected under the "Right-Turn Volume" and down the column selected for the "Through Volumes Plus Left-Turn Volume" to the point of intersection.

For this example a right-turn lane is warranted.

# Right-Turn Lane Volume Warrant Table

Two-Lane Roadways with a Prevailing Speed of 35 MPH or Less

| Right-Turn Volume | <100 | 100-199 | 200-249 | 250-299 | 300-349 | 350-399 | 400-449 | 450-499 | 500-549 | 550-599 | 600 or More |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Through Volumes Plus Left-Turn Volume* | | | | | | | | | | |
| Fewer than 25 | | | | | | | | | | | |
| 25-49 | | | | | | | | | | | Yes |
| 50-99 | | | | | | | | | | Yes | Yes |
| 100-149 | | | | | | | | | Yes | Yes | Yes |
| 150-199 | | | | | | | | Yes | Yes | Yes | Yes |
| 200-249 | | | | | | | Yes | Yes | Yes | Yes | Yes |
| 250-299 | | | | | | Yes | Yes | Yes | Yes | Yes | Yes |
| 300-349 | | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 350-399 | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 400-449 | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 450-499 | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 500-549 | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 550-599 | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| More than 600 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

** Or through volume only if a left-turn lane exists*

*Note: Through Volume Plus Left-Turn Volumes (columns) is the through and left volumes traveling in the same direction as the right-turn volume in question.*

*"Yes" signifies that a right-turn lane is warranted.*

*For multi-lane roaways, the average throughvolume should be multiplied by 1.05.*

Table 1: Right-Turn Lane Volume Warrant 35 MPH or Less

## Right-Turn Lane Volume Warrant Table

Two-Lane Roadways with a Prevailing Speed of 36 to 45 MPH

| Right-Turn Volume | <100 | 100-199 | 200-249 | 250-299 | 300-349 | 350-399 | 400-449 | 450-499 | 500-549 | 550-599 | 600 or More |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Through Volumes Plus Left-Turn Volume* | | | | | | | | | | |
| Fewer than 25 | | | | | | | | | | | |
| 25-49 | | | | | | | | | | Yes | Yes |
| 50-99 | | | | | | | | | Yes | Yes | Yes |
| 100-149 | | | | | | | | Yes | Yes | Yes | Yes |
| 150-199 | | | | | | | Yes | Yes | Yes | Yes | Yes |
| 200-249 | | | | | | Yes | Yes | Yes | Yes | Yes | Yes |
| 250-299 | | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 300-349 | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 350-399 | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 400-449 | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 450-499 | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 500-549 | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 550-599 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| More than 600 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

** Or through volume only if a left-turn lane exists*

*Note: Through Volume Plus Left-Turn Volumes (columns) is the through and left volumes traveling in the same direction as the right-turn volume in question.*

*"Yes" signifies that a right-turn lane is warranted.*

*For mult-lane roadways, the average through volume should be multiplied by 1.05.*

Table 2: Right-Turn Lane Volume Warrant 36 to 45 MPH

## Right-Turn Lane Volume Warrant Table

Two-Lane Roadways with a Prevailing Speed of 46 to 55 MPH

| Right-Turn Volume | <100 | 100-199 | 200-249 | 250-299 | 300-349 | 350-399 | 400-449 | 450-499 | 500-549 | 550-599 | 600 or More |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Through Volumes Plus Left-Turn Volume* | | | | | | | | | | |
| Fewer than 25 | | | | | | | | | | | |
| 25-49 | | | | | | | | | Yes | Yes | Yes |
| 50-99 | | | | | | | | Yes | Yes | Yes | Yes |
| 100-149 | | | | | | | Yes | Yes | Yes | Yes | Yes |
| 150-199 | | | | | | Yes | Yes | Yes | Yes | Yes | Yes |
| 200-249 | | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 250-299 | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 300-349 | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 350-399 | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 400-449 | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 450-499 | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 500-549 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 550-599 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| More than 600 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

** Or through volume only if a left-turn lane exists*

*Note: Through Volume Plus Left-Turn Volumes (columns) is the through and left volumes traveling in the same direction as the right-turn volume in question.*

*"Yes" signifies that a right-turn lane is warranted.*

*For multi-lane roadways, the average through volume should be multiplied by 1.05.*

Table 3: Right-Turn Lane Volume Warrant 46 to 55 MPH

## Right-Turn Lane Volume Warrant Table

Two-Lane Roadways with a Prevailing Speed of 56 MPH or Over

| Right-Turn Volume | <100 | 100-199 | 200-249 | 250-299 | 300-349 | 350-399 | 400-449 | 450-499 | 500-549 | 550-599 | 600 or More |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Through Volumes Plus Left-Turn Volume* | | | | | | | | | | |
| Fewer than 25 | | | | | | | | | | | |
| 25-49 | | | | | | | | Yes | Yes | Yes | Yes |
| 50-99 | | | | | | | Yes | Yes | Yes | Yes | Yes |
| 100-149 | | | | | | Yes | Yes | Yes | Yes | Yes | Yes |
| 150-199 | | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 200-249 | | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 250-299 | | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 300-349 | | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 350-399 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 400-449 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 450-499 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 500-549 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 550-599 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| More than 600 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

** Or through volume only if a left-turn lane exists*

*Note: Through Volume Plus Left-Turn Volumes (columns) is the through and left volumes traveling in the same direction as the right-turn volume in question.*

*"Yes" signifies that a right-turn lane is warranted.*

*For multi-lane roadways, the average through volume should be multiplied by 1.05.*

Table 4: Right-Turn Lane Volume Warrant 56 MPH or Over

## Left-Turn Lane Volume Warrant Table

Two-Lane Roadways with a Prevailing Speed of 35 MPH or Less

| Opposing Volume | 100-149 | 150-199 | 200-249 | 350-299 | 300-349 | 350-399 | 400-449 | 450-499 | 500-549 | 550-599 | 600 or More |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Through Volumes Plus Right-Turn Volume* | | | | | | | | | | |
| 100-149 | 300 | 235 | 185 | 145 | 120 | 100 | 80 | 70 | 60 | 55 | 50 |
| 150-199 | 245 | 200 | 160 | 130 | 110 | 90 | 75 | 65 | 55 | 50 | 45 |
| 200-249 | 205 | 170 | 140 | 115 | 100 | 80 | 72 | 60 | 55 | 50 | 45 |
| 250-299 | 175 | 150 | 125 | 105 | 90 | 70 | 65 | 55 | 50 | 45 | 40 |
| 300-349 | 155 | 135 | 110 | 95 | 80 | 65 | 60 | 50 | 50 | 45 | 40 |
| 350-399 | 135 | 120 | 100 | 85 | 70 | 60 | 55 | 50 | 45 | 40 | 40 |
| 400-449 | 120 | 105 | 90 | 75 | 65 | 55 | 50 | 45 | 45 | 40 | 35 |
| 450-499 | 105 | 90 | 80 | 70 | 60 | 50 | 45 | 45 | 40 | 35 | 35 |
| 500-549 | 95 | 80 | 70 | 65 | 55 | 50 | 45 | 40 | 40 | 35 | 35 |
| 550-599 | 85 | 70 | 65 | 60 | 50 | 45 | 40 | 40 | 35 | 35 | 35 |
| 600-649 | 75 | 65 | 60 | 55 | 45 | 40 | 35 | 35 | 35 | 35 | 30 |
| 650-699 | 70 | 60 | 55 | 50 | 40 | 35 | 35 | 35 | 30 | 30 | 30 |
| 700-749 | 65 | 55 | 50 | 45 | 35 | 30 | 30 | 30 | 30 | 30 | 30 |
| More than 750 | 60 | 50 | 45 | 40 | 35 | 30 | 30 | 30 | 30 | 30 | 30 |

** Or through volume only if a right-turn lane exists*

*Note: Opposing Volume (rows) is the Total volume opposing the left-turn volume in question.*
*Through Volume Plus Right-Turn Volumes (columns) is the through and right volumes traveling in the same direction as the leftt-turn volume in question.*
*The values in the matrix are the left-turn volume in question.*
*For multi-lane roadways, the average through volume should be multiplied by 1.05.*

Table 5: Left-Turn Lane Volume Warrant 35 MPH or Less

## Left-Turn Lane Volume Warrant Table

Two-Lane Roadways with a Prevailing Speed of 36 to 45 MPH

| Opposing Volume | 100-149 | 150-199 | 200-249 | 350-299 | 300-349 | 350-399 | 400-449 | 450-499 | 500-549 | 550-599 | 600 or More |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Through Volumes Plus Right-Turn Volume* | | | | | | | | | | |
| 100-149 | 250 | 180 | 140 | 110 | 80 | 70 | 60 | 50 | 45 | 40 | 35 |
| 150-199 | 200 | 140 | 105 | 90 | 70 | 60 | 55 | 45 | 40 | 35 | 30 |
| 200-249 | 160 | 115 | 85 | 75 | 65 | 55 | 50 | 40 | 35 | 30 | 30 |
| 250-299 | 130 | 100 | 75 | 65 | 60 | 50 | 45 | 35 | 30 | 30 | 30 |
| 300-349 | 110 | 90 | 70 | 60 | 55 | 45 | 40 | 35 | 30 | 25 | 25 |
| 350-399 | 100 | 80 | 65 | 55 | 50 | 40 | 35 | 30 | 25 | 25 | 20 |
| 400-449 | 90 | 70 | 60 | 50 | 45 | 35 | 30 | 30 | 25 | 20 | 20 |
| 450-499 | 80 | 65 | 55 | 45 | 40 | 30 | 25 | 25 | 20 | 20 | 20 |
| 500-549 | 70 | 60 | 45 | 35 | 35 | 25 | 25 | 20 | 20 | 20 | 15 |
| 550-599 | 65 | 55 | 40 | 35 | 30 | 25 | 20 | 20 | 20 | 20 | 15 |
| 600-649 | 60 | 45 | 35 | 30 | 25 | 25 | 20 | 20 | 20 | 20 | 15 |
| 650-699 | 55 | 35 | 35 | 30 | 25 | 20 | 20 | 20 | 20 | 20 | 15 |
| 700-749 | 50 | 35 | 30 | 25 | 20 | 20 | 20 | 20 | 15 | 15 | 15 |
| More than 750 | 45 | 35 | 25 | 25 | 20 | 20 | 20 | 20 | 15 | 15 | 15 |

** Or through volume only if a right-turn lane exists*

*Note: Opposing Volume (rows) is the Total volume opposing the left-turn volume in question.*
*Through Volume Plus Right-Turn Volumes (columns) is the through and right volumes traveling in the same direction as the leftt-turn volume in question.*
*The values in the matrix are the left-turn volume in question.*
*For multi-lane roadways, the average through volume should be multiplied by 1.05.*

Table 6: Left-Turn Lane Volume Warrant 36 to 45 MPH

# Left-Turn Lane Volume Warrant Table

Two-Lane Roadways with a Prevailing Speed of 46 to 55 MPH

| Opposing Volume | 100-149 | 150-199 | 200-249 | 350-299 | 300-349 | 350-399 | 400-449 | 450-499 | 500-549 | 550-599 | 600 or More |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Through Volumes Plus Right-Turn Volume* | | | | | | | | | | |
| 100-149 | 200 | 140 | 100 | 75 | 60 | 50 | 45 | 40 | 35 | 30 | 25 |
| 150-199 | 175 | 120 | 85 | 65 | 55 | 45 | 40 | 35 | 30 | 30 | 25 |
| 200-249 | 150 | 100 | 75 | 60 | 50 | 40 | 35 | 30 | 25 | 25 | 20 |
| 250-299 | 130 | 85 | 65 | 55 | 45 | 35 | 35 | 30 | 25 | 25 | 20 |
| 300-349 | 110 | 75 | 60 | 50 | 40 | 30 | 30 | 25 | 25 | 20 | 20 |
| 350-399 | 95 | 65 | 55 | 45 | 35 | 25 | 25 | 25 | 20 | 20 | 20 |
| 400-449 | 80 | 60 | 50 | 40 | 30 | 25 | 25 | 20 | 20 | 20 | 15 |
| 450-499 | 70 | 55 | 45 | 35 | 25 | 20 | 20 | 20 | 20 | 20 | 15 |
| 500-549 | 60 | 50 | 40 | 30 | 25 | 20 | 20 | 20 | 20 | 15 | 15 |
| 550-599 | 50 | 45 | 35 | 25 | 20 | 20 | 20 | 20 | 15 | 15 | 15 |
| 600-649 | 45 | 40 | 30 | 25 | 20 | 20 | 20 | 15 | 15 | 15 | 15 |
| 650-699 | 40 | 35 | 30 | 20 | 20 | 20 | 15 | 15 | 15 | 15 | 15 |
| 700-749 | 35 | 35 | 25 | 20 | 20 | 15 | 15 | 15 | 15 | 15 | 15 |
| More than 750 | 35 | 35 | 25 | 20 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |

** Or through volume only if a right-turn lane exists*

*Note: Opposing Volume (rows) is the Total volume opposing the left-turn volume in question.*
*Through Volume Plus Right-Turn Volumes (columns) is the through and right volumes traveling in the same direction as the leftt-turn volume in question.*
*The values in the matrix are the left-turn volume in question*
*For multi-lane roadways, the average through volume should be multiplied by 1.05.*

Table 7: Left-Turn Lane Volume Warrant 46 to 55 MPH

# Left-Turn Lane Volume Warrant Table

Two-Lane Roadways with a Prevailing Speed of 56 MPH or Over

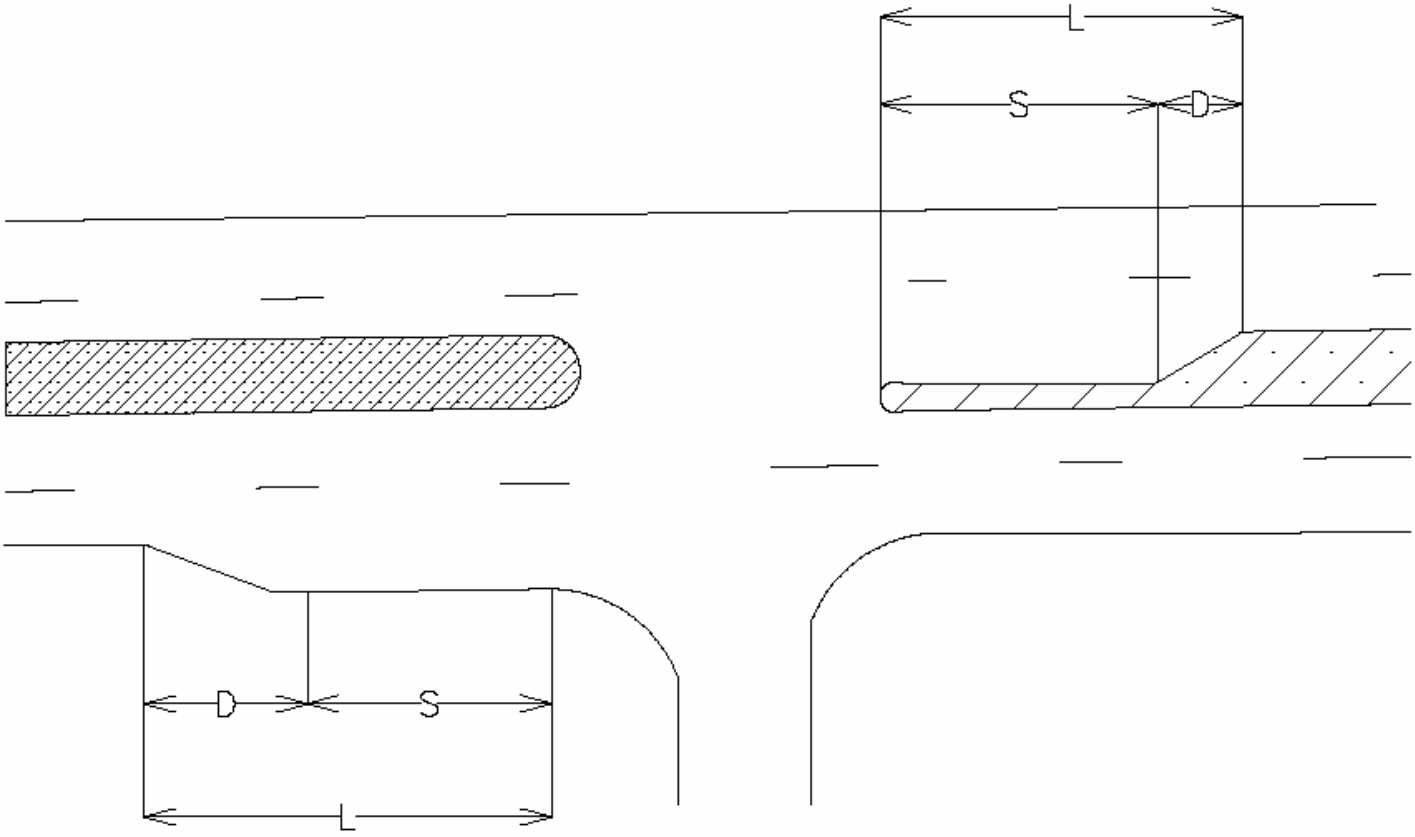
| Opposing Volume | 100-149 | 150-199 | 200-249 | 350-299 | 300-349 | 350-399 | 400-449 | 450-499 | 500-549 | 550-599 | 600 or More |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Through Volumes Plus Right-Turn Volume* | | | | | | | | | | |
| 100-149 | 150 | 75 | 60 | 45 | 35 | 30 | 25 | 25 | 20 | 20 | 20 |
| 150-199 | 110 | 65 | 55 | 40 | 35 | 30 | 25 | 25 | 20 | 20 | 20 |
| 200-249 | 85 | 60 | 50 | 35 | 30 | 30 | 25 | 25 | 20 | 20 | 15 |
| 250-299 | 70 | 55 | 45 | 35 | 30 | 30 | 25 | 25 | 20 | 20 | 15 |
| 300-349 | 60 | 50 | 40 | 30 | 25 | 25 | 25 | 20 | 20 | 15 | 15 |
| 350-399 | 55 | 45 | 35 | 30 | 25 | 25 | 25 | 20 | 20 | 15 | 15 |
| 400-449 | 50 | 40 | 30 | 25 | 20 | 20 | 20 | 20 | 15 | 15 | 15 |
| 450-499 | 45 | 35 | 30 | 25 | 20 | 20 | 20 | 20 | 15 | 15 | 15 |
| 500-549 | 40 | 30 | 25 | 20 | 20 | 20 | 20 | 15 | 15 | 15 | 15 |
| 550-599 | 40 | 25 | 20 | 20 | 20 | 20 | 15 | 15 | 15 | 15 | 15 |
| 600-649 | 35 | 20 | 20 | 20 | 20 | 15 | 15 | 15 | 15 | 15 | 15 |
| 650-699 | 35 | 20 | 20 | 20 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| 700-749 | 30 | 20 | 20 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| More than 750 | 30 | 20 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |

** Or through volume only if a right-turn lane exists*

*Note: Opposing Volume (rows) is the Total volume opposing the left-turn volume in question.*
*Through Volume Plus Right-Turn Volumes (columns) is the through and right volumes traveling in the same direction as the leftt-turn volume in question.*
*The values in the matrix are the left-turn volume in question.*
*For multi-lane roadways, the average through volume should be multiplied by 1.05.*

Table 8: Left-Turn Lane Volume Warrant 55 MPH or Over

# LEFT AND RIGHT TURN LANE DESIGN



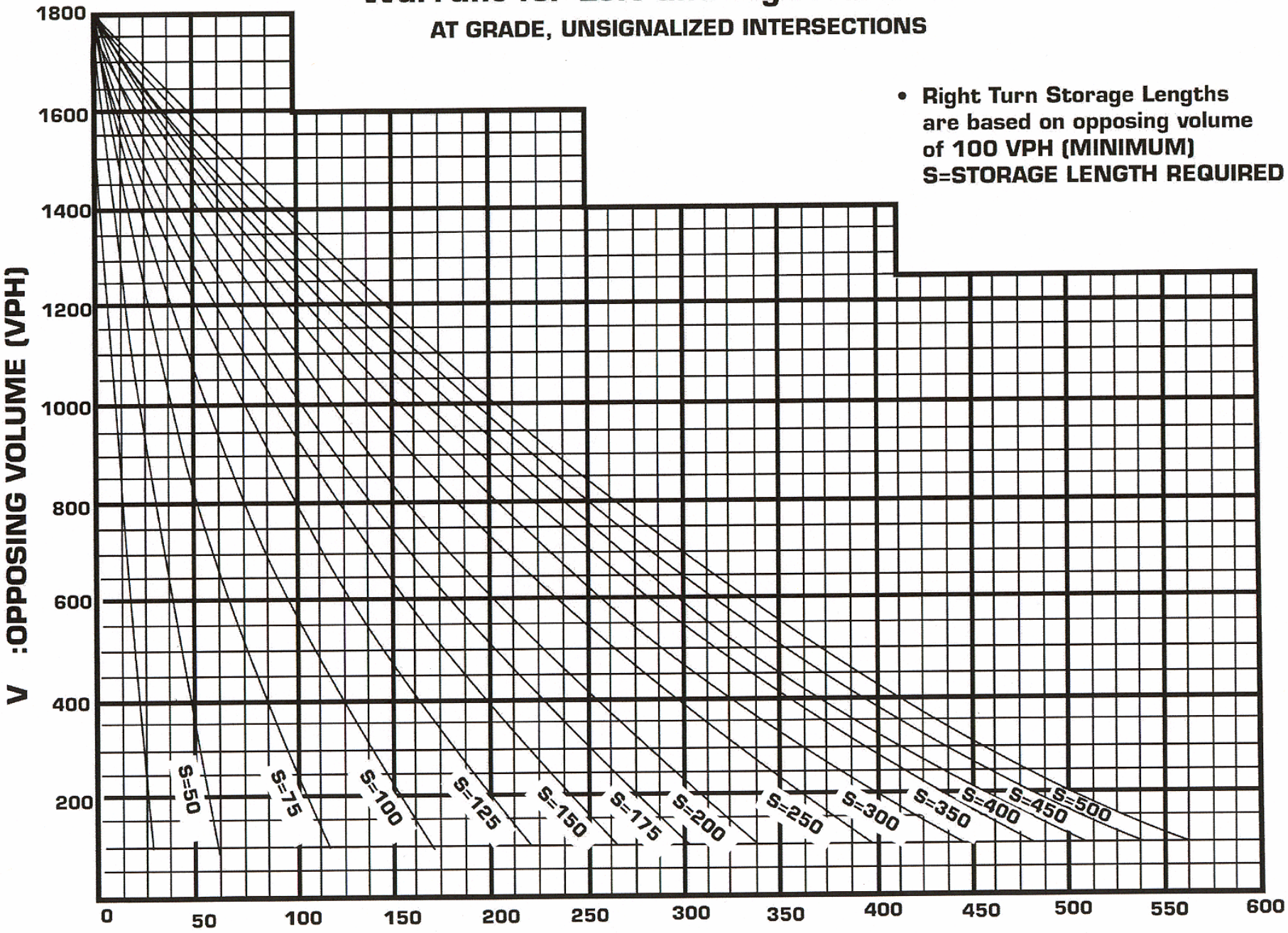

| DESIGNING Speed | (D) Deceleration Length (ft) | (S) Storage Length (ft) | (L) Total Length (ft) |
|---|---|---|---|
| 30MPH | 230 | X | |
| 40MPH | 330 | X | |
| 45MPH | 430 | X | |
| 50MPH | 550 | X | |
| 55MPH | 680 | X | |
| | | | |

X– Determined by NCDOT graph included in appendix. (page 32)

FIGURE 4

# Warrant for Left and Right-Turn Lanes

## AT GRADE, UNSIGNALIZED INTERSECTIONS

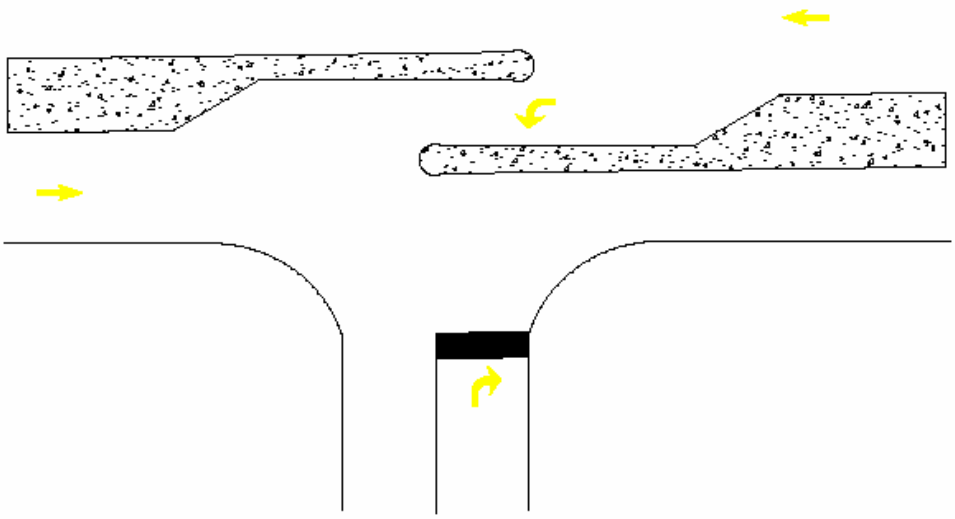



$V_L$ :LEFT TURNING VOLUME (VPH)
$V_R$ :RIGHT TURNING VOLUME (VPH)

**Note: Where adjacent signalization may provide opportunities for gaps in the traffic stream a reduction in the above storage values can be considered on a case by case basis.**

# TURN–RESTRICTED DRIVEWAYS

## A) LEFT OVER



## B) Right In Right Out

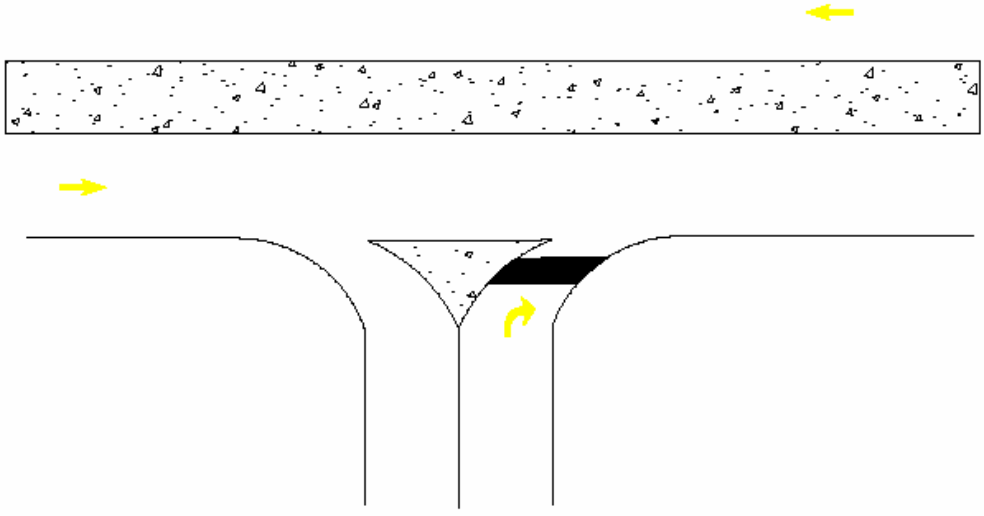
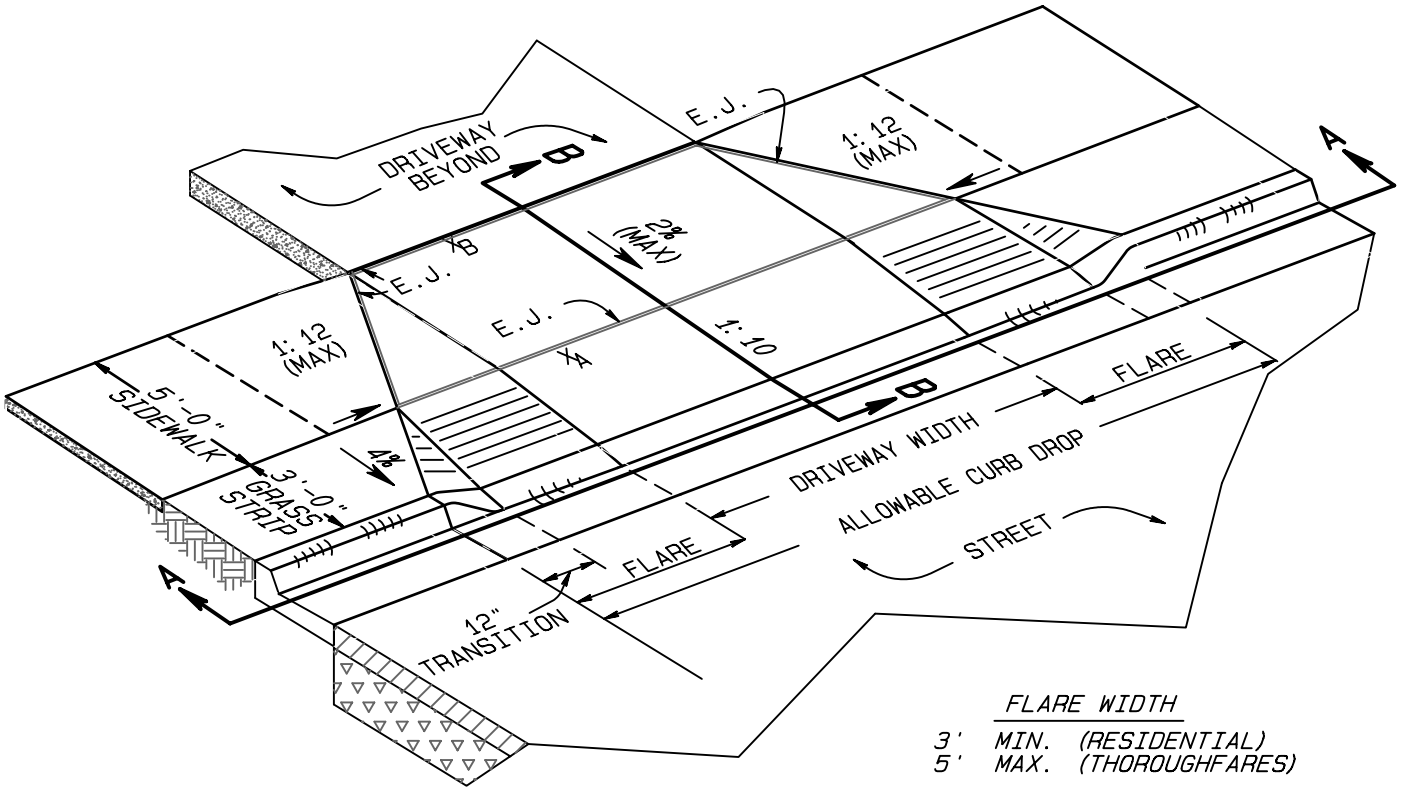


FIGURE 5

GRADE POINT

(A) 1 1/4" BELOW TOP OF CURB
(B) LEVEL WITH TOP OF CURB



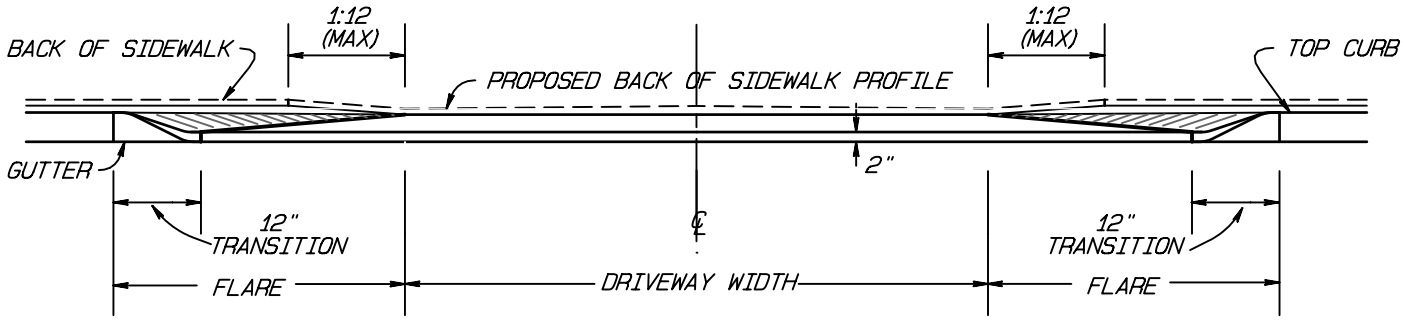

FLARE WIDTH

3' MIN. (RESIDENTIAL)
5' MAX. (THOROUGHFARES)

## ISOMETRIC VIEW WITH GRASS STRIP

*NOTE:

EXPANSION JOINT (E.J.) MATERIAL TO BE
1/2" BITUMINOUS FIBRE EXPANSION JOINT MATERIAL
1:10 (10%) 1 1/4" /FT
1:12 (8%) 1"/FT




## SECTION A-A



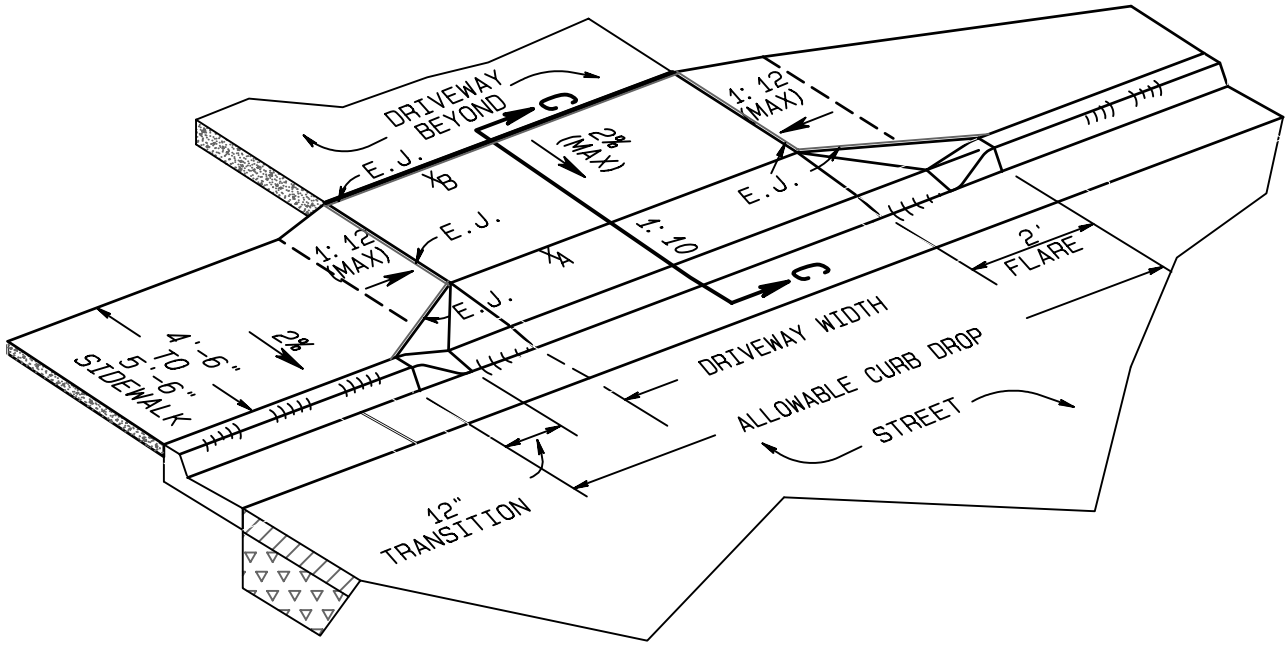
# CITY OF GREENSBORO

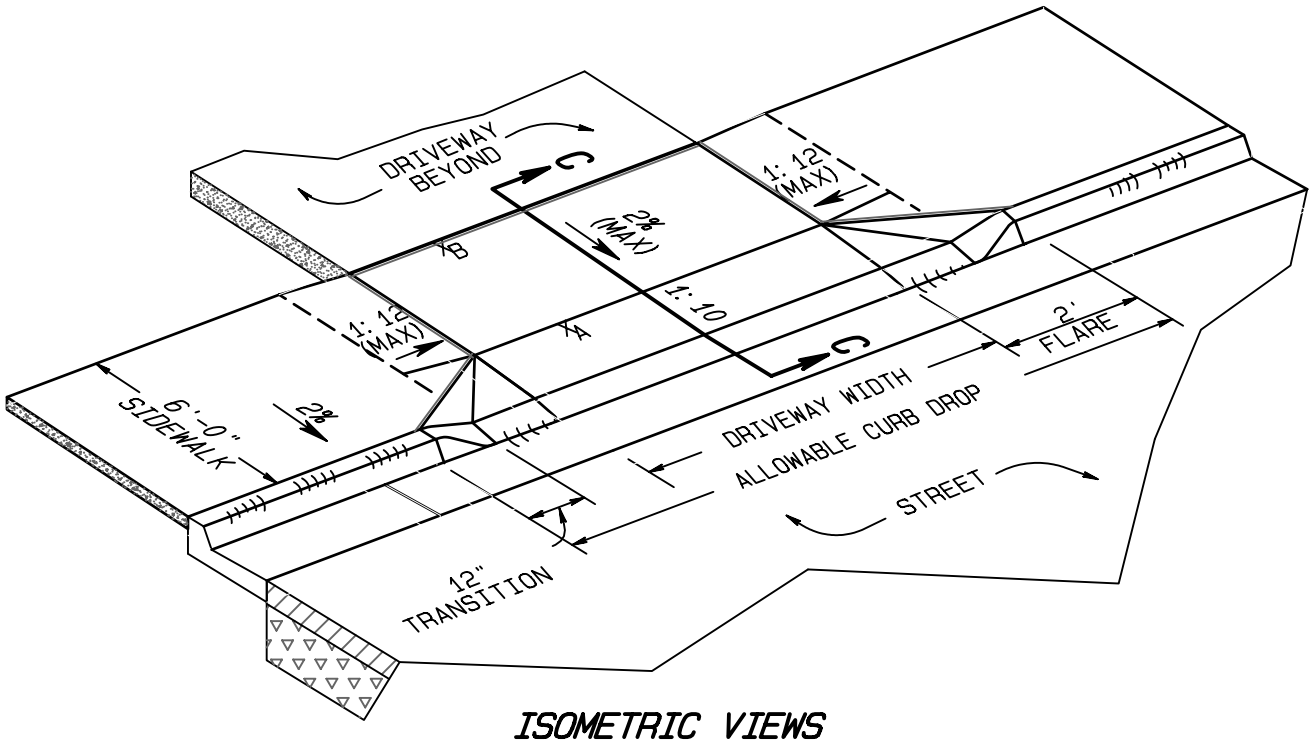
## TYPICAL WALK AND DRIVEWAY SECTION FOR CURB AND GUTTER STREETS

| STD. NO. | REV. |
|---|---|
| 416 | 01-96 06-04 09-03 03-04 |

GRADE POINT

(A) 1 3/4" BELOW TOP OF CURB
(B) 1/2" BELOW TOP OF CURB




## ISOMETRIC VIEWS
## DRIVEWAY APRON DETAIL

*NOTE:

EXPANSION JOINT (E.J.) MATERIAL TO BE
1/2" BITUMINOUS FIBRE EXPANSION JOINT MATERIAL
1:10 (10%) 1 1/4" /FT
1:12 (8%) 1"/FT



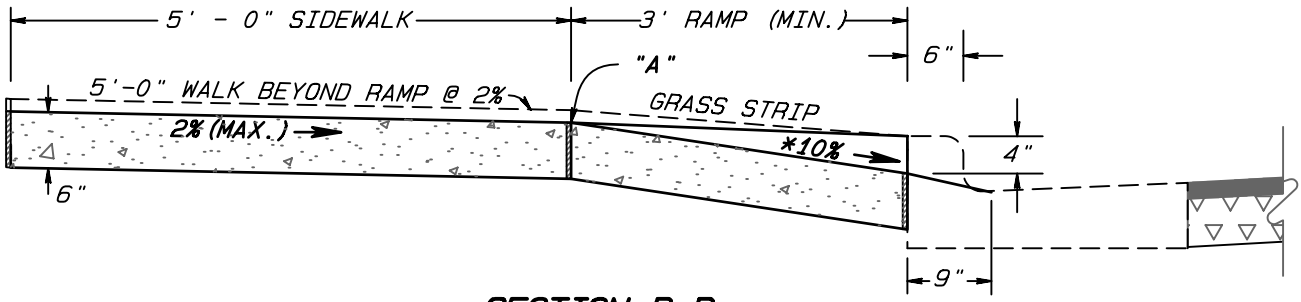
# CITY OF GREENSBORO

| TYPICAL WALK AND DRIVEWAY SECTION FOR CURB AND GUTTER STREETS | STD. NO. | REV. |
|---|---|---|
| | 416 | 01-96 06/04<br>09-03<br>03-04 |

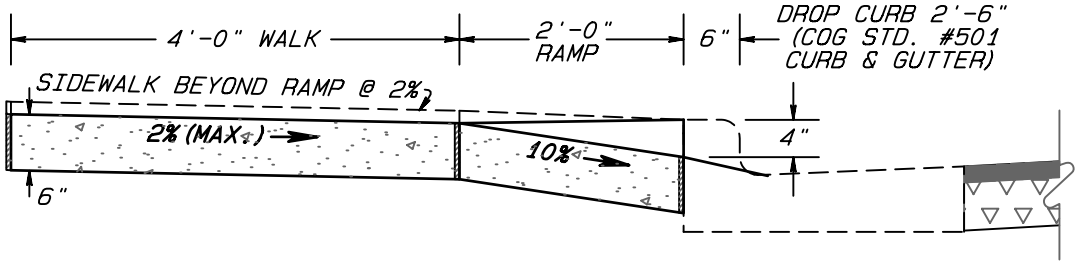
GRADE POINT

(A) 1 1/4" BELOW GRADE POINT "B"
(B) LEVEL WITH TOP OF CURB

* MAY REDUCE GRADE IF PT "B" IS ABOVE TOP OF CURB

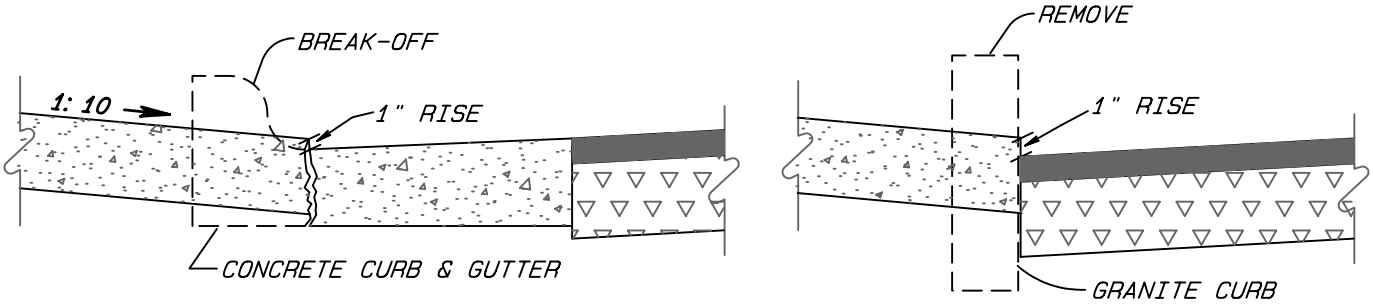



## SECTION B-B
## MINIMUM DRIVEWAY APRON REQUIREMENTS
## SIDEWALK WITH GRASS PLOT




## SECTION C-C
## SIDEWALK @ BACK OF CURB

ABSOLUTE MINIMUM APRON WIDTH DUE TO R/W RESTRICTIONS




## SECTION THRU DRIVEWAY INSTALLED
## W/ EXISTING CURB TO BE REMOVED



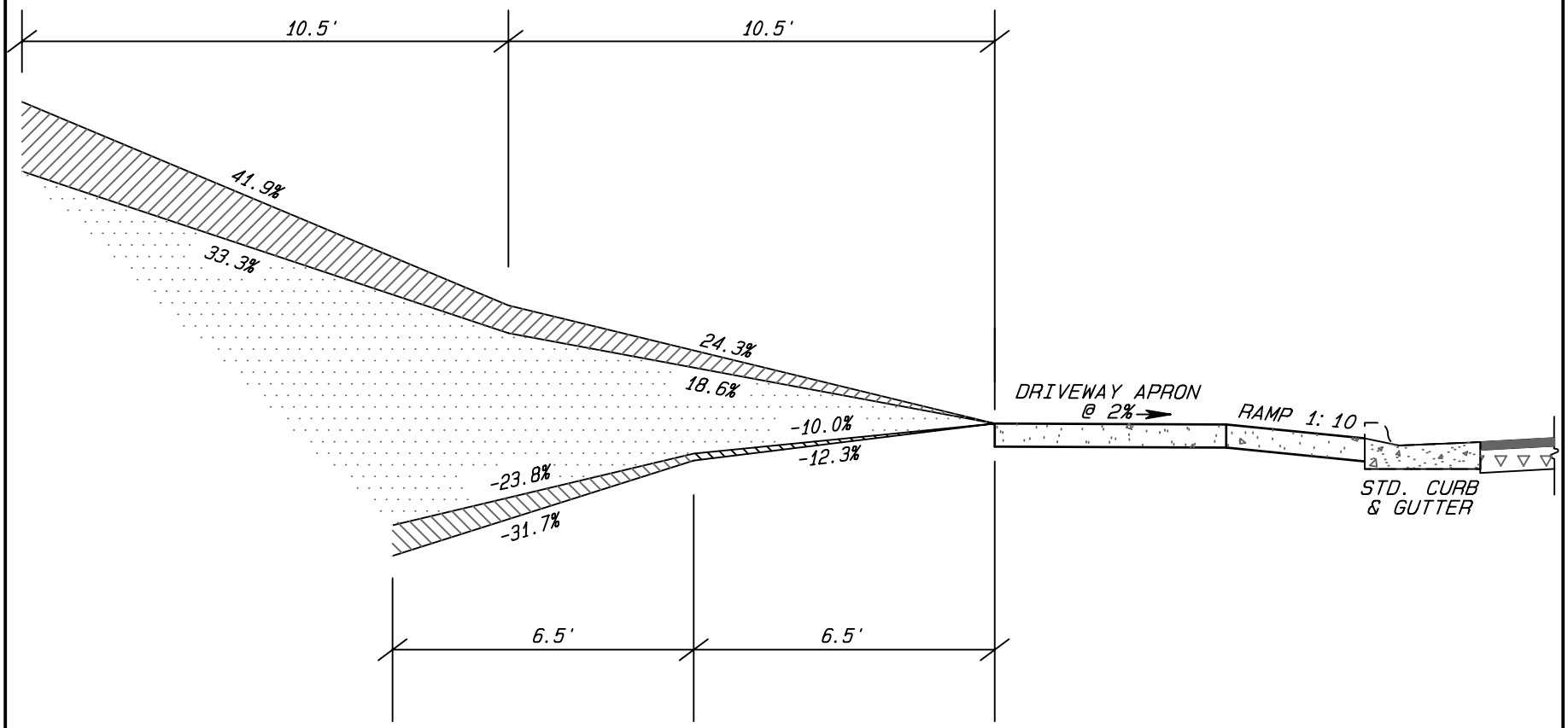
# CITY OF GREENSBORO

| TYPICAL WALK AND DRIVEWAY SECTION FOR CURB AND GUTTER STREETS | STD. NO. | REV. |
|---|---|---|
| | 416 | 01-96 06/04<br>09-03<br>03-04 |

# CITY OF GREENSBORO

## TYPICAL WALK AND DRIVEWAY SECTION FOR CURB AND GUTTER STREETS

| STD. NO. | REV. |
|---|---|
| 416 | 01-96<br>09-03<br>03-04<br>06/04 |




DRIVE ON STREET W/ GRASS PLOT

GRADES WITHIN THIS AREA ARE SAFE TO USE.

GRADES WITHIN THIS AREA - SOME CARS WILL DRAG.

GRADES OUTSIDE OF SHADED AREA - ALMOST ALL CARS WILL DRAG.

INTERVALS UP - 10.5'

INTERVALS DOWN - 6.5'

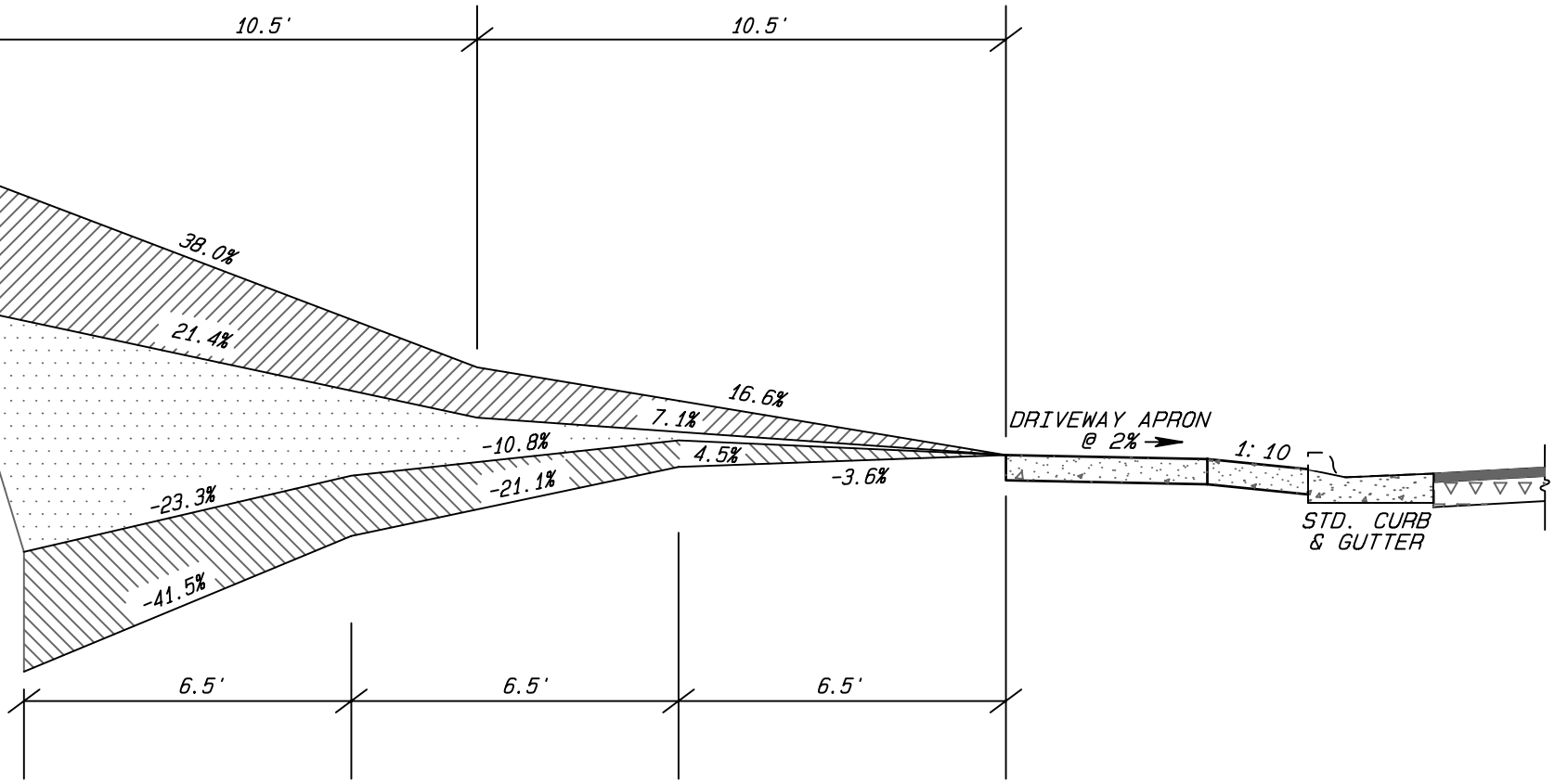
NOTE:

MAXIMUM GRADE CHANGE UP OR DOWN - 18% OR 2-1/4" PER FT.

CITY OF GREENSBORO

# TYPICAL WALK AND DRIVEWAY SECTION FOR CURB AND GUTTER STREETS

| STD. NO. | REV. |
|---|---|
| 416 | 01-96<br>09-03<br>03-04<br>06/04 |




## DRIVE ON STREET W/O GRASS PLOT

GRADES WITHIN THIS AREA ARE SAFE TO USE.

GRADES WITHIN THIS AREA - SOME CARS WILL DRAG.

GRADES OUTSIDE OF SHADED AREA - ALMOST ALL CARS WILL DRAG.

INTERVALS UP - 10.5'

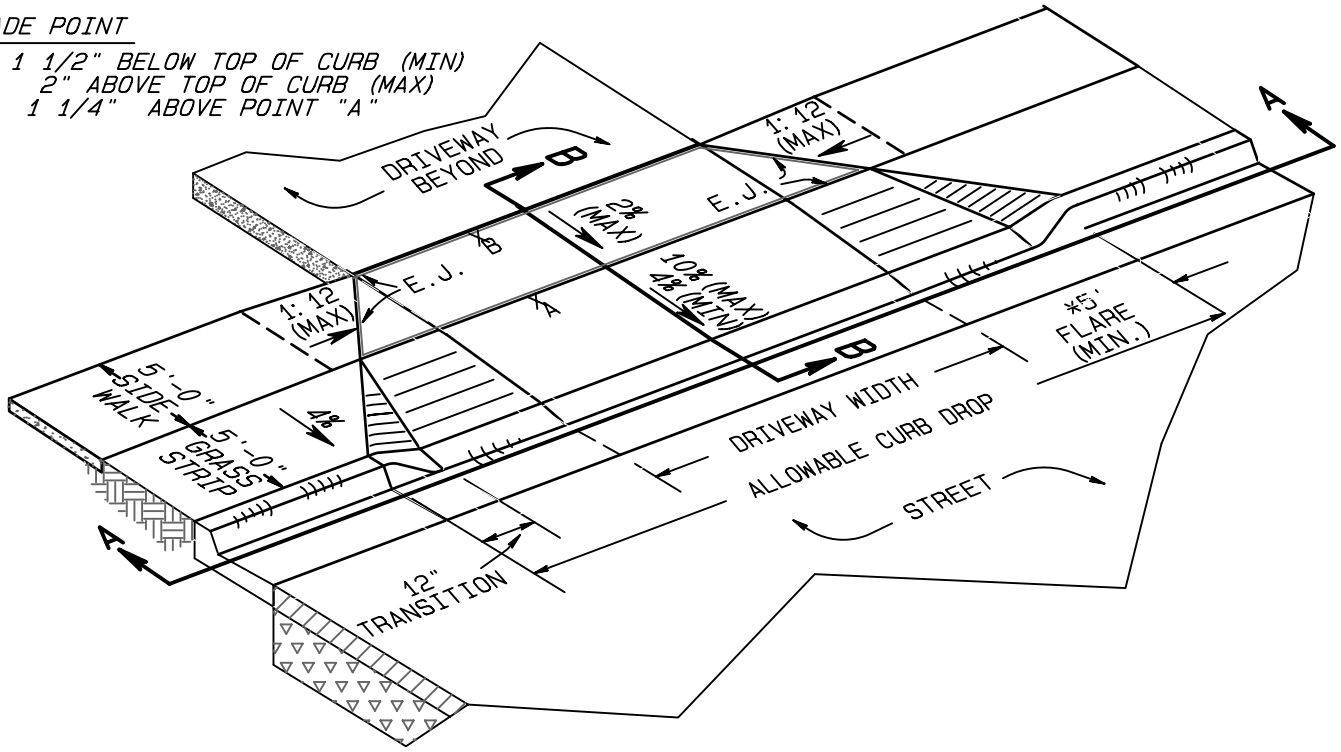
INTERVALS DOWN - 6.5'

NOTE:

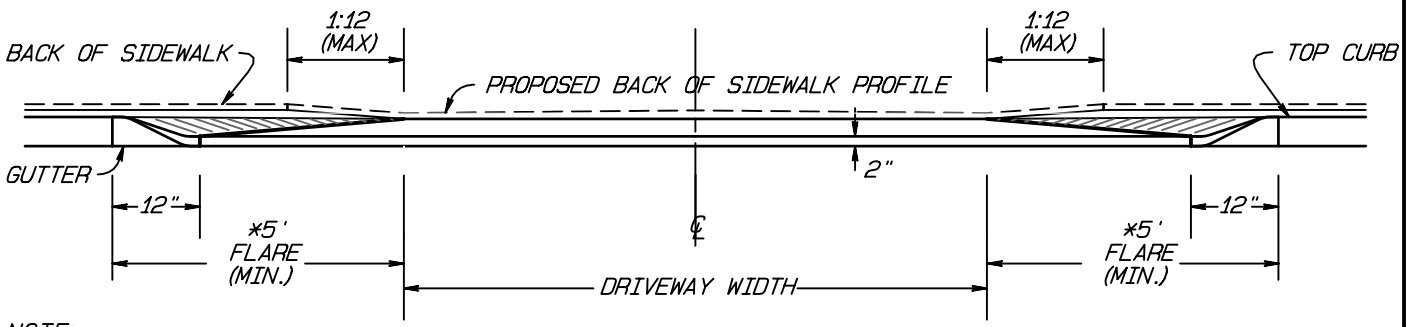
MAXIMUM GRADE CHANGE UP OR DOWN - 18% OR 2-1/4" PER FT.

GRADE POINT

(A) 1 1/2" BELOW TOP OF CURB (MIN)
2" ABOVE TOP OF CURB (MAX)
(B) 1 1/4" ABOVE POINT "A"

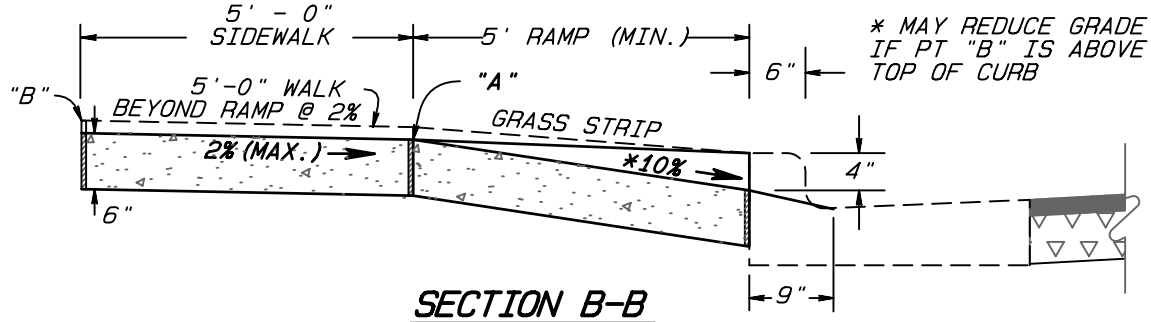



## ISOMETRIC VIEW WITH GRASS STRIP




## SECTION A-A

NOTE:
*FLARE WIDTH
5' (MIN.)
10' (MAX.)




## SECTION B-B

## MINIMUM DRIVEWAY APRON REQUIREMENTS SIDEWALK WITH GRASS PLOT

*NOTE:
EXPANSION JOINT (E.J.) MATERIAL TO BE
1/2" BITUMINOUS FIBRE EXPANSION JOINT MATERIAL
1: 10 (10%) 1 1/4" /FT
1: 12 (8%) 1"/FT



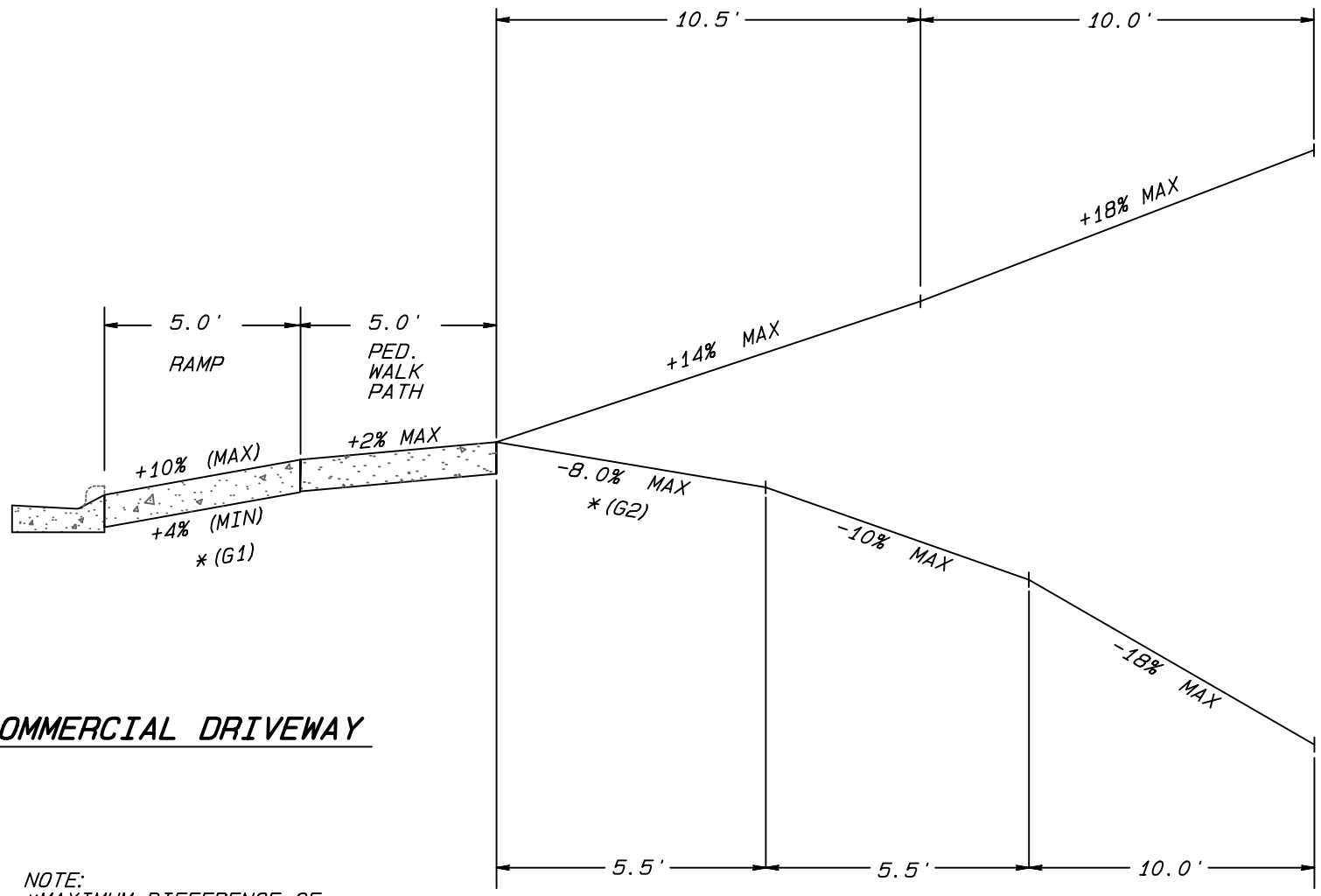
# CITY OF GREENSBORO

| TYPICAL COMMERCIAL DRIVEWAY SECTION | STD. NO. | REV. |
|---|---|---|
| | 416-A | 06-04 |

CITY OF GREENSBORO

TYPICAL COMMERCIAL DRIVEWAY SECTION

| STD. NO. | REV. |
|---|---|
| 416-A | 06-04 |




## COMMERCIAL DRIVEWAY

NOTE:
*MAXIMUM DIFFERENCE OF GRADE BETWEEN (G1) & (G2) IS 12%

* (10%) 1 1/4"/FT
(4%) 1/2"/FT

# TYPICAL EXAMPLE OF PARKING AREAS

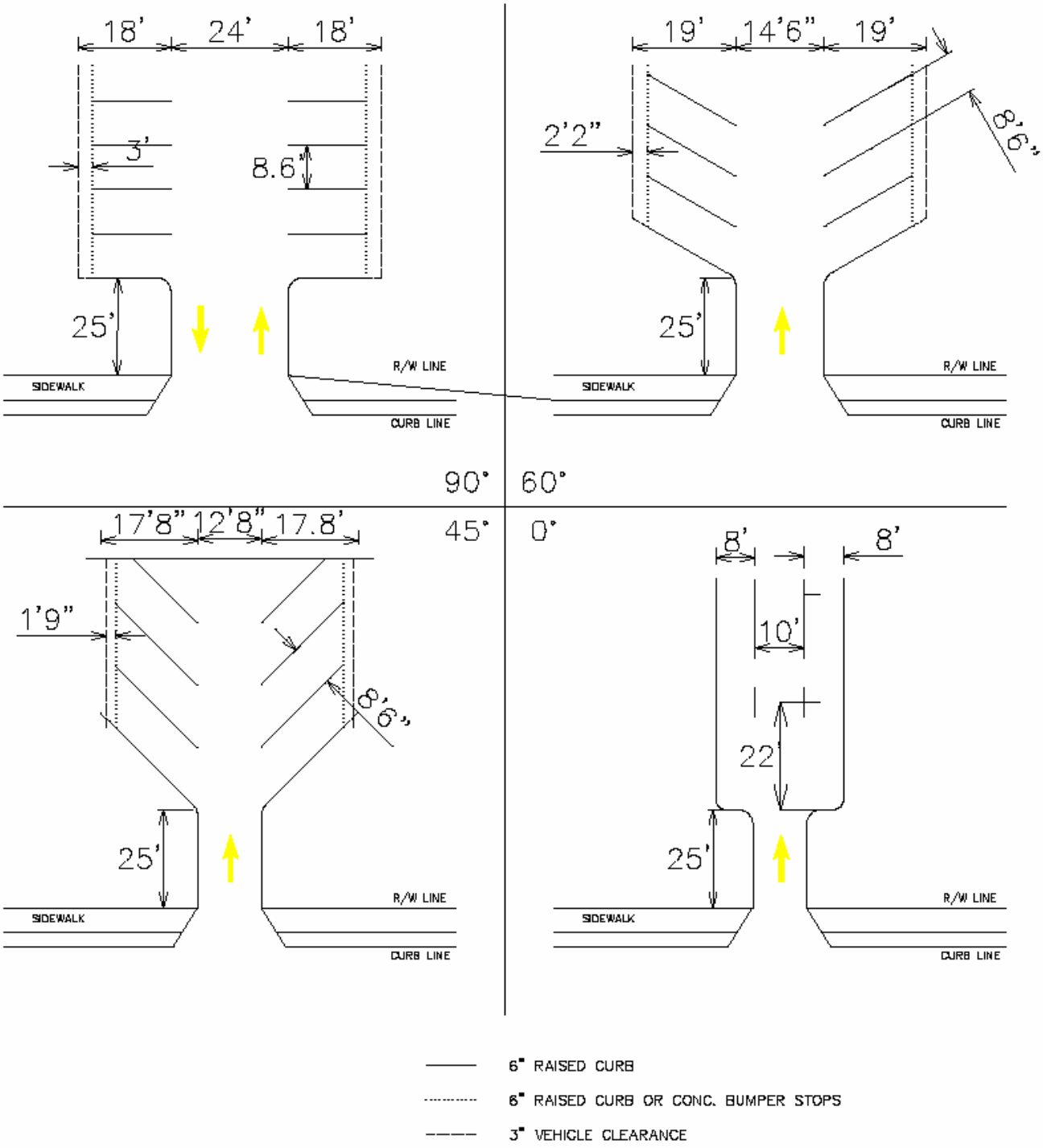



Figure 8

## MINIMUM PARKING REQUIRMENT
## GEOMETRIC DESIGN STANDARDS

| PARKING STALL ANGLE | STALL LENGTH | AISLE | CURB TO CURB | WALL TO WALL |
|---|---|---|---|---|
| (Degrees) | (Ft. – In.) | (Ft. – In.) | (Ft. – In.) | (Ft. – In.) |
| 0 | 22'-0" | 10'-0" | 26'-0" | 26'-0" |
| 45 | 17'-8" | 12'-8" | 44'-6" | 48'-0" |
| 60 | 19'-0" | 14'-6" | 48'-2" | 52'-6" |
| 90 | 18'-0" | 24'-0" | 55'-0" | 60'-0" |

*Stall Width = 9'-0" Recommended; 8' – 6" minimum;*

# DRIVEWAY PERMIT APPLICATION CITY OF GREENSBORO, NC

**LOCATION OF PROPERTY**

Access requested from _____ to _____ .
Street Address Street Name

---

**DEVELOPMENT TYPE**

**RESIDENTIAL** **COMMERCIAL** **INDUSTRIAL** **CHURCH/SCHOOL** **OTHER _____**

**DRIVEWAY 1:** Proposed width _____ feet, centerline located _____ feet north / south / east / west (circle one) of the intersection of

_____ and _____.
Street Name Street Name

**DRIVEWAY 2:** Proposed width _____ feet, centerline located _____ feet north / south / east / west (circle one) of the intersection of

_____ and _____.
Street Name Street Name

**DRIVEWAY 3:** Proposed width _____ feet, centerline located _____ feet north / south / east / west (circle one) of the intersection of

_____ and _____.
Street Name Street Name

---

**AGREEMENT**

I, the undersigned applicant, on behalf of the named property owner, request permission to construct driveway(s) on public right-of-way at the above location(s) and agree to the following:

- to construct driveway(s) in absolute conformance with current City standards and approved plans as applicable;
- to provide necessary sight distance easements if deemed necessary by the City;
- to promptly repair areas disturbed by construction in City right-of-way;
- to provide and be responsible for work zone traffic control measures in and adjacent to City right-of-way in conformance with guidelines established by the City of Greensboro's ***Work Area Traffic Control Handbook (WATCH)***, and the ***Manual on Uniform Traffic Control Devices*** *(**MUTCD**, Millinneum Edition)*;
- to maintain driveway(s) in a manner so as not to interfere with or endanger public travel;
- to indemnify and save harmless the City of Greensboro from all damages and claims for damage that may result from this construction; and
- to notify the City of Greensboro Department of Transportation not less that 48 hours prior to beginning work.

I understand that any permit issued based on this application becomes void if construction of the driveway(s) is not completed within one (1) year of the approval date shown on the permit.

Owner _____ Applicant _____

Address _____ Address _____

City _____ State ____ Zip _____ City _____ State ____ Zip _____

Tel No. _____ FAX No. _____ Tel No. _____ FAX No. _____

Signature _____ Date ___/___/___ Signature _____ Date ___/___/___

---

**PROVIDE A SKETCH OF PROPOSED DRIVEWAY(S) ON REVERSE SIDE OR ATTACH SITE PLANS. SUBMIT THREE (3) COPIES OF COMPLETED APPLICATION AND PLANS TO THE DEPARTMENT OF TRANSPORTATION, P.O. BOX 3136, GREENSBORO, NC 27402-3136. CALL (336) 373-2332 FOR ADDITIONAL INFORMATION.**

---

**CITY USE ONLY**

**APPROVED** **DENIED** by _____ Date ___/___/___ Permit No. _____
Director of Transportation

**SKETCH THE PROPOSED DRIVEWAY(S) BELOW, OR ATTACH SITE PLANS. CLEARLY SHOW THE FOLLOWING INFORMATION:**

- **Locations of existing and proposed driveways and street intersections adjacent to or opposite the property.**
- **Existing and proposed buildings, walls, fences, pipes and culverts, signs, poles, water meters, landscaping, etc.**
- **North arrow and applicable dimensions (driveway width, turn radii, distances, etc.)**

**Recommended Scale: 1" = 20' (each block equals 2 feet). Please indicate if drawing is not to scale.**

## Design Guidelines for Residential Driveways

- A maximum of 2 driveway aprons per residential lot will be permitted.
- A minimum width of at least 8 feet should be provided at the right-of-way line.
- A maximum width of 24 feet should be provided at the right-of-way line.
- Driveway flares should be provided in accordance with COG Standard #416.
- All residential driveways should be constructed as apron type driveways.
- A minimum spacing of at least 20 feet should be provided between all driveways to the same lot.
- The driveway flare should not extend over the projected property line, unless a copy of a written agreement with the adjoining property owner is provided.
- If joint or shared driveways between adjoining properties are to be constructed, a copy of a written agreement between the property owners should be provided.
- For corner lots a minimum tangent of at least 25 feet should be provided between the end of intersection radius and the driveway flare. In areas where the existing lot width will not allow for the 25' minimum tangent, the driveway should be constructed on the far side of the lot away from the street intersection. At no time however, should any portion of the driveway or driveway flare encroach upon the intersection radius.
- All driveways and driveway flares must be constructed outside the existing intersection sight distance triangles. For corner lots the driveway should be constructed along the "Stop" controlled street at least 20 feet from the back of curb from the through street to prevent encroachment into the intersection sight distance triangle.
- No driveway or driveway flare should be constructed within 12 inches of any municipal or state owned feature such as curb inlets, fire hydrants, utility poles, traffic signal standards, or other similar type structure.
- Residential driveways to thoroughfare streets should be avoided, where possible. Where required, GDOT recommends circle type driveways or an on-site turn around be provided for residential driveways to thoroughfare streets, to limit backing into or from the thoroughfare street.
- Horizontal and vertical sight distance in accordance with AASHTO Standards should be provided.
- All driveways shall be constructed as nearly as possible to a right angle to the street. A lesser angle should not typically vary more than 15 degrees from the right angle.

# CITY OF GREENSBORO GATED RESIDENTIAL DRIVEWAY POLICY

The City of Greensboro Department of Transportation in response to new and existing developments constructing gates at their entrances has formulated this policy in the interest of public safety.

The purpose of this policy is to ensure that the safety of the public will not be hampered by the installation of gates into residential developments and that the developer's plan for providing a sense of security is not compromised.

The concern of GDOT is that gates placed too close to a public street may cause traffic attempting to enter a residential development to stack or store in the public street, thus creating capacity and safety problems.

Elements of GDOT's Driveway Manual have been incorporated in the formation of this policy.

## DRIVEWAY POLICY FOR DEVELOPMETNS ENTRANCES WITH GATES

The following standards shall apply (see figure 1):

- There shall be 2 entrance lanes, 1 for residents and 1 for guests.
- Islands or medians shall be 15 feet from the edge of public street or beginning at the public right-of-way line, whichever is greater.
- Gates shall be a minimum of 170 feet with the resident call box 150 feet and guest call box 100 feet from the public right-of-way (exact distances may be greater, see existing and new developments below).
- The distance between the resident call box and the guest call box shall be a minimum of 50 feet.
- A 20 foot minimum opening in the driveway median, between the guest and resident call boxes, shall be constructed to allow vehicles unable to gain access through the gates to exit out to the street.
- Two detector loops shall be connected ti the gate controller. The first loop is to be placed 20 feet from the gate, and the second loop is to be placed twenty feet into the driveway from the edge of the public street. The second loop shall have a 10 second call delay. When traffic is present on the first loop and present on the second, at the end of the 10 second call delay, the gate shall open to clear the traffic queue in the driveway.
- Emergency gate activation shall be provided. All gate systems shall have siren activation, battery powered emergency backup and a manual release in the event of a total system failure.
- The distance for determining the placement of the resident call box, at no less that the minimum, shall be determined by the following:
  For existing developments: based on the peak 3 minute arrival of vehicles multiplied by 20 feet (Example: 10 vehicles x 20' = 200'). Development Owners or Homeowners Association shall submit to GDOT for review traffic counts of vehicle entering the development for a 24 hour period in 3 minute intervals. The traffic count is to be gathered by a traffic engineer registered with the state of North Carolina and submitted to GDOT for review with the gate design. A revised site plan shall be submitted to the Greensboro Planning Department for final approval.
  For new developments: based on peak hour trip generation per the latest edition of the ITE TRIP GENERATION MANUAL, one foot of lane storage from the public right-of-way to the resident call box per vehicle generated in the peak hour or as directed by GDOT. The gate design shall be included with site plans submitted to the Greensboro Planning Department for final approval.
- Mailboxes shall be a distance into the complex from the gate, at a minimum, equal to the required distance between the gate and the public right-of-way.

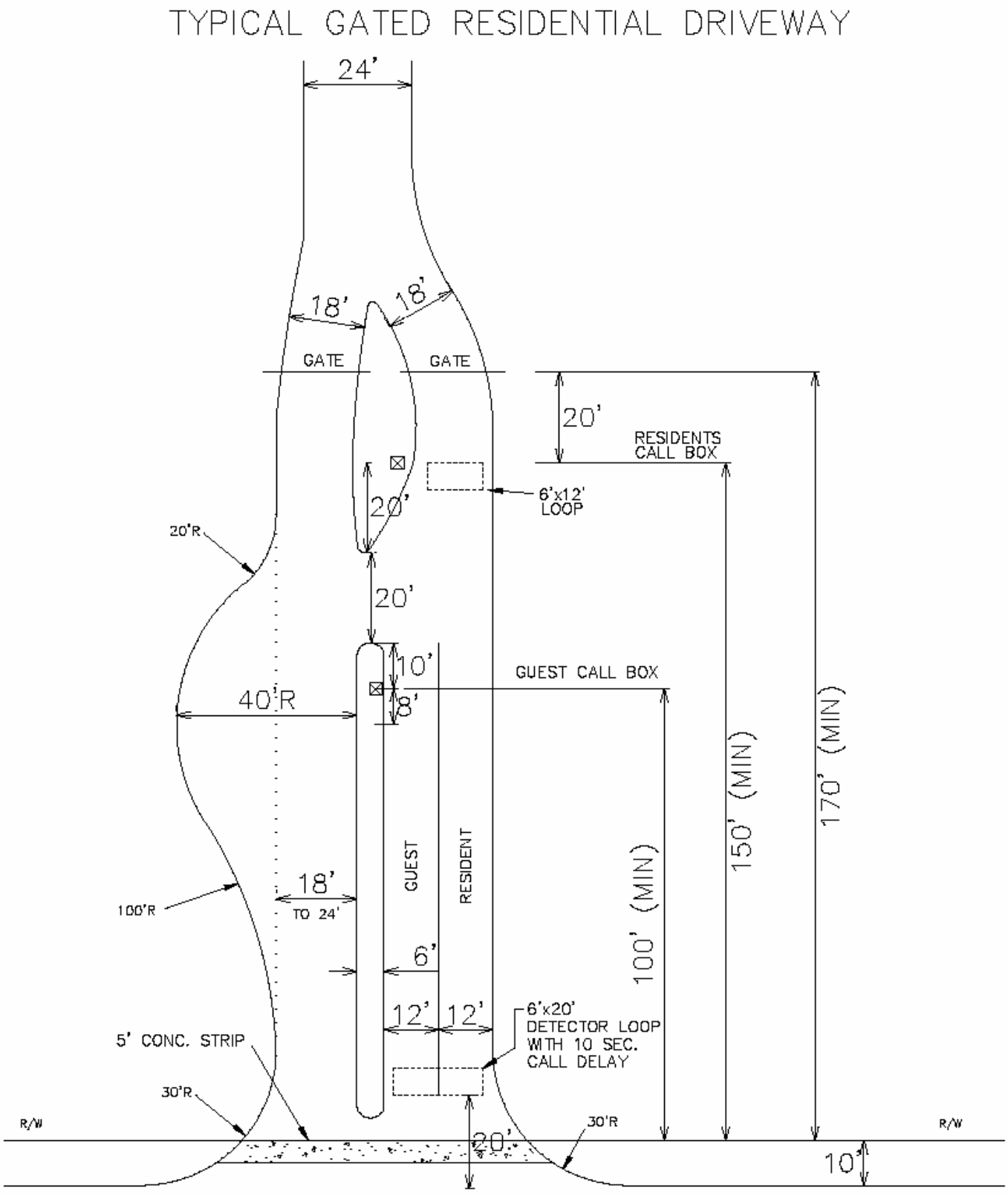

TYPICAL GATED RESIDENTIAL DRIVEWAY
24'
18'
18'
GATE
GATE
20'
RESIDENTS
CALL BOX
6'x12'
LOOP
20'
20'R
20'
10'
GUEST CALL BOX
40'R
8'
18'
TO 24'
100'R
GUEST
RESIDENT
6'
12'
12'
6'x20'
DETECTOR LOOP
WITH 10 SEC.
CALL DELAY
100' (MIN)
150' (MIN)
170' (MIN)
5' CONC. STRIP
30'R
30'R
R/W
R/W
20'
10'

Figure 9

NOTES:

## PART II: DRIVEWAY STANDARDS AND SPECIFICATIONS

### A. GREENSBORO CODE OF ORDINANCES

Some of the following information and specifications are contained in Chapter 26 of the City of Greensboro Code of Ordinances and is reproduced herein for the information of those concerned with this type of construction. The requirements of these specifications must be met in addition to all provisions of the City of Ordinance, as described in Section 26-66 of said code.

### B. DEFINITION OF CONSTRUCTION:

All driveways constructed within the city on street right-of-way by property owners shall conform to these specifications.

### C. PERMITS:

#### Requirements:

No driveway shall be laid, except under contract with the City, without a permit therefore. No permit for the construction of any driveway shall be issued except to a person, firm or corporation licensed under the provision of the license tax ordinance and bonded as required by ordinance.

No person, firm, or corporation shall make any opening in any street or sidewalk of the City without a permit therefore issued by the City of Greensboro by the authority of the Department of Transportation Director.

Before a permit is issued for a driveway on a commercial, industrial or institutional property, a plot plan, sketch, or topographic map must be submitted showing the slope of the parking lot and the manner in which run-off is to be handled.

#### Application

Before any driveway on any public street is laid by any property owner, the contractor therefore shall file with the City of Greensboro a written application for the construction of such a driveway. Such application shall show the name of the owner of

the property abutting such proposed driveway, the location and extent thereof and the name of the contractor who proposes to construct it.

## D. INSPECTION:

### Requirements

The proposed driveway must be inspected by a representative of the Engineering and Inspections Department of the City of Greensboro after the forms are set to final grade but before any concrete or asphalt is placed. The contractor shall call between the hours of 8 a.m. and 9 a.m., Monday through Friday to arrange for this inspection. Calls after 9 a.m. will require the inspection being delayed until the following work day. No inspections will be scheduled if the proper permit has not been issued. Calls should be placed as follows:

| Phone Number | Division |
|---|---|
| 373-2155 | Building Inspections |

### Authority of Inspector

Failure to comply – In case of the failure of the contractor or the property owner constructing the driveway to conform to the requirements of the Manual, the inspector or other official of the Engineering and Inspections Department exercising supervision over the work shall have authority to require the immediate stopping of the work.

Removal of the defective work – The inspector or other official exercising supervision over the work shall have authority to, and shall require the removal of any driveway which does not conform to the requirements of this Manual. Both the property owner for whom the driveway is being constructed and the contractor therefore, shall be liable for the removal of such defective driveway.

## E. MATERIAL SPECIFICATIONS FOR DRIVEWAYS

### Cement

Cement shall be Portland cement of a brand in general use meeting A.S.T.M. Specification c-150, Type 1 or 3.

### Fine Aggregate

Fine aggregate shall be shipped sand and shall conform to A.S.T.M. Specifications C-33. Local sand will not be used.

### Coarse Aggregate

Coarse Aggregate shall be crushed stone or gravel from an approved source. No slag may be used. The aggregate shall conform to N.C. Department of Transportation Specifications for coarse Aggregate, Size No. 3. Size No. 4 will be used when specified or when ordered by the inspector.

### Water

Water shall be from the city system.

### Admixtures

Admixtures will not be used unless specified in these specifications or authorized by the inspector.

### Expansion Joint Filler

Expansion joint filler shall be a non-extruding type such as "Seal Tight", manufactured by W.R. Meadows, or an approved equal. This material shall meet A.S.T.M. Specification D-1751, and shall have a minimum thickness of one-half inch.

### Curing Materials

Curing materials shall be of four general types:

- New Burlap with no holes or breaks
- Polyethylene sheets with no holes or breaks

- Waterproof paper made of two sheets of Kraft paper cemented together with a bituminous material, and shall meet A.S.T.M. Specification C-171
- Liquid membrane-forming compounds shall be clear, or white, or light gray in color, and shall meet A.S.T.M. Specification C-309

## F. CONCRETE SPECIFICATIONS FOR DRIVEWAYS

### Mix Design of Concrete

Concrete shall be an air-entrained sidewalk mix with cement-water proportions as follows:

| | |
|---|---|
| Cement (min) | 6 bags per CY |
| Water (max) | 6.0 gallons per sack of cement |

This concrete shall have a minimum 28-day compressive strength of 3000psi; an air content of not less than 4% nor more than 6%; a slump of not more than 4 inches; and a coarse aggregate of 1 inch maximum size.

### Mixing of Concrete

Mixing of the concrete shall be in accordance with A.S.T.M. Specification C-94 and the requirements of the N.C. State Highway Specifications. No job mixing or hand mixing will be allowed unless specifically authorized by the Engineering and Inspections Officer or his designated representative.

### Placing of Concrete

The rate of delivery of the job shall be regulated such that the proper handling, placing, and finishing may be provided, but the maximum interval between batches must not exceed 20 minutes for continuous placing; and the concrete must be in the final position in the forms within 90 minutes after the introduction of the mixing water to the cement and aggregates or of the cement to the aggregates. This maximum time may be reduced during hot weather if the concrete shows signs of stiffening before it can be placed. **Concrete that has partially hardened will not be re-tempered or used.**

Placing and handling concrete shall be done in such a manner to avoid segregation of the materials, or displacement of the forms. No concreting will be started that cannot be completely placed and finished during daylight, and concreting during inclement weather will be avoided whenever possible. All chutes will be metal lined and cleaned thoroughly before using. Chutes, more than 25 feet long will not be used. Where required, the subgrade will be moistened before the concrete is placed.

No concrete will be dropped more than 5 feet during placing. All water will be removed from the space to be occupied by the ties of concrete at any point and running or working it along the forms will not be permitted. After the initial set of the concrete, the forms must not be jarred, nor strain placed on the projecting ends of reinforcement.

### Testing

The City will take test specimens at random and will have them tested at its own expense. The City shall have the right to enter upon the contractor's premises to examine the plant and to make such checks and tests for accuracy as may be deemed necessary.

## G. CONSTRUCTION SPECIFICATIONS FOR DRIVEWAYS

### Location of Driveways

All driveways shall be placed with the back edge on the property line.

### Thickness and Width

All driveways shall be 6 inches in depth and not exceeding the maximum width as provided elsewhere in this specification. All driveways will be of one course construction.

### Joints

Where sidewalks intersect a curb line or a driveway, an expansion joint shall be installed. Where driveways extend beyond the property line, a ½ inch expansion joint shall be set at the property line.

## Forms

Forms shall be 6 inches in depth for driveways. If of metal, they shall be of a type approved by the Engineering and Inspections Department, and if of wood, shall be not less than 2 inches in thickness and dressed on the top and on the side adjacent to where the concrete is to be poured.

## Subgrade

Where any driveway is to be laid, all rubbish and other encumbrances shall be removed; all soft and spongy material below the subgrade shall be removed and replaced with granular material. The subgrade shall be compacted to a dense state.

Fill over 6 inches in depth shall be compacted with approved mechanical tamps or rolled with approved rollers. In wet area, crushed stone may be required to stabilize the subgrade.

## Standard Finish

The freshly placed concrete shall be struck off with a straight edged template resting upon the side forms and advanced with a crosswise motion. It shall then be floated until the surface has true contour and the concrete is thoroughly compacted. Before the concrete has taken its final set, it shall be properly finished by troweling and brushing lightly with a soft push broom, leaving a gritty texture.

**NOTE:** For exposed-aggregate finish, see PERMITTED VARIANCE FROM STANDARD SPECIFICATIONS described herein later.

## Curing

Any of the curing materials previously specified may be used but they must cover the entire surface of the concrete and must be left in place for a minimum of 72 hours to prevent rapid surface drying by the wind, sun or evaporation.

## Cold Weather

Atmosphere temperature in the shade must be 35 degrees F (2 degrees C) and rising before concrete is placed. No concrete will be placed on frozen subgrade.

The inspector may grant permission for calcium chloride to be added during cold weather as an accelerating admixture. It will not prevent concrete from freezing and cold weather protection must be provided if necessary even if calcium chloride is added to the concrete. The materials will meet the requirements of A.S.T.M. Specification, D-98. The quantity of calcium chloride shall not exceed 2 pounds per sack of cement.

Calcium chloride may be dissolved in the mixing water or may be added dry to the aggregates but not in direct contact with the cement. The amount of calcium chloride added will be regulated such that flash set and rapid hardening do not make the concrete unworkable.

**Hot Weather**

The inspector may require that an approved retarder be added to the concrete mix during hot weather to obtain the finish and curing required.

**Cleanup**

Immediately after the completion of the work, the owner or his contractor shall remove all unused material, refuse, and dirt placed by him on or in the vicinity of the work. All parking and grass plots adjacent to the portion of such driveway shall be evenly graded and left in a neat and orderly condition.

## H. OTHER SPECIFICATION

Unless specifically stated otherwise in these specifications, all materials and work quality will conform to the latest edition of N.C. Department of Transportation – Standard Specifications for Roads and Structures.

When reference to American Society for Testing Materials (A.S.T.M.) or other specifications is used, the latest edition shall apply.

## I. PERMITTED VARIANCE FROM STANDARD SPECIFICATIONS

### Brick Driveways

At the option of the owner, mortarless brick driveways may be installed under the following conditions:

- Total thickness of brick and base shall not be less than that required for concrete alone.

- Brick shall meet the requirements of grade SW, A.S.T.M. specifications C62.

- Brick units shall be placed tightly together with no deliberate jointing; and they shall be adequately restrained by suitable curbing on both street side and property side.

- Base shall be a minimum of 2 ½ inches of 3000 psi concrete, a base of compacted stone screenings will be acceptable provided the owner furnishes the Engineering and Inspections Department with certificating by an independent testing laboratory that the soil subbase has been compacted to 95% of the Standard Proctor Density.

NOTES: