



# Engineering Standards and Procedures Manual

February 15, 2021

# Table of Contents

## **I. Administrative Procedures:**

<u>Page No.</u>	<u>Title</u>
7	A. Introduction
7	B. Application
8	C. Engineering Plan Review Checklist
8	D. Fees
8	E. Driveway Permits
8	F. Encroachment Permits
9	G. PE Certification Process for Subdivision and Streets
9	H. Performance Guarantees
11	I. Final Inspection
11	J. Street Maintenance Acceptance into Town

## **II. Design Criteria:**

<u>Page No.</u>	<u>Title</u>
11	A. Introduction
12	B. Road Design
13	C. Storm Drainage
15	D. Utilities
15	E. Signage
16	F. Cluster Box Units

## **III. Specifications and Special Provisions:**

<u>Page No.</u>	<u>Title</u>
16	A. General Notes
19	B. 100 Series Drawings – Miscellaneous Concrete Infrastructure
19	C. 200 Series Drawings – Street Sections
20	D. 300 Series Drawings – Storm Drainage
22	E. 400 Series Drawings – Reserved
22	F. 500 Series Drawings - Reserved
22	G. 600 Series Drawings - Reserved
22	H. 700 Series Drawings – Miscellaneous
23	I. Traffic Control

## **IV. Standard Drawings:**

### 100 Series - Miscellaneous Concrete Infrastructure

<u>Standard</u>	<u>Description</u>
100.1	Standard Curb and Gutter
101.1	Other Curb and Gutter
102.1	Concrete Contraction Joint
103.1	18" Vertical Curb
104.1	Curb Transition 2'-6" Curb and Gutter to 2'-0" Valley Gutter
105.1	Curb Transition 2'-6" Curb and Gutter to 1'-6" Curb and Gutter

<u>Standard</u>	<u>Description</u>
106.1	Concrete Sidewalks Details and Notes
107.1	Monolithic Concrete Curb and Sidewalk
108.1	Commercial Type II and Residential Type I Drop Curb Driveway with Sidewalk Abutting Curb (2'-6" Curb and Gutter)
109.1	Commercial Type II and Residential Type I Drop Curb Driveway with Sidewalk Abutting Curb (6"x18" Vertical Curb)
110.1	Commercial Type II and Residential Type I Drop Curb Driveway with Sidewalk Abutting
111.1	Residential Drop Curb Type I Driveway with Planting Strip (2'-6" Curb and Gutter)
112.1	Commercial Drop Curb Type II Driveway with Planting Strip (2'-6" Curb and Gutter)
113.1	Residential Drop Curb Type I Driveway with Planting Strip (6"x18" Vertical Curb)
114.1	Commercial Drop Curb Type II Driveway with Planting Strip (6"x18" Vertical Curb)
115.1	Type II Modified Driveway Detail with wide Planting Strip and Standard Curb
116.1	Commercial Type IV Driveway Standard
117.1	Drop Curb Driveway – Monolithic Concrete Curb and Sidewalk
118.1	Residential Driveway (Type I) for Valley Gutter
119.1	Commercial Type II Driveway for 2'-0" Valley Gutter
120.1	Type III Driveway Entrance
121.1	Catch Basin Frame in Valley Gutter
122.1	Catch Basin Placement at Intersections
123.1	Accessible Ramp Standard with Planting Strip 2'-6" Curb and Gutter
124.1	Accessible Ramp Sections with Planting Strip 2'-6" Curb and Gutter
125.1	Accessible Ramp Standard without Planting Strip 2'-6" Curb and Gutter
126.1	Accessible Ramp Sections without Planting Strip 2'-6" Curb and Gutter
127.1	Accessible Ramp Standard 2'-0" Valley Gutter
128.1	Accessible Ramp Sections 2'-0" Valley Gutter
129.1	Accessible Ramp Standard Monolithic Curb and Sidewalk
130.1	Accessible Ramp Sections Monolithic Curb and Sidewalk
131.1	Standard Placement of Accessible Ramps and General Notes
132.1	Truncated Domes Plan and Cross-Section
133.1	Culvert Crossings on Residential and Commercial Streets
134.1	Culvert Crossings on Residential and Commercial Streets
135.1	Typical Local Residential to Local Limited Residential Street Taper
136.1	Directional Accessible Ramp
137.1	Directional Accessible Ramp with Large Curb Radius

## 200 Series - Street Section Details

<u>Standard</u>	<u>Description</u>
200.1	Residential Local Street Parking on Both Sides of Street Typical Section
200.2	Residential Local Street Parking on One Side of Street Typical Section
200.3	Residential Local Street No on Street Parking Typical Section
200.4	Residential Local Street Ditch Type Typical Section
200.5	Residential Local Street Parking on One Side/Open Space on Other Typical Section
210.1	Residential Collector Street with Bike Lanes Typical Section
210.2	Residential Divided Collector Street Typical Sections
210.3	Residential Divided Collector Street with Left-Turn Lane Typical Section
210.4	Residential Collector Street Ditch Type Typical Section
210.5	Residential Divided Collector Street Ditch Type with Median Ditch Typical Section

<u>Standard</u>	<u>Description</u>
220.1	Retail/Mixed Use Local Street Parking on Both Sides of Street Typical Section
220.2	Retail/Mixed Use Local Street No Parking Typical Section
220.3	Retail/Mixed Use Local Street with Median and Parking Typical Section
220.4	Retail/Mixed Use Local Street Parking and Planting Strip on Both Sides Typical Section
230.1	Retail/Mixed Use Collector Street with Bike Lanes Typical Section
230.2	Retail/Mixed Use Collector Street with Median and Bike Lanes Typical Section I
240.1	Industrial Local Street Parking on Both Sides of Street
240.2	Industrial Local Street Parking on One Side of Street
240.3	Industrial Local Street No Parking
250.1	Industrial Collector Street No On Street Parking
250.2	Industrial Collector Street With Median and No Parking
280.1	Residential Local Street Cul-de-sac Detail
280.2	Retail/Mixed Use Local Street Hammerhead Detail
280.3	Residential Alley One-way Operation Typical Section
280.4	Residential Alley Two-way Operation Typical Section
280.5	Residential Local Street Temporary Turnaround
285.1	Local Street Parallel Parking Layout
285.2	Parallel Parking Standards
285.3	Parking, Sidewalk, and Curb and Gutter Transitions at Residential Driveways
285.4	Parking, Sidewalk, and Curb and Gutter Transitions at Retail/Mixed Use Driveways

## 300 Series - Storm Drain Standards

<u>Standard</u>	<u>Description</u>
300.1	NCDOT Standards Approved for Use
301.1	NCDOT Standards Approved for Use
302.1	NCDOT Standards Approved for Use
303.1	Brick Double Catch Basin 15"-36" Pipe
304.1	Concrete Wingwall with Splash Pad
305.1	Concrete Wingwall with Splash Pad
306.1	Rip Rap Aprons at Pipe Outfalls other than SWIM



- 307.1 Flared End Section 12" Thru 72" Pipe
- 308.1 Rip Rap Plunge Pool
- 309.1 Trench Detail for Storm Drain
- 310.1 Concrete Paved Ditches
- 311.1 Rip Rap Ditches
- 312.1 Subdrain Detail
- 313.1 Overlapping Storm Drain / Sanitary Sewer Easements
- 314.1 Minimum Drainage Easement Requirements for Storm Drain Pipes and Open Channels
- 315.1 Offset Catch Basin
- 316.1 Grading at Drop Inlet

400 Series – RESERVED

500 Series – RESERVED

600 Series – RESERVED

700 Series – Miscellaneous Standards

<u>Standard</u>	<u>Description</u>
700.1	Typical Handrail
701.1	Handrail Warrants
702.1	Non-Thoroughfare Street Name Sign
703.1	Thoroughfare Street Name Sign
704.1	Street Name Sign Installation Locations
705.1	End of Roadway Marker
706.1	End of Roadway Street Barricade
707.1	End of Roadway Marker Guard Rail Clamp Installation
708.1	Street Connectivity Sign for End of Roadway Barricade
709.1	End of Roadway Street Barricade General Notes
710.1	Parking Standards
711.1	Parking Standards (Other)
712.1	Accessible Parking and Signage Standards
713.1	Supplemental Van Accessible Sign
714.1	Supplemental Maximum Penalty Sign
715.1	Emergency Vehicle Median Crossover
716.1	Emergency Vehicle Median Crossover
717.1	Inverted "U" Rack for Bicycle Parking
718.1	Wave Rack for Bicycle Parking
719.1	Bicycle Lockers
720.1	Pavement Patching Detail

## **V. Appendices:**

1. Plan Review Checklist
2. Driveway Permit Application
3. Encroachment Permit Application
4. NCDOT Driveway Permit Application
5. PE Certification for Subdivision Streets
6. Subdivision Prefinal Checklist
7. Common Punch List Items
8. Final Inspection Request Form
9. Street Acceptance Application
10. Fees

# **Engineering Standards and Procedures Manual**

The Town of Oakboro's Engineering Standards and Procedures Manual (ESAPM) is provided as a resource that will assist in ensuring compliance with all Town requirements related to proposed land development activities.

It is the Town's goal that the ESAPM present clear and concise technical requirements, policies, and procedures while providing the guidance and details necessary for an effective and efficient process.

The ESAPM is intended as a supplement to the Town's Zoning Ordinance and Subdivision Ordinance. County, State, and Federal agencies may also have additional requirements not provided for or referenced within this manual. This manual does not relieve the design professional of the responsibility to correctly incorporate the provided information. It is the Town's Engineer's responsibility to provide technical adequacy of the design using engineering judgment, experience, and sufficient knowledge in providing all related design elements.

The Town Engineer shall be responsible for incorporating revisions as deemed appropriate based on a continual review of the ESAPM. The ESAPM is available for on-line viewing on the Town of Oakboro's website [www.oakboro.com](http://www.oakboro.com)

Where discrepancies exist between this manual and any adopted Town Ordinance, the Ordinance shall govern. The latest revision of the "NCDOT Standard Specifications for Roads and Structures" and the "NCDOT Design Manual" shall apply to all roadway, storm drainage and utility construction unless otherwise specified herein this manual.

This manual was created to capture most, but not all, scenarios related to development within the Town of Oakboro. The Town's Engineer reserves the right to enforce standards not included within this manual, which uphold the Town's initiative to maintain a safe environment for its citizens.

## **I. Administrative Procedures**

### **A. Introduction**

Processes and procedures for various plan review and development standards are discussed in this section. Each section provides information on the process, standard, or the plan review agency to contact regarding that process.

### **B. Application**

An application for plan review is required. For plan review applications, contact the Town of Oakboro at 704-485-3351 or [oakboro.com](http://oakboro.com).

### **C. Engineering Plan Review Checklist**

The engineering plan review checklist is a detailed list of the items to be reviewed by the Town Engineering or designee. The plans must include, at a minimum, the information described in the Town's Subdivision Ordinance and/or other applicable ordinances. A copy of the engineering plan review checklist is included in Appendix 10. Fees - per the Fee Schedule adopted in the annual budget ordinance.

#### D. Fees

Per the adopted Fee Schedule.

#### E. Driveway Permits

##### Town Driveway Permit

A Town Driveway Permit is required for all new or proposed modifications to connections to Town streets except an individual single family residence. A copy of the Town Driveway Permit Application is in the Appendix. The Town fee for a driveway permit is \$200. If a property owner is proposing to do work within Town maintained right-of-way, an Encroachment Permit may be required. Contact the Town Engineer to confirm if a permit is needed.

Note: Two signed original copies of the driveway permit application along with two sets of plans are required for submission to the Town. A separate encroachment permit is not needed if a driveway permit has been obtained.

##### NCDOT Driveway Permit

When accesses and/or driveways to North Carolina Department of Transportation (NCDOT) maintained facilities are proposed or are proposed to be modified, contact the NCDOT. Forms are available on the web at <http://www.ncdot.gov/>. The Town will review the NCDOT driveway permit applications for accesses proposed within the Town of Oakboro.

#### F. Encroachment Permits

The Town requires that an encroachment permit be obtained when construction activity, including installation of temporary or permanent structures, is proposed under, on, or over property in which the Town has property rights. Permanent structures include, but are not limited to driveway curb-cuts, small wireless facilities, tele-communications switch gear, batteries and other appurtenances, mail boxes and others. Temporary structures include but are not limited to planters, tables, chairs, sandwich signs and others. Property rights include but are not limited to street rights of way, utility easements, or other Town-owned property. An Encroachment Permit is required regardless of any other approvals (excluding a driveway permit), such as building permits.

Encroachment Permit applications are processed through the Town Engineer. A copy of the Town Encroachment Agreement is included in the Appendix.

#### G. PE Certification Process for Subdivisions and Streets

The Town requires that all streets proposed to be taken over by the Town for maintenance be reviewed, inspected, and certified by a licensed professional engineer registered in the state of North Carolina for adequate construction. A pre-construction meeting with the Town Engineer is required.

Review of street construction by the certifying Engineer is required throughout the construction process. PE Certification is required for all developments in which the first submittal of the Town sketch plan or construction plans (if no sketch plan was submitted) occurred after the adoption of this manual on February 15, 2021. A copy of the PE Certification requirements is included in the Appendix.

During construction until such time as the streets are accepted by the Town, the Town Engineer shall conduct weekly Quality Assurance inspections. The owner of the development shall reimburse the Town for QA inspection costs.

All sketch plans and construction plans submitted to the Town for subdivision approval must have the following statement on the cover sheet of the plan set:

*The Town of Oakboro requires that all streets proposed to be taken over by the Town for maintenance be reviewed, inspected, and certified by a licensed professional engineer registered in the state of North Carolina for adequate construction. Review of street construction by the certifying Engineer is required throughout the construction process. Refer to the Town of Oakboro's Engineering Standards and Procedures Manual for additional information including the required certification form.*

#### H. Performance Guarantees

The following list contains information regarding performance guarantees including minimum amounts, duration, and security type.

1. Release of the final subdivision plat or zoning permit for a site plan will not occur until the improvements required for the area of the final plat are constructed and a final inspection has been performed and found to be in conformance with the plans approved by the Town, or a performance guarantee has been posted and all required documents are received in their entirety and acknowledged by the Town.
2. Performance guarantees may be in the form of a: a) Surety bond issued by any company authorized to do business in North Carolina; or b) Letter of Credit issued by any financial institution licensed to do business in North Carolina; or c) Other form of guarantee that provides equivalent security.

3. The type of performance guarantee may be selected by the subdivider or developer. The developer has the option to post one type of performance guarantee in lieu of multiple bonds, letters of credit, or other equivalent security, for all development matters related to the same project requiring performance guarantees.
4. Performance guarantees shall be posted for a minimum of one year, unless the developer determines that the scope of work for the required improvements necessitates a longer duration. In the case of a bonded obligation, the completion date will be set one year from the date the bond is issued, unless the developer determines that the scope of work for the required improvements necessitates a longer duration.
5. Timing. The Town may require the performance guarantee to be posted either at the time the plat is recorded or at a time subsequent to plat recordation. For site plans, the performance guarantee shall be posted after the final Town inspection, but before the final zoning permit is issued.
6. Coverage. The performance guarantee shall only be used for completion of the required improvements and not for repairs or maintenance after completion.
7. Extension. A developer shall demonstrate reasonable, good-faith progress toward completion of the improvements that are secured by the performance guarantee or any extension. If the improvements are not completed to the specifications of the Town, and the current performance guarantee is likely to expire prior to completion of the required improvements, the performance guarantee may be extended or a new performance guarantee issued for an additional period necessary to complete the required improvements. If a new performance guarantee is issued the amount shall be determined by the procedure in sub-section 6 below and shall include the total cost of all uncompleted improvements.
8. Amount. The amount of the performance guarantee shall not exceed one hundred twenty five per cent (125%) of the reasonably estimated cost of completion at the time the performance bond is issued. The Town may determine the amount of the performance guarantee or use a cost estimate determined by the developer. The reasonably estimated cost of completion shall include one hundred per cent (100%) of the costs for labor and materials necessary for completion of the required improvements. Where applicable the costs shall be based on unit pricing. The additional twenty five per cent (25%) includes inflation and all costs of administration. The amount of extension of any performance guarantee shall be determined according to the procedures for determining the initial guarantee and shall not exceed one hundred twenty five per cent (125%) of the reasonably estimated cost of completion of the remaining incomplete improvements still outstanding at the time the extension is obtained.
9. Release. The performance guarantee shall be returned or released, as appropriate, in a timely manner upon the acknowledgement by the local government that the improvement for which the performance guarantee was required are complete. The Town shall return letters of credit or escrowed funds upon completion of the required improvements to its specifications, or upon acceptance of the required improvements, if the improvements are subject to acceptance by the Town. When required improvements that are secured by a bond are completed to the Town's specifications,

or accepted by the Town, the Town shall timely provide written acknowledgement that the required improvements have been completed.

10. Exclusion. Performance guarantees for erosion control and/or stormwater control measures are not subject to this section.

## **I. Final Inspection**

A final inspection of all streets and other infrastructure to be turned over to the Town for Maintenance must be inspected by the Town or the Town's designated inspector. Contact the Town Engineer for scheduling of final inspections.

## **J. Street Maintenance Acceptance**

When a phase/map of a subdivision reaches 90% occupancy, the phase/map will be considered eligible for acceptance by the Town. The Town will not accept streets stubbed out without a cul-de-sac. The procedures for requesting a final inspection are as follows:

1. Submit an executed "Request for Final Inspection Form", along with a "PE Certification for Subdivisions and Streets" form. (refer to Appendix).
2. A representative from the Town's Engineer will proceed with the Final Inspection.
3. Necessary repairs will be marked in the field, and indicated on a punchlist, which shall be valid for a period of ninety days.
4. When the necessary repairs have been completed, the Town should be contacted to verify the repairs have been completed. When all repairs have been approved by the Town Engineer, the final one and one half in. (1.5") lift of asphalt surface course shall be placed.
5. When all conditions have been met, the developer may proceed following the Town of Oakboro Road Acceptance Policy.

The road acceptance policy includes streets, curbs, gutters, storm water drains and sewers, water lines and sanitary sewers and all items located within the right-of- way. A copy of the Road Acceptance Policy and application form are found in the Appendix.

# **II. Design Criteria**

## **A. Introduction**

The following sections present minimum design criteria for the design of public streets, storm drainage, street lighting, street and roadway signage for traffic regulation and street identification, and landscaping.

## B. Road Design

For use in designing Residential and Retail/Mixed-Use Public Streets

<b>Posted Speed Limit</b>	<b>25</b>	<b>30</b>	<b>35</b>	<b>40</b>	<b>45</b>
Stopping Sight Distance* (feet)	155	225	285	350	415
Intersection Sight Distance - Left-Turn Movement From Stop*and** (feet)	280	365	425	485	545
Intersection Sight Distance - Right-Turn From Stop*and** (feet)	240	315	370	420	475
Minimum Horizontal Radius (Normal Crown) (feet)	200	430	675	980	1470
Minimum K value for Crest Vertical Curves	11	24	37	56	81
Minimum K value for Sag Vertical Curves	25	43	58	75	94
Maximum Longitudinal Grade	10 percent				
Maximum Longitudinal Grade within 125 feet of intersection (measured from intersecting street nearest edge of pavement of travel way)	5 percent				
Intersection Angle Range	75 to 105 degrees				

\* Values will need to be adjusted for grades of more than +/- 3 percent

\*\* Values to be adjusted for streets with more than two total lanes; measurements to be taken 14.5' from travel lane

Lower posted speed limits may be permitted by the Town's Engineer on a case by case basis.

Provisions of adequate stopping sight distance may require use of larger K values than the minimums listed above. The Town of Oakboro reserves the right to prescribe more stringent sight distance standards and/or means to achieve adequate sight distance than those listed above. Recordation of sight distance easements may be required on plats prior to approval.

The minimum distance between two horizontal curves is 50 feet. Longer distances may be needed based on the specifics of the roadway design.

Minimum curb and right-of-way radius measured from face of curb (when intersecting streets have different classification, use the more restrictive):

- Residential Local Street – 20 feet
- Residential Local Street to Residential Alley – 10 feet
- Residential Collector – 25 feet
- Retail/Mixed-Use Local – 25 feet
- Retail/Mixed-Use Collector – 25 feet
- Industrial Local and Collector – 35 feet

For minimum intersection separation, refer to block length minimums in the Subdivision Ordinance. NCDOT shall determine minimum lengths / separation along thoroughfares, at signalized intersections, or at intersections that may become signalized in the future on a case-by- case basis.



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

Intersection corner easements – A minimum 35 x 35 foot triangular maintenance easement (measured along right-of-way lines) shall be provided at each intersection corner where any street type intersects a collector or thoroughfare. A minimum 15 x 15 foot triangular maintenance easement (measured along right-of-way lines) shall be provided at each intersection corner where two local streets intersect. An additional 10 x 70 foot triangular maintenance easement shall be provided at intersections connecting to NCDOT maintained roadways (measured along right-of-way lines). Driveways (no formal right-of-way) to serve a single project may be required to provide triangular maintenance easements as determined on a case by case basis. Other triangular maintenance easements or sight distance requirements may be required by the NCDOT or the Town at all intersections. Conveyance to the Town shall be indicated on the final plat.

#### Sidewalks and Driveways

1. Planting strips adjacent to sidewalk shall be graded to one quarter inch per foot (min.) up to one and one quarter in. (1.25") /foot (max.), except where excessive natural grades make this requirement impractical. In such cases, the Town Engineer may authorize a suitable grade.
2. Sidewalk widths shall be a minimum of five feet unless otherwise specified.
3. Accessible ramps are required where sidewalks intersect curbing at any street intersection and curbed driveway connections. Truncated domes shall be black in color.

#### Roundabouts

Refer to the Manual on Uniform Traffic Control Devices (MUTCD) for roundabout signage and pavement markings.

### C. Storm Drainage

1. In addition to this manual, all storm drainage design shall conform to the standards and specifications as provided in the Charlotte-Mecklenburg Storm Water Design Manual, and NCDOT Standards Specifications for Roads and Structures. If conflicts occur, the more restrictive standard shall govern.
2. Reinforced concrete pipe may be used in all storm drain applications. Pipe shall be manufactured by an NCDOT approved facility. High Density Polyethylene Pipe (HDPE) may be substituted for pipe diameters of 48 inches or less as approved by the Town Engineer. Culverts 60 inches in diameter or greater may be Corrugated Aluminized Metal Pipe (CAMP) or aluminum with a minimum 14 gauge metal subject to approval of the Town Engineer.
3. The minimum cover for all pipes is two feet measured from the final surface. Special applications for less than two feet of cover will be reviewed and approved by the Town Engineer individually.

The maximum cover for storm drainage pipes shall at a minimum comply with the requirements of the NCDOT Roadway Design Manual, Part I, Section 5, and “Drainage Design”. Storm pipe design that exceeds these criteria may be approved at the discretion of the Town Engineer.

4. All storm drain structures over three feet six inches in height must have steps in accordance with standard details set forth in this manual.
5. All graded creek banks and slopes shall be at a maximum of two feet horizontal to one foot vertical (2:1) and not to exceed ten feet without terracing or the slopes shall be designed by a Professional Geotechnical Engineer and approved by the Town Engineer on a case by case basis.
6. Adequate storm drainage shall be provided throughout the development by means of storm drainage pipes or properly graded channels. All pipes shall be of adequate size and capacity, as approved by the Town Engineer, to carry all storm water in its drainage area.
7. In accordance with the Town Subdivision Ordinance, the Town Engineer or duly authorized designee shall review the drainage plan for compliance with the standards contained in the current edition of the The Town of Oakboro Engineering Standards and Procedures Manual and the Charlotte Mecklenburg Storm Water Design Manual and all other relevant and appropriate standards established by the Town Engineer.
8. Sub-surface drainage shall be provided where the ground water level is likely to be near the surface. In capillary soils, the water level should be four to six feet below the surface to prevent the rise of moisture into the subgrade. Subdrains shall be used to lower ground water in low areas in the street.
9. All Storm Drainage Easements must extend down stream of flared end sections to an appropriate property line or buffer. Overlapping of storm drainage easements shall be approved by the Town Engineer on a case by case basis.
10. Storm Drainage Easements shall be provided for all storm drainage pipes and shown on site plans, construction plans and plats with widths specified in detail 314.1. The following note shall be placed on all grading plans and plats; "The purpose of the storm drainage easement (SDE) is to provide storm water conveyance. Buildings are not permitted in the easement area. Any other objects which impede storm water flow or system maintenance are also prohibited. Conveyance to Town shall be indicated on the final plat."
11. Storm Drainage Easements shall be provided for all storm drainage pipes and shown on site plans, construction plans and plats with widths specified in detail 314.1. The following note shall be placed on all grading plans and plats; "The purpose of the storm drainage easement (SDE) is to provide storm water conveyance. Buildings are not permitted in the easement area. Any other objects which impede storm water flow or system maintenance are also prohibited. Conveyance to Town shall be indicated on the final plat."

12. In areas where the Floodway Regulations are applicable, the Future Conditions Flood Fringe Line, FEMA Flood Fringe Line, Community Encroachment Line, and FEMA Encroachment Line shall be shown on the preliminary plan and the final plat.

#### D. Utilities

1. Avoid placement of sewer manholes in gutter pans, the crown of the road, wheel paths, wheelchair ramps, and over stormwater lines.
2. Avoid placement of water lines under roadway pavement.
3. Water valves shall not be placed in curbing.
4. Water pipe shall be PVC C-900, SDR 14 or Ductile Iron Class 50 as needed.
5. Gravity sewer pipe shall be SDR-35; Force Main sewer pipe shall be PVC C-900, SDR 14
6. Meter box shall be  $\frac{3}{4}$  plastic W/CIR.
7. Meter setter shall be Mueller H1404-2A, 5/8x3/4 with/Check Valve.  
  
Mueller H14222 setter end connection  
  
Mueller H 14227 setter end connection
8. Water service tubing shall be  $\frac{3}{4}$  PE plastic service tubing.
9. Saddles or service taps shall be Mueller DR2S W/CC threads, stainless steel straps.
10. Fire Hydrant shall be Mueller A421 W3'6" bury.
11. Gate valves shall be Mueller A2362-8/ 2".
12. Substitutes require prior approval from engineer.
13. Utility placement should be comprised of gas on the outer limits of the right of way followed by electric, water, cable and phone to 2 feet behind the back of the curb and gutter. Sewer should be placed in the center of the road.

#### E. Signage

All regulatory, warning, and guide roadway signage shall be consistent with the Manual on Uniform Traffic Control Devices (MUTCD), the North Carolina Supplement to the MUTCD or as specified in this manual. All street name markers are also to be designed in accordance with 700 series standard drawings. All street name markers shall be nine inch tall extruded aluminum blades and utilize high intensity white prismatic reflective sheeting.

## F. Cluster Box Units (CBU's)

Install per USPS standards. Mail cluster box units shall be placed outside of the line of sight (determined by intersection sight distance measurements), sight distance triangles and intersection corner easements. They shall not be placed between the subdivision entrance and its first street intersection. It is best to avoid placing CBU's on the main entrance road to a subdivision, however, special cases may apply.

When locating CBU's near on-street parking, do not place units directly adjacent to the on-street parking. CBU's shall be behind the sidewalk in such cases.

When placing CBU's within the green zone (planting strip), units shall be oriented perpendicular to the street.

Access easements shall be required for all CBU's located outside of the right-of-way and/or common open space.

The ultimate goal in determining locations for mail cluster box units is to avoid placing the CBU in any way which encourages driving on the wrong side of the street and/or hinders handicap accessibility.

## III. Specifications and Special Provisions

### A. General Notes

The following specifications and special provisions are intended to be used in conjunction with Town of Oakboro Standard Drawings, NCDOT Roadway Standard Drawings, and NCDOT Standard Specifications for Roads and Structures for all development within the Town of Oakboro unless otherwise directed by the Town Engineer.

1. Unless otherwise specified in this manual, **all work and materials shall conform to the latest edition of the North Carolina Department of Transportation Standard Specifications for Roads and Structures.**
2. All backfill material shall be non-plastic in nature, free from roots, vegetative matter, waste, construction material or other objectionable material. Said material shall be capable of being compacted by mechanical means and the material shall have no tendency to flow or behave in a plastic manner under the tamping blows or proof rolling.
3. Materials deemed by the inspector as unsuitable for backfill purposes shall be removed and replaced with select backfill material.
4. Compaction requirements shall be attained by the use of mechanical compaction methods. Each six inch layer of backfill shall be placed loose and thoroughly compacted into place.
5. ALL concrete used in the public right-of-way for streets, curb and gutter, sidewalks and drainage structures, etc. shall have a minimum compressive strength of 3600 PSI at 28 days.

This requirement shall be provided regardless of any lesser compressive strength specified in the North Carolina Department of Transportation Standard Specifications for Roads and Structures. The contractor shall prepare concrete test cylinders in accordance with Section 1000 of the North Carolina Department of Transportation Standard Specifications for Roads and Structures at the direction of the project inspector. All equipment and cylinder molds shall be furnished by the contractor. It shall be the responsibility of the contractor to protect the cylinders until such time as they are transported for testing. Testing for projects shall be performed by an independent testing lab, at no cost to the Town. The contractor shall provide equipment and perform tests on concrete for a maximum slump and air content as defined in Section 1000 of the North Carolina Department of Transportation Standard Specifications for Roads and Structures. These tests shall be performed at a frequency established by the inspector. Materials failing to meet specifications shall be removed by the contractor.

6. Concrete or asphalt shall not be placed until the air temperature measured at the location of the paving operation is at 35 degrees Fahrenheit and rising by 10:00 a.m. Concrete or paving operations should be suspended when the air temperature is 40 degrees Fahrenheit and descending. The contractor shall protect freshly placed concrete or asphalt in accordance with Sections 420 (Concrete Structures), 600 (Asphalt Bases And Pavements), and 700 (Concrete Pavements And Shoulders) of the North Carolina Department of Transportation Standard Specifications for Roads and Structures when the air temperature is at or below 35 degrees Fahrenheit and the concrete has not obtained an age of 72 hours.
7. Trees must meet Guidelines for Planting within Highway Right of Way, NCDOT.
8. Handrail shall be installed by a certified welder.

#### Grading

1. Proposed street rights-of-way shall be graded to their full width for ditch type streets and a minimum of eight feet behind the curb for curb and gutter sections.
2. Fill embankments shall be constructed in accordance with section 235 of the North Carolina Department of Transportation Standard Specifications for Roads and Structures and placed in successive lifts not to exceed more than six inches in depth for the full width of the cross-section, including the width of the slope area. No stumps, trees, brush, rubbish or other unsuitable materials or substances shall be placed in the right-of-way. Each successive six inch layer shall be thoroughly compacted by the sheepsfoot tamping roller, 10-ton power roller, pneumatic-tired roller, or other methods approved by the Town Engineer. Embankments over and around all pipe culverts shall be of select material, placed and thoroughly tamped and compacted as directed by the Town Engineer or his representative.

#### Roadway Base

1. All roadways shall be constructed with a base course as detailed on the applicable Town of Oakboro Standard Detail Drawing.
2. The material for the aggregate base course (ABC) shall be in conformance with Section 520 – Aggregate Base Course of the North Carolina Department of Transportation Standard Specifications for Roads and Structures.

3. An asphalt concrete base course, as detailed on the Standard Detail Drawing may be substituted in lieu of an aggregate base course and shall be in accordance with all applicable articles of the North Carolina Department of Transportation Standard Specifications for Roads and Structures.
4. Asphalt concrete base course (ACBC) shall be used for widening strips less than five feet in width.

#### Roadway Intermediate and Surface Course

1. Plant mixed asphalt shall conform in all respects to Section 610 of the NCDOT Standard Specifications for Roads and Structures.
2. The final one and one half inch (1.5") of asphalt surface course for residential subdivision and/or site-planned streets shall be withheld until a minimum 90 percent of the development is occupied (occupied means a certificate of occupancy has been issued) (All documentation to be provided by the developer and approved by the Town Engineer or designee). All deficiencies shall be repaired prior to application of the final one and one half (1.5") lift of asphalt surface course.
3. The Town Engineer shall be given at least a 48-hour notification to inspect and approve repairs prior to application of the final layer of asphalt. All deficiency repairs are to be monitored and accepted by the Town Engineer or designee.
4. The Town Engineer shall be notified prior to using recycled plant mixes.
5. Failure to meet any of the requirements of this manual may result in the delay or prevention of street acceptance by the Town of Oakboro or NCDOT.

#### Sidewalks and Driveways

1. Sidewalks shall be constructed with concrete having a minimum compressive strength of not less than 3600 P.S.I. concrete. The sidewalk shall be at least six inches thick where sidewalk crosses a driveway and at least four inches thick in all other locations. The subgrade shall be compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test. The surface of the sidewalk shall be steel trowel and light broom finished and cured with an acceptable curing compound. Tooled joints shall be provided at intervals of not less than five feet and expansion joints at intervals of not more than 45 feet. The sidewalk shall have a lateral or cross slope of one-quarter inch per foot.
2. Planting strip adjacent to sidewalk shall be graded to ¼ inch per foot (min.) up to 1 ¼ inch per foot maximum, except where excessive natural grades make this requirement impractical. In such cases, the Town Engineer may authorize a suitable grade.
3. Sidewalk widths shall be a minimum of five feet unless otherwise specified.
4. Approval of sidewalk construction plans must be obtained as part of the plan review process. A recorded permanent public sidewalk easement is required for all sidewalk located outside public right-of-way; the width of the easement shall be specified by the Town. The sidewalk

easement must be recorded with the Stanly County Register of Deeds prior to issuance of a certificate of occupancy for the corresponding building(s).

5. Accessible ramps are required where sidewalks intersect curbing at all street intersections and curbed driveway connections.
6. All sidewalks shall comply with the standards of the U.S. Code - Americans with Disabilities Act and any N.C. applicable statutes and regulations.

## B. 100 Series Drawings – Miscellaneous Concrete Infrastructure

Drawings in this series include details for curb and gutter, sidewalks, driveways, accessible ramps, culvert crossings, and street tapers. The following list provides information in addition to that included in the standard drawings in this series.

1. All curb and gutter shall be backfilled with soil approved by the Inspector within 48 hours after construction to prevent erosion.
2. All concrete shall be cured with 100 percent Resin Base, white pigmented curing compound which meets ASTM Specifications C-309, Type 1, applied at a uniform rate at one gallon to 400 square feet within 24 hours of placement of the concrete.
3. Straight forms shall not be used for forming curb and gutter in curves.
4. All excess concrete on the front edge (lip) of gutter shall be removed when curb and gutter is poured with a machine.

## C. 200 Series Drawings – Street Sections

Drawings in this series include details for street typical sections including pavement design, cul-de-sacs, parallel parking space location/layout, alleys, and hammerheads.

1. All asphalt cuts shall be made with a saw when preparing street surfaces for patching or widening strips.
2. All subgrades shall be compacted to 100% of the maximum density obtainable with the Standard Proctor Test to a depth of twelve (12) inches, and a density of 95% Standard Proctor for depths greater than twelve (12) inches. All tests shall be performed by developer at no cost to the Town.
3. Paper joints shall be used to seal the ends of an asphalt pour so that future extensions can be made without causing rough joints.
4. When placing asphalt against existing surfaces, a straight edge shall be used to prevent “humping” at that location.

5. Stone shall be primed if paving is not complete within seven days following stone base approval.
6. Surfaces shall be tacked when asphalt is being placed over existing asphalt streets or adjoining concrete, storm drain and sanitary sewer structures.
7. Sweeping of the stone base and/or application of a tack coat may be required near intersections. These requirements will be established by the Town/NCDOT Inspector based on field conditions.
8. A canvas cover or other suitable cover shall be required for transporting plant mix asphalt during cool weather when the following conditions are present:
  - a. Air temperature is below 60 degrees Fahrenheit.
  - b. Length of haul from plant to job is greater than five (5) miles.
  - c. Other occasions at the Inspector's discretion when a combination of factors indicates that material should be covered in order to assure proper placement temperature.
9. Roadside ditches shall conform to NCDOT standards unless otherwise specified by the Town along Town maintained roads.

#### D. 300 Series Drawings – Storm Drainage

Drawings in this series include NCDOT standards approved for use, catch basins, wingwalls, riprap aprons, flared end section pipe, riprap plunge pools, trench drains, paved ditches, subdrains, overlapping of easements, minimum drainage easements, and grading at drop inlets. The following list provides information in addition to that included in the standard drawings in this series.

1. All concrete shall be at least 3600 PSI. Prior approval from the Town Engineer shall be obtained in order to use pre-cast storm drainage structures in any street right-of-way.
2. Concrete pipe used within the street right-of-way shall be a minimum of Class III Reinforced Concrete Pipe, with a minimum diameter of fifteen inches (eighteen inches minimum on cross drain culverts). Installation of Class IV or higher concrete pipe shall be identified on the As-Built Plan and the Town Inspector shall be given documentation and notification of this information prior to construction.
3. Concrete mortar joints shall be used for joining all concrete pipes. The pipe shall be clean and moist when mortar is applied. The lower portions of the bell or groove shall be filled with mortar sufficient to bring the inner surface flush and even when the next joint is fitted into place. The remainder of the joint shall then be filled with mortar and a bead or ring of mortar formed around the outside of the joint. The application of mortar may be delayed until fill is completed when the pipe is larger than thirty inches.
4. Performed joint sealer, which conforms to AASHTO specification M-198 for Type B flexible plastic gaskets, may be used in lieu of the mortar joining method.
5. Under no circumstances shall water be permitted to rise in un-backfilled trenches after the pipe has been placed.



### High Density Polyethylene Pipe (HDPE)

1. All trenches in the street right-of-way shall be backfilled with suitable material immediately after the pipe is laid. The fill around all pipes shall be placed in layers not to exceed six inches and each layer shall be compacted thoroughly.
2. Any installation within the maintenance limits of the Town is subject to the approval of the Town Engineer.
3. The product used shall be corrugated exterior/smooth interior pipe (Type S), conforming to the requirements of AASHTO Specification M294 (latest edition) for Corrugated Polyethylene Pipe.
4. Bell and spigot joints shall be required on all pipes inside the right-of-way. Bells shall cover at least two full corrugations on each section of pipe. The bell and spigot joint shall have an "O" ring rubber gasket meeting ASTM F477 with the gasket factory installed, placed on the spigot end of the pipe. Pipe joints shall meet all requirements of AASHTO M294.
5. All HDPE pipe installed must be inspected and approved by the Town's Inspector prior to any backfill being placed. The Town Engineer or his designee must be present during the backfilling operation.
6. Backfill material used to install HDPE pipe within the street right-of-way shall be Select Material, Class II-IV, as defined by Section 1016-3 of the North Carolina Department of Transportation Standard Specifications for Roads and Structures. Upon submittal of written certification of material suitability by a licensed geotechnical engineer, NCDOT Class I Select Material may be used. All backfill material shall be approved by the Town inspector prior to placement of the material within the Town street right-of-way.
7. The minimum length of HDPE pipe permitted for use shall be four feet. HDPE flared end sections are not allowed.
8. All HDPE pipe installed shall be third party certified and shall bear the Plastic Pipe Institute's (PPI) certificate sticker.

### Installation of Reinforced Concrete and Corrugated Metal Pipe

1. All backfill shall be non-plastic in nature, free from roots, vegetative matter, waste, construction material or other objectionable material. Said material shall be capable of being compacted by mechanical means and shall have no tendency to flow or behave in a plastic manner under the tamping blows or proof rolling.
2. Materials deemed by the Engineer as unsuitable for backfill purposes shall be removed and replaced with select backfill material.
3. Backfilling of trenches shall be accomplished immediately after the pipe is laid. The fill around the pipe shall be placed in layers not to exceed eight inches; each layer shall be thoroughly

compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test (a density of 100 percent Standard Proctor is required for the top eight inches).

4. Compaction requirements shall be attained by the use of mechanical compaction methods. Each layer of backfill shall be placed loose and thoroughly compacted in place.

E. 400 Series Drawings – RESERVED

F. 500 Series Drawing – RESERVED

G. 600 Series Drawings – RESERVED

H. 700 Series Drawings – Miscellaneous

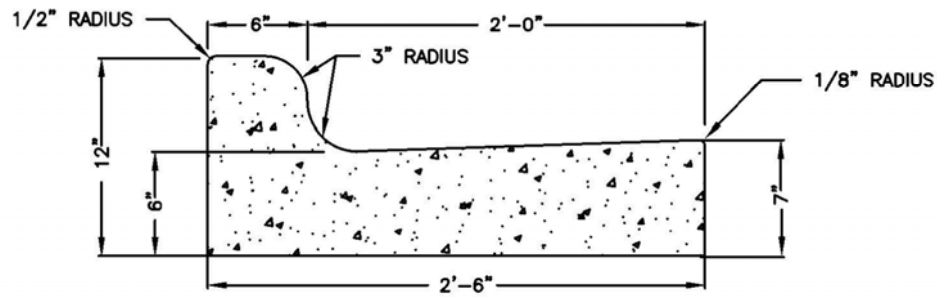
Drawings in this series include concrete control monuments, handrails, street name signs, end of road devices and markers, parking standards, accessible parking signage, roundabout signage, emergency vehicle median crossovers, bicycle racks and bicycle lockers.

## I. Traffic Control

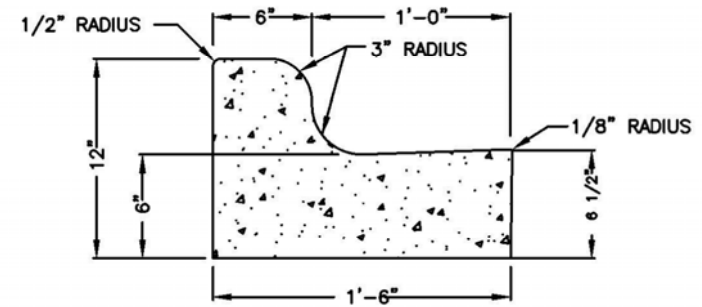
The contractor shall maintain two-way traffic at all times when working within existing streets. The contractor shall place and maintain signs, danger lights, and barricades and furnish watchmen or flagmen to direct traffic in accordance with the latest edition Work Area Traffic Control Handbook (WATCH). Work in the right-of-way of State System Streets may require additional traffic control provisions. Refer to the Work Area Traffic Control Handbook (WATCH) for traffic control needs for work within the road right-of-way.

## References

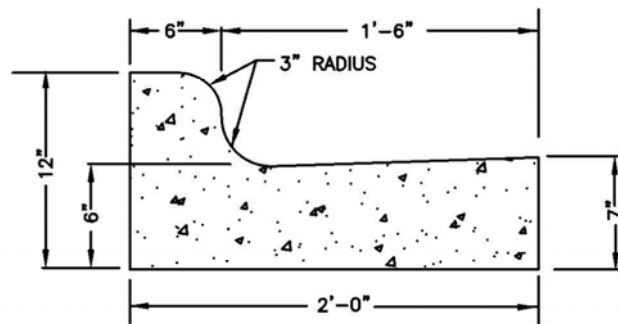
1. North Carolina Department of Transportation, most recent edition, Standard Specifications for Roads and Structures.
2. North Carolina Department of Transportation, most recent edition, Roadway Standards Drawings.
3. City of Charlotte Department of Transportation, most recent edition, Work Area Traffic Control Handbook (WATCH).
4. City of Charlotte Storm Water Services-Mecklenburg County Storm Water Services most recent edition, Charlotte-Mecklenburg Storm Water Design Manual.
5. American Association of State Highway and Transportation Officials most recent edition, A Policy on Geometric Design of Highways and Streets.
6. North Carolina Department of Transportation, Roadway Design Manual, latest edition.
7. North Carolina Department of Environment and Natural Resources most recent edition, Erosion and Sediment Control Planning and Design Manual.
8. Charlotte-Mecklenburg BMP Design Manual, latest edition.
9. Mecklenburg County Storm Water Services, most recent edition, Administrative Manual for Implementation of the Post-Construction Storm Water Ordinance.
10. Mecklenburg County Board of County Commissioners, most recent edition, Mecklenburg County Soil and Sedimentation Control Ordinance.
11. Manual of Uniform Traffic Control Devices for Streets and Highways, Federal Highway Administration, latest edition.



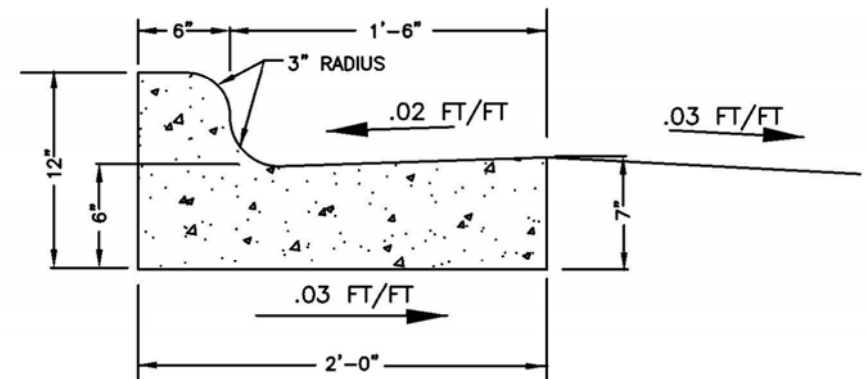
STANDARD 2'-6" CURB AND GUTTER



1'-6" STANDARD CURB AND GUTTER



2'-0" STANDARD CURB & GUTTER



SLOPE FOR VARIABLE  
SUPERELEVATION RATES

NOT TO SCALE

Town of Oakboro  
Development Standards

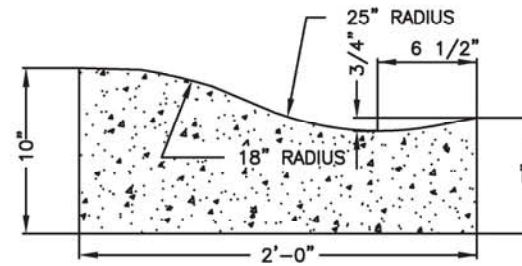
## STANDARD CURB AND GUTTER

REV. DATE

STD. NO.

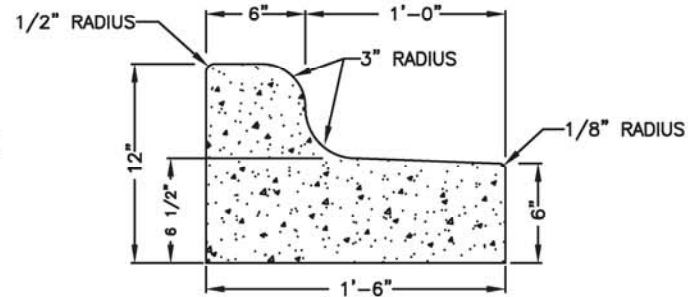
100.1

### 2'-0" VALLEY GUTTER



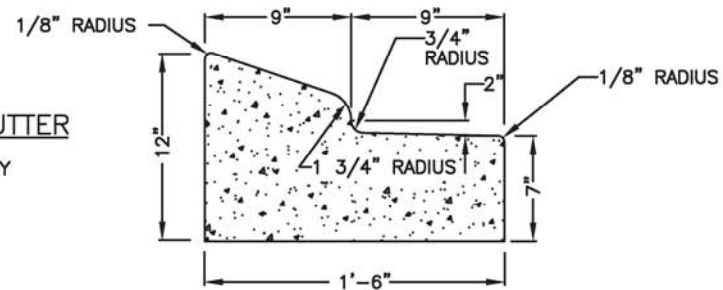
### 1'-6" MEDIAN CURB AND GUTTER

TO BE USED IN MEDIANS WHEN LANES ARE SLOPED FROM ISLAND OR AS SPECIFIED BY THE ENGINEER.

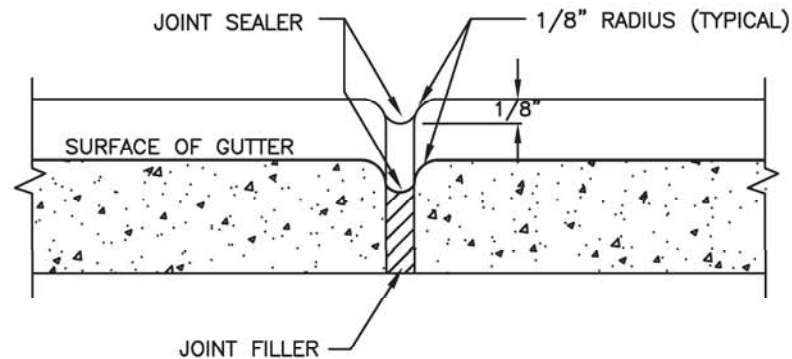


### 1'-6" MOUNTABLE CURB AND GUTTER

TO BE USED IN MEDIANS ONLY: WHEN SPECIFIED BY THE ENGINEER.



NOT TO SCALE



### TRANSVERSE EXPANSION JOINT

#### NOTES:

1. CONTRACTION JOINTS SHALL BE SPACED AT 10-FOOT INTERVALS. FOR VALLEY GUTTER, A 10-FOOT SPACING MAY BE USED WHEN A MACHINE IS USED. JOINT SPACING MAY BE ALTERED BY THE VILLAGE ENGINEER TO PREVENT UNCONTROLLED CRACKING.
2. CONTRACTION JOINTS MAY BE INSTALLED BY THE USE OF TEMPLATES OR FORMED BY OTHER APPROVED METHODS. WHERE SUCH JOINTS ARE NOT FORMED BY TEMPLATES, A MINIMUM DEPTH OF 1 1/2" SHALL BE OBTAINED.
3. ALL EXPANSION JOINTS SHALL BE SPACED AT 90-FOOT INTERVALS, AND ADJACENT TO ALL RIGID OBJECTS. JOINTS SHALL MATCH LOCATIONS WITH JOINTS IN ABUTTING SIDEWALK.
4. CONCRETE COMPRESSIVE STRENGTH SHALL BE 3600 P.S.I. IN 28 DAYS.
5. CURB SHALL BE DEPRESSED AT INTERSECTIONS TO PROVIDE FOR FUTURE ACCESSIBLE RAMPS.
6. TOP 6" OF SUBGRADE BENEATH THE CURB AND GUTTER SHALL BE COMPACTED TO 100% STANDARD PROCTOR DENSITY.

NOT TO SCALE

Town of Oakboro  
Development Standards

## CONCRETE CONTRACTION JOINT

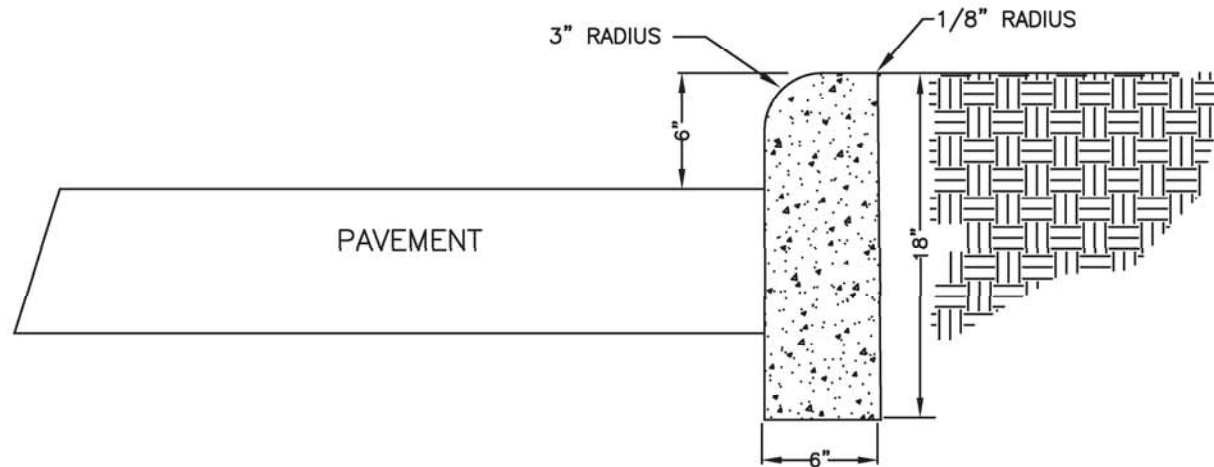
REV. DATE

STD. NO.

102.1

NOTES:

1. CONTRACTION JOINTS SHALL BE SPACED AT 10-FOOT INTERVALS. JOINT SPACING MAY BE ALTERED BY THE ENGINEER TO PREVENT UNCONTROLLED CRACKING.
2. CONTRACTION JOINTS MAY BE INSTALLED BY THE USE OF TEMPLATES OR FORMED BY OTHER APPROVED METHODS. WHERE SUCH JOINTS ARE NOT FORMED BY TEMPLATES, A MINIMUM DEPTH OF 1 1/2" SHALL BE OBTAINED.
3. ALL EXPANSION JOINTS SHALL BE SPACED AT 90-FOOT INTERVALS, AND ADJACENT TO ALL RIGID OBJECTS. JOINTS SHALL MATCH LOCATIONS WITH JOINTS IN ABUTTING SIDEWALK.
4. CONCRETE COMPRESSIVE STRENGTH SHALL BE 3600 P.S.I. IN 28 DAYS.
5. CURB SHALL BE DEPRESSED AT INTERSECTIONS TO PROVIDE FOR FUTURE ACCESSIBLE RAMPS.
6. TOP 6" OF SUBGRADE BENEATH THE CURB SHALL BE COMPACTED TO 100% STANDARD PROCTOR DENSITY.
7. DETAIL MAY BE USED FOR PRIVATE DRIVES, PARKING LOTS, AND INTERIOR CIRCULATION DRIVE.



NOT TO SCALE

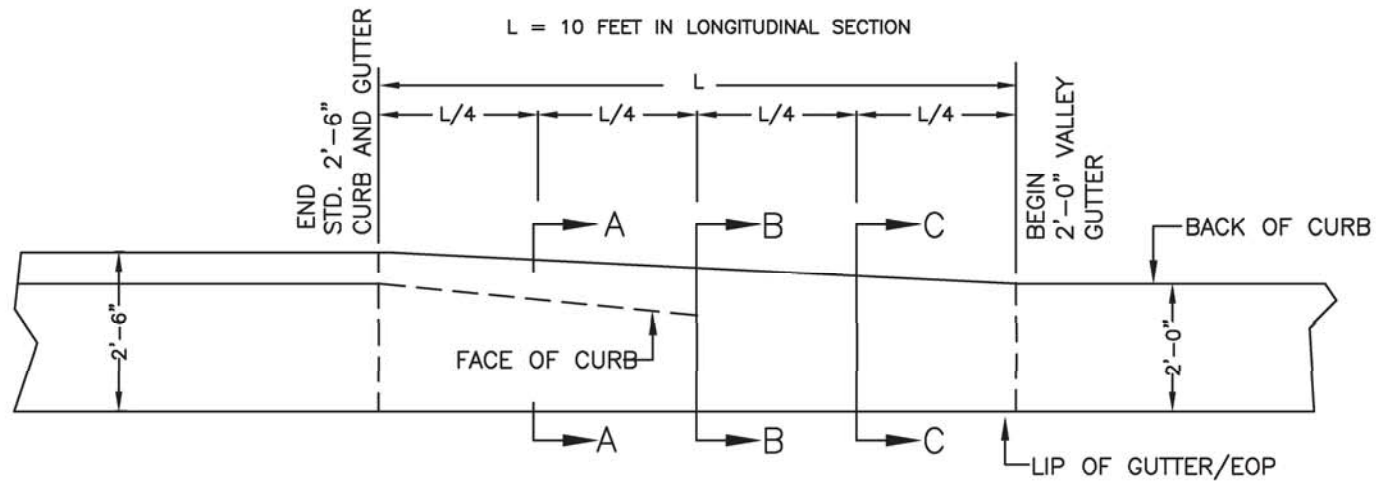
Town of Oakboro  
Development Standards

18" VERTICAL CURB

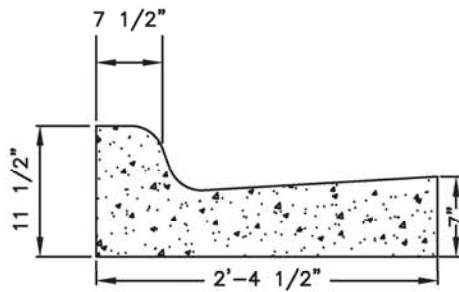
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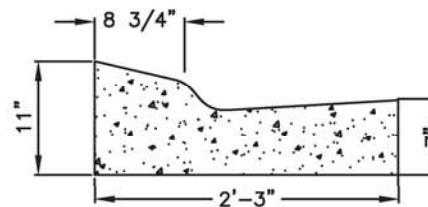
103.1



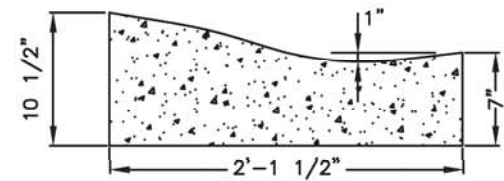
PLAN VIEW



SECTION A-A



SECTION B-B



SECTION C-C

NOTES:

1. TRANSITION IS NOT TO BE LOCATED WITHIN THE CURB RADIUS.

NOT TO SCALE

Town of Oakboro  
Development Standards

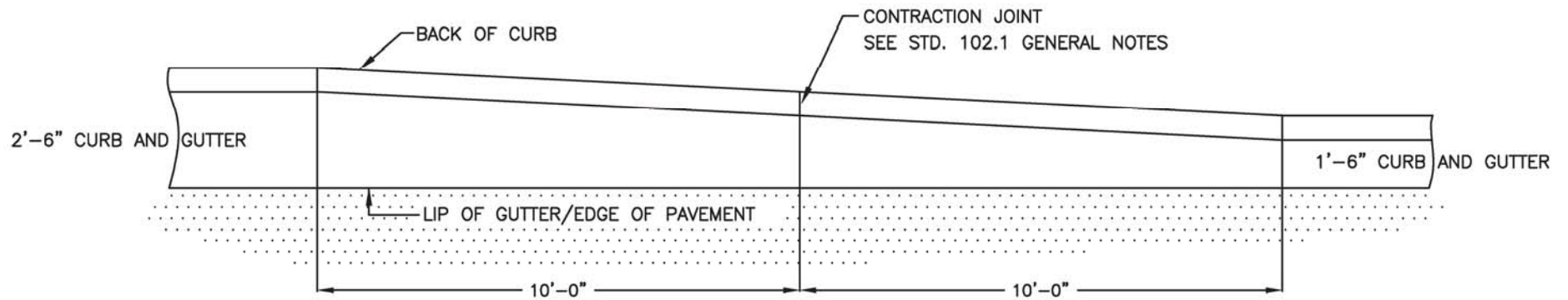
## CURB TRANSITION 2'-6" CURB AND GUTTER TO 2'-0" VALLEY GUTTER

REV. DATE

STD. NO.

104.1





PLAN VIEW

NOTES:

1. TRANSITION TO BE ALONG BACK OF CURB.

NOT TO SCALE

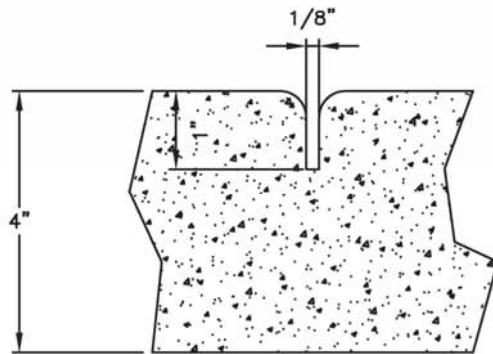
Town of Oakboro  
Development Standards

**CURB TRANSITION**  
**2'-6" CURB AND GUTTER TO**  
**1'-6" CURB AND GUTTER**

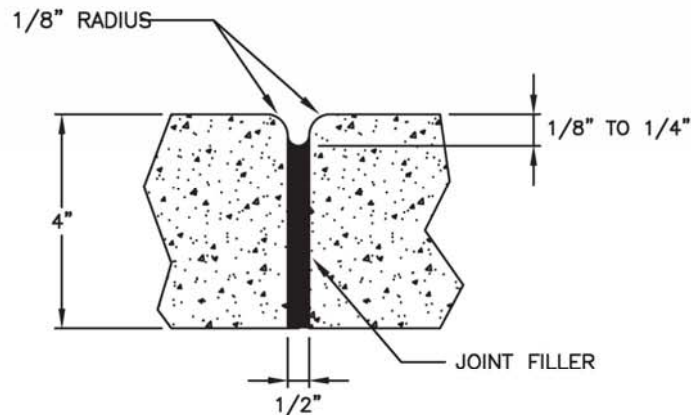
REV. DATE

STD. NO.

105.1



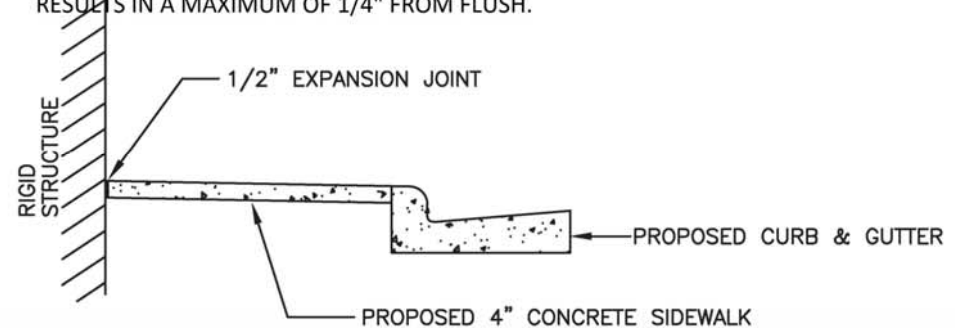
GROOVE JOINT IN SIDEWALK



TRANSVERSE EXPANSION  
JOINT IN SIDEWALK

GENERAL NOTES:

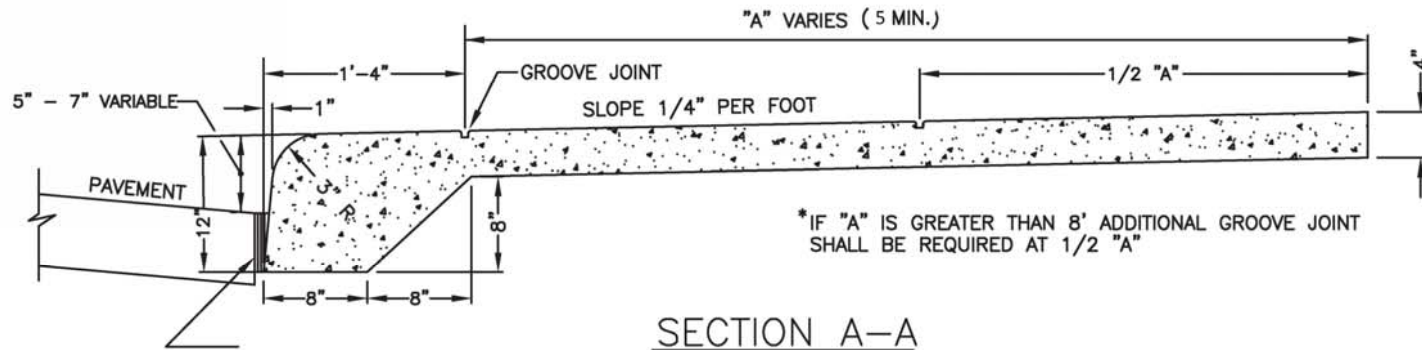
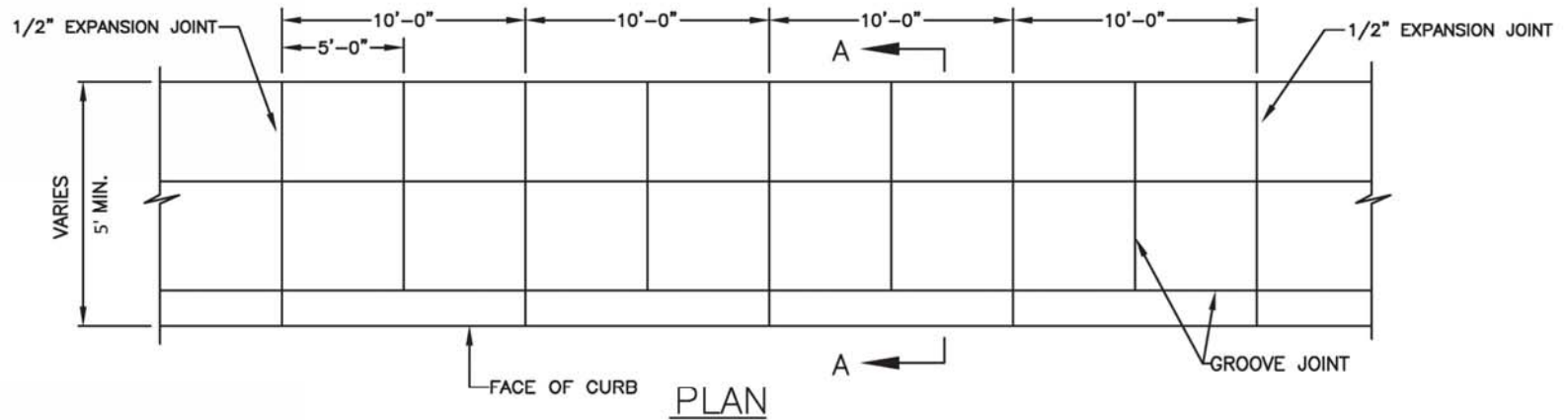
1. A GROOVE JOINT 1" DEEP WITH 1/8" RADII SHALL BE REQUIRED IN THE CONCRETE SIDEWALK AT 5' INTERVALS. ONE 1/2" EXPANSION JOINT WILL BE REQUIRED AT 45' INTERVALS NOT TO EXCEED 50' AND MATCHING EXPANSION/CONSTRUCTION JOINT IN ADJACENT CURB. A SEALED 1/2" EXPANSION JOINT WILL BE REQUIRED WHERE THE SIDEWALK JOINS ANY RIGID STRUCTURE.
2. SIDEWALK AT DRIVEWAY ENTRANCES TO BE 6" THICK.
3. WIDTH OF SIDEWALK ON RESIDENTIAL STREETS SHALL BE A MINIMUM OF 5'.
4. WIDTH OF SIDEWALKS A PART OF THE LOOP AND GREENWAY MASTER PLAN SHALL BE A MINIMUM OF 8'.
5. SIDEWALK TO BE CONSTRUCTED TO END OF RADIUS AT INTERSECTING STREETS.
6. CONCRETE COMPRESSIVE STRENGTH SHALL BE 3600 PSI. IN 28 DAYS.
7. ZONING CONDITIONS MAY REQUIRE ADDITIONAL WIDTH SIDEWALKS WHICH SHALL SUPERSEDE THESE STANDARD DIMENSIONS SHOWN.
8. LIDS FOR JUNCTION BOXES AND UTILITY VAULTS SHALL BE NON-SKID AS SPECIFIED BY THE VILLAGE ENGINEER.
9. JOINT MATERIALS SHALL LIMIT SHRINK/SWELL SO POST CONSTRUCTION INSTALLATION RESULTS IN A MAXIMUM OF 1/4" FROM FLUSH.



DETAILS SHOWING EXPANSION JOINTS

FOR CONCRETE SIDEWALK

NOT TO SCALE



TWO 1/2" THICK PIECES BITUMINOUS FIBER REQUIRED  
IF SUBBASE IS CONCRETE. MUST BE SEALED WITH  
APPROVED JOINT SEALER.

#### GENERAL NOTES:

1. A GROOVE JOINT 1" DEEP WITH 1/3" RADII SHALL BE REQUIRED IN THE CONCRETE SIDEWALK AT 5' INTERVALS. ONE 1/2" EXPANSION JOINT WILL BE REQUIRED AT 40' INTERVALS. A 1/2" EXPANSION JOINT WILL BE REQUIRED WHERE THE SIDEWALK JOINS ANY RIGID STRUCTURE.
2. ALL CONCRETE TO BE 3600 P.S.I. COMPRESSIVE STRENGTH.
3. SEE STANDARD 106.1 FOR DETAIL OF EXPANSION JOINT AND GROOVE JOINT.
4. SEE STANDARD 117.1 FOR DETAIL OF DRIVEWAY.
5. MONOLITHIC CURB AND SIDEWALK TO BE CONSTRUCTED ONLY WHEN REPLACING GRANITE CURB OR AT LOCATIONS APPROVED BY THE APPROPRIATE ENGINEER.

NOT TO SCALE

Town of Oakboro  
Development Standards

## MONOLITHIC CONCRETE CURB AND SIDEWALK

REV. DATE

STD. NO.

107.1

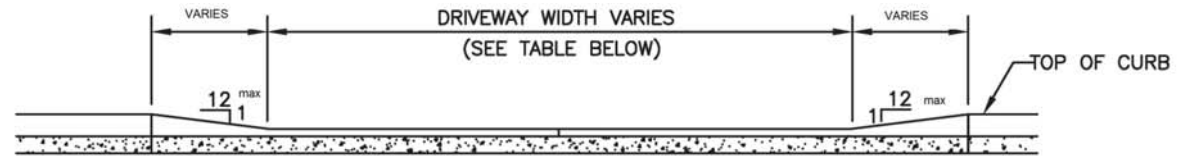
# NOTE:

- 1/2" EXPANSION JOINTS REQUIRE INSTALLATION OF ONE 1/2" THICK PIECE OF BITUMINOUS FIBER THROUGH THE ENTIRE SLAB.
- TO LIMIT STORM WATER FLOW DOWN DRIVEWAYS, USE STANDARD 110.1 FOR DRIVEWAYS NEAR LOW POINTS.
- ALL DRIVEWAYS MUST MEET THE CURRENT VILLAGE DRIVEWAY REGULATIONS AND NCDOT REQUIREMENTS FOR SPACING, SIGHT DISTANCE AND OFFSETS FROM PROPERTY LINES AND INTERSECTIONS.
- "A" BREAKOVER SHALL BE 8% OR LESS (A = ALGEBRAIC DIFFERENCE).
- PRIOR APPROVAL IS REQUIRED ON GRADES EXCEEDING WHAT ARE SHOWN.
- \* PER NC IFC SECTION D103.2 FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 10 PERCENT IN GRADE.

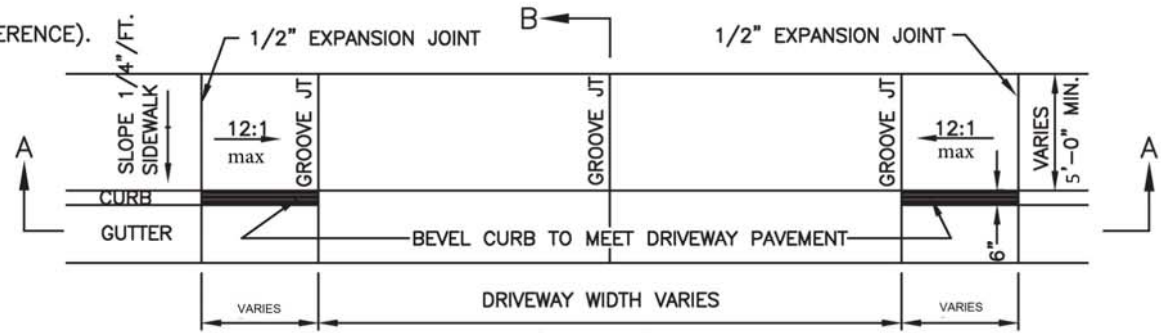
# GENERAL NOTES:

ALL CONCRETE TO BE 3600 P.S.I. COMPRESSIVE STRENGTH.

ALL CURB, CURB AND GUTTER AND SIDEWALKS ARE TO BE REMOVED TO THE NEAREST JOINT BEYOND NEW CONSTRUCTION OR CUT WITH A SAW AND REMOVED. SAW CUT OR JOINT TO BE PERPENDICULAR TO EDGE OF EXISTING PAVEMENT. SEE STD. NO 102.1 FOR DETAIL OF EXPANSION JOINT AND GROOVE JOINT.



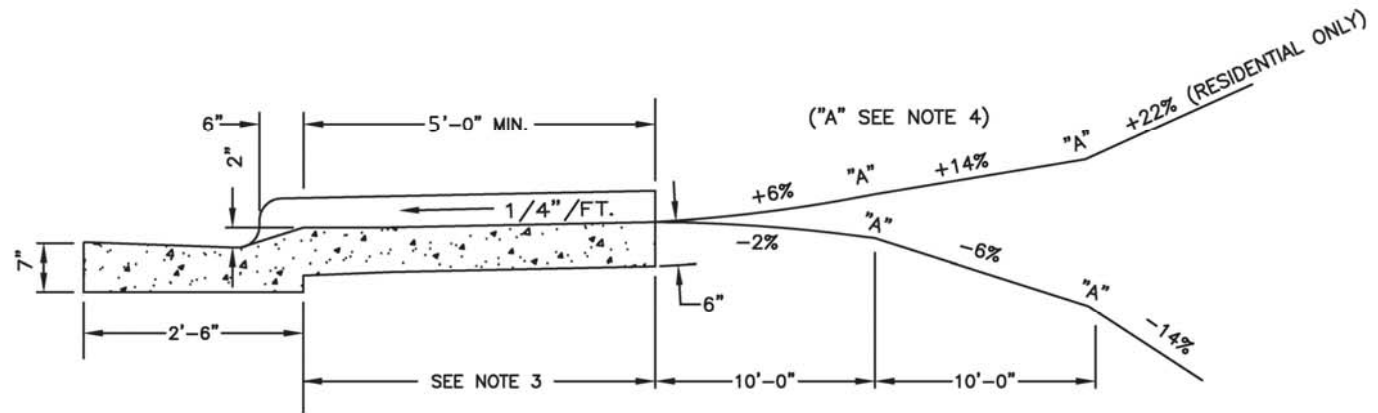
SECTION A - A



PLAN

DRIVEWAY CLASSIFICATION		
TYPE DRIVEWAY	MINIMUM	MAXIMUM
TYPE I-RESIDENTIAL LOCAL/COLLECTOR	10'	30'
TYPE I-RESIDENTIAL *THOROUGHFARE	15'	30'
ONE-WAY TYPE II COMMERCIAL	20'	30'
TWO-WAY TYPE II COMMERCIAL	26'	50'

\*MUST PROVIDE ON-SITE TURNAROUND



SECTION B - B

NOT TO SCALE

Town of Oakboro  
Development Standards

COMMERCIAL TYPE II AND RESIDENTIAL TYPE I  
DROP CURB DRIVEWAY WITH SIDEWALK ABUTTING  
CURB (2'-6" CURB AND GUTTER)

REV. DATE

STD. NO.

108.1



**NOTE:**

- 1/2" EXPANSION JOINTS REQUIRE INSTALLATION OF ONE 1/2" THICK PIECE OF BITUMINOUS FIBER MATERIAL THROUGH THE ENTIRE SLAB.
- TO LIMIT STORM WATER FLOW DOWN DRIVEWAYS, USE STANDARD 110.1 FOR DRIVEWAY LOWPOINT.
- ALL DRIVEWAYS MUST MEET THE CURRENT VILLAGE DRIVEWAY REGULATIONS AND NCDOT REQUIREMENTS FOR SPACING, SIGHT DISTANCE AND OFFSETS FROM PROPERTY LINES AND INTERSECTIONS.
- "A" BREAKOVER SHALL BE 8% OR LESS (A = ALGEBRAIC DIFFERENCE).
- PRIOR APPROVAL IS REQUIRED ON GRADES EXCEEDING WHAT ARE SHOWN.
- \*PER NC IFC SECTION D103.2, FIRE APPARATUS ACCESS ROADS SHALL NOT EXCEED 10 PERCENT IN GRADE.

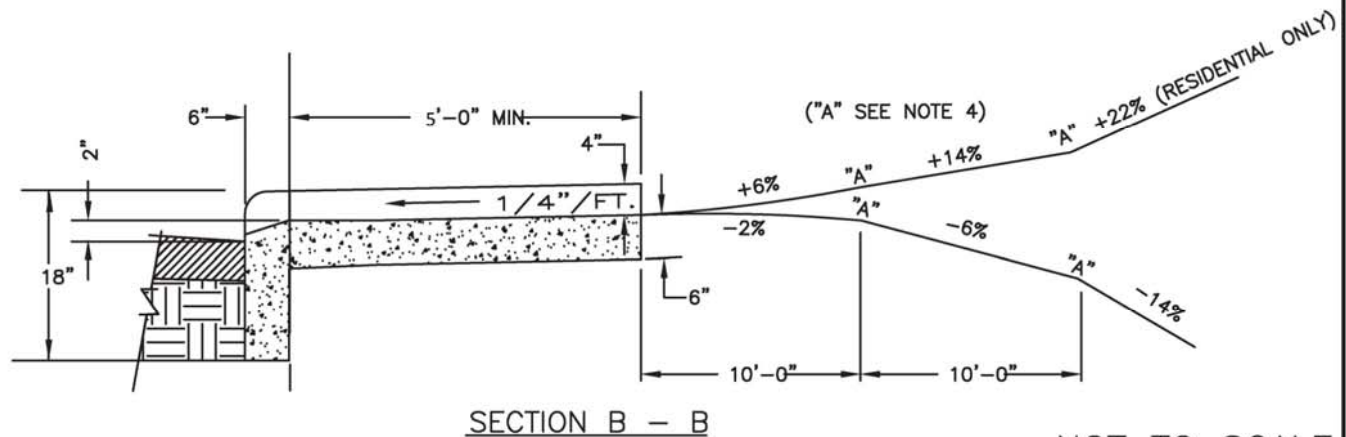
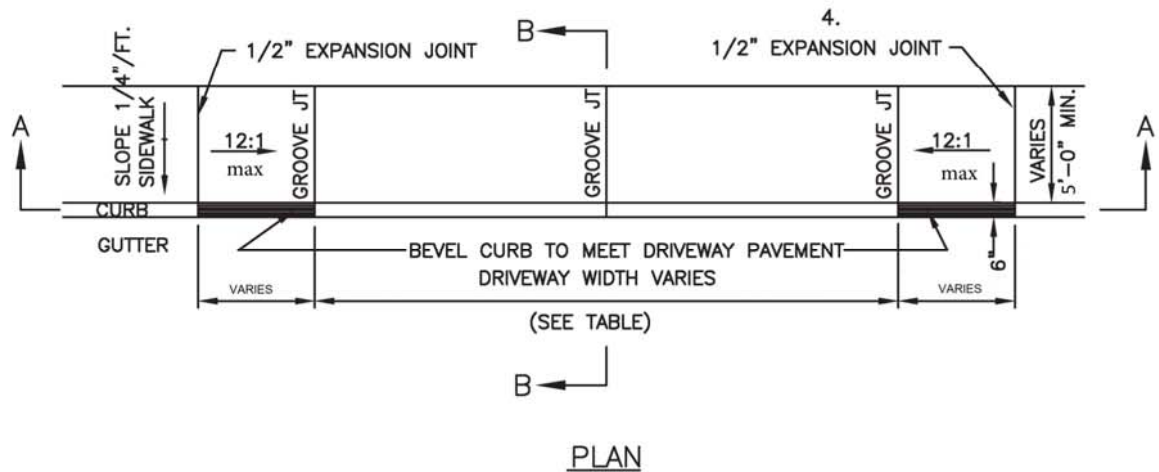
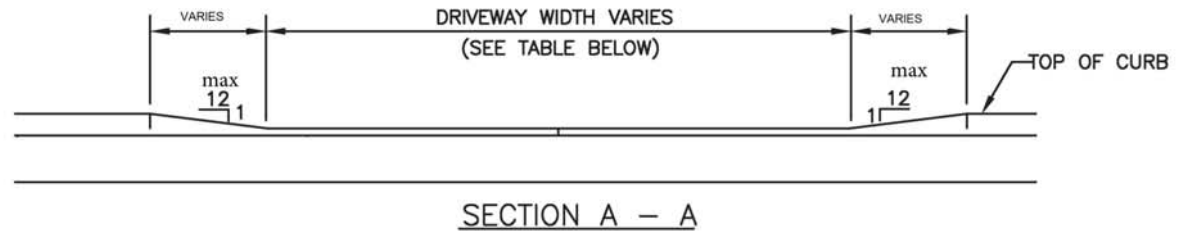
**GENERAL NOTES:**

ALL CONCRETE TO BE 3600 P.S.I. COMPRESSIVE STRENGTH.

ALL CURB OR CURB AND GUTTER AND SIDEWALKS ARE TO BE REMOVED TO THE NEAREST JOINT BEYOND NEW CONSTRUCTION OR CUT WITH A SAW AND REMOVED. SAW CUT OR JOINT TO BE PERPENDICULAR TO EDGE OF EXISTING PAVEMENT. SEE STD. NO 102.1 FOR DETAIL OF EXPANSION JOINT AND GROOVE JOINT.

DRIVEWAY CLASSIFICATION		
TYPE DRIVEWAY	MINIMUM	MAXIMUM
TYPE I-RESIDENTIAL LOCAL/COLLECTOR	10'	30'
TYPE I-RESIDENTIAL THOROUGHFARE	15'	30'
ONE-WAY TYPE II COMMERCIAL	20'	30'
TWO-WAY TYPE II COMMERCIAL	26'	50'

\*MUST PROVIDE ON-SITE TURNAROUND



NOT TO SCALE

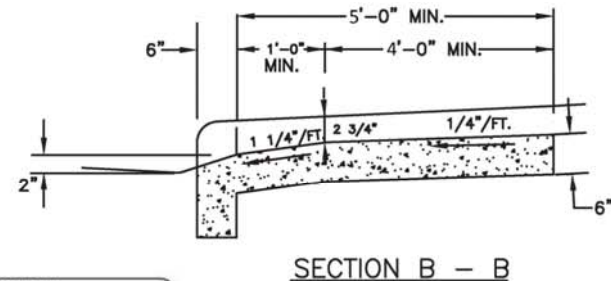
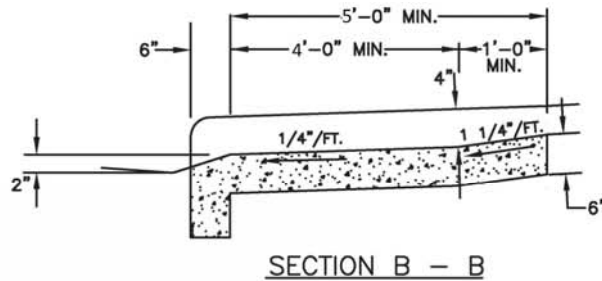
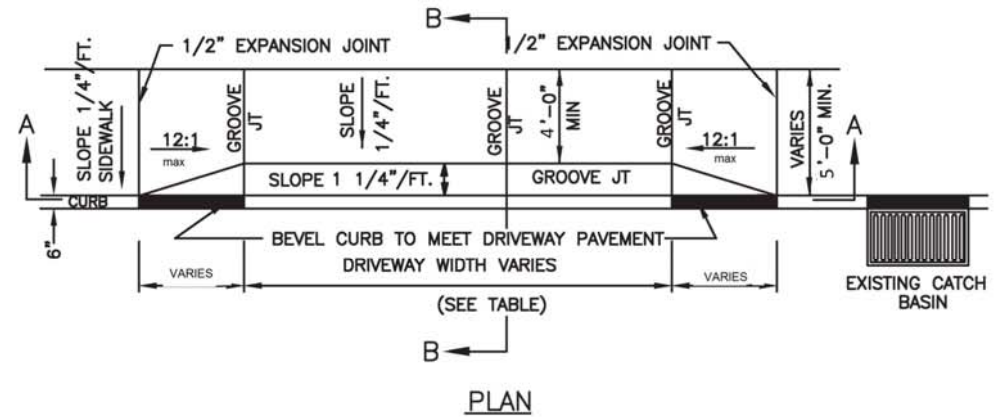
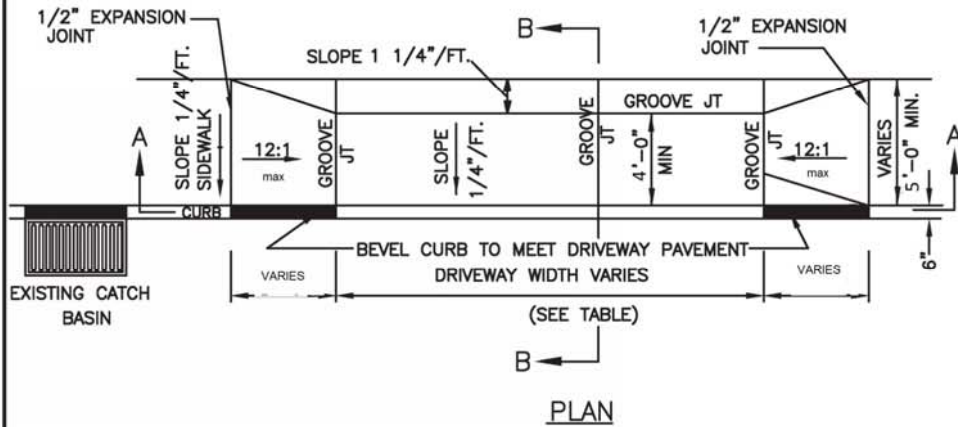
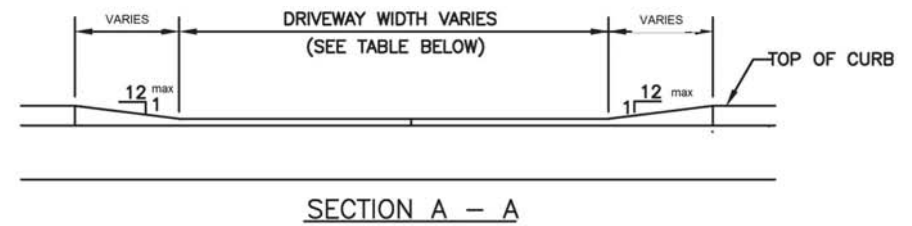
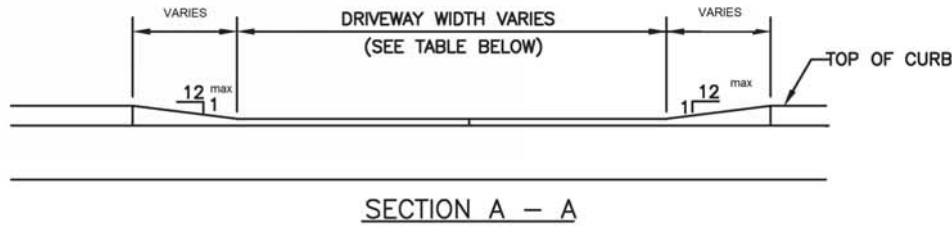
Town of Oakboro  
Development Standards

COMMERCIAL TYPE II AND RESIDENTIAL TYPE I  
DROP CURB DRIVEWAY WITH SIDEWALK  
ABUTTING CURB (6" X 18" VERTICAL CURB)

REV. DATE

STD. NO.

109.1



#### NOTES

1. USED AT LOW POINTS IN ROADWAYS WITH 2'-6" CURB AND GUTTER OR 6" X 18" CURB AS DIRECTED BY ENGINEER.
2. SEE STANDARDS 108.1 & 109.1 FOR ADDITIONAL DETAILS.
3. ALL DRIVEWAYS MUST MEET THE CURRENT VILLAGE DRIVEWAY REGULATIONS AND NCDOT REQUIREMENTS FOR SPACING, SIGHT DISTANCE AND OFFSETS FROM PROPERTY LINES AND INTERSECTIONS.

DRIVEWAY CLASSIFICATION		
TYPE DRIVEWAY	MINIMUM	MAXIMUM
TYPE I-RESIDENTIAL LOCAL/COLLECTOR	10'	30'
TYPE I-RESIDENTIAL * THOROUGHFARE	15'	30'
ONE-WAY TYPE II COMMERCIAL	20'	30'
TWO-WAY TYPE II COMMERCIAL	26'	50'

\*MUST PROVIDE ON-SITE TURNAROUND

NOT TO SCALE

Town of Oakboro  
Development Standards

COMMERCIAL TYPE II AND RESIDENTIAL TYPE I  
DROP CURB DRIVEWAY WITH SIDEWALK  
ABUTTING CURB

REV. DATE

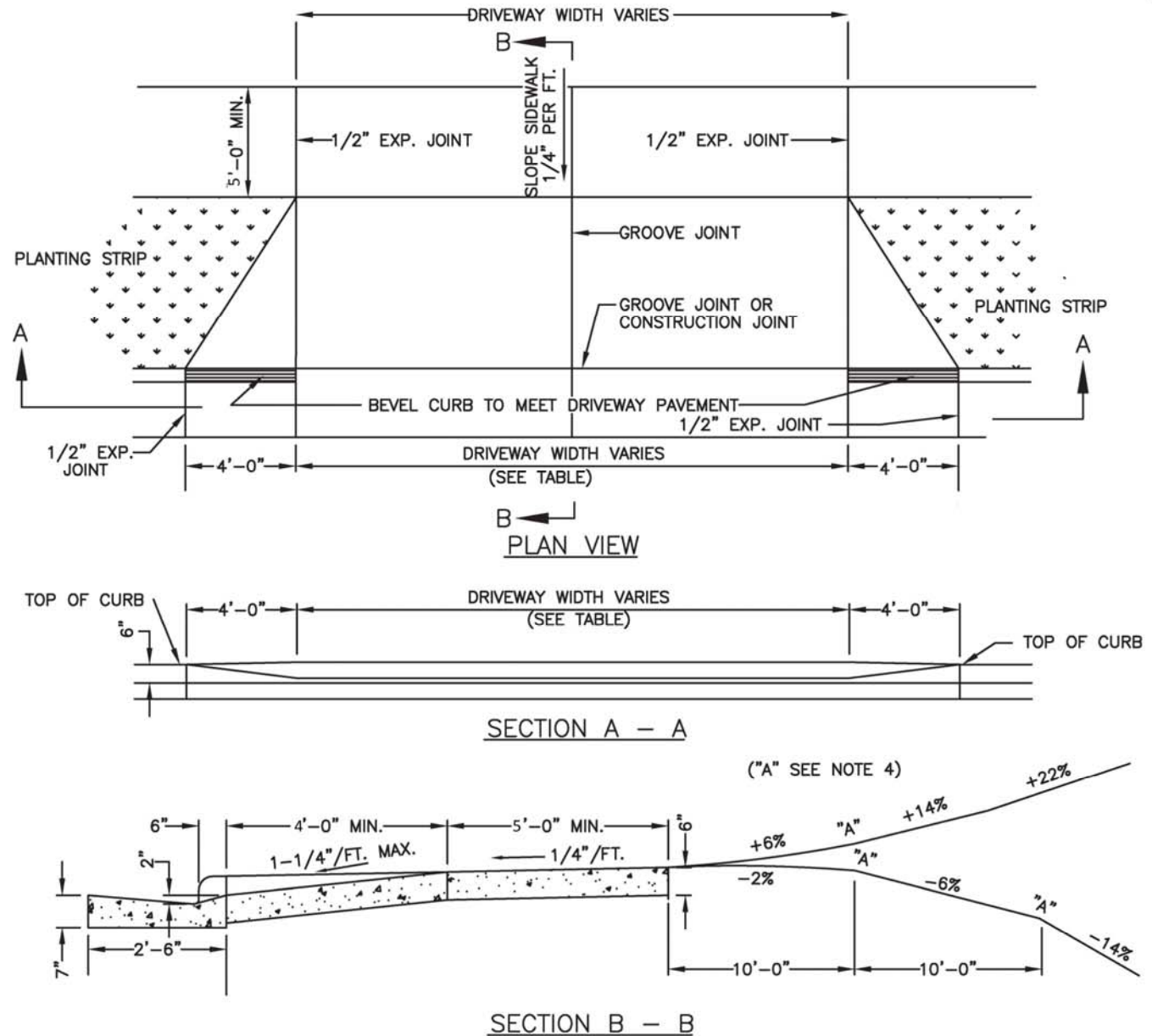
STD. NO.

110.1

**NOTES:**

1. ALL CONCRETE TO BE 3600 P.S.I.
2. ALL CURB OR CURB AND GUTTER AND SIDEWALK ARE TO BE REMOVED TO THE NEAREST JOINT BEYOND NEW CONSTRUCTION OR CUT WITH A SAW AND REMOVED. SAW CUT OR JOINT TO BE PERPENDICULAR TO EDGE OF EXISTING PAVEMENT. SEE STD. NO. 102.1 FOR JOINT DETAIL.
3. ALL DRIVEWAYS MUST MEET THE CURRENT VILLAGE DRIVEWAY REGULATIONS AND NCDOT REQUIREMENTS FOR SPACING, SIGHT DISTANCE AND OFFSETS FROM PROPERTY LINES AND INTERSECTIONS.
4. "A" BREAKOVER SHALL BE 8% OR LESS (A = ALGEBRAIC DIFFERENCE).
5. PRIOR APPROVAL IS REQUIRED ON GRADES EXCEEDING WHAT ARE SHOWN.

DRIVEWAY CLASSIFICATION		
TYPE DRIVEWAY	MINIMUM	MAXIMUM
TYPE I - RESIDENTIAL LOCAL/COLLECTOR	10'	30'
TYPE I - RESIDENTIAL THOROUGHFARE*	15'	30'



Town of Oakboro  
Development Standards

**RESIDENTIAL DROP CURB TYPE I  
DRIVEWAY WITH PLANTING STRIP  
(2'-6" CURB AND GUTTER)**

REV. DATE
STD. NO.
111.1

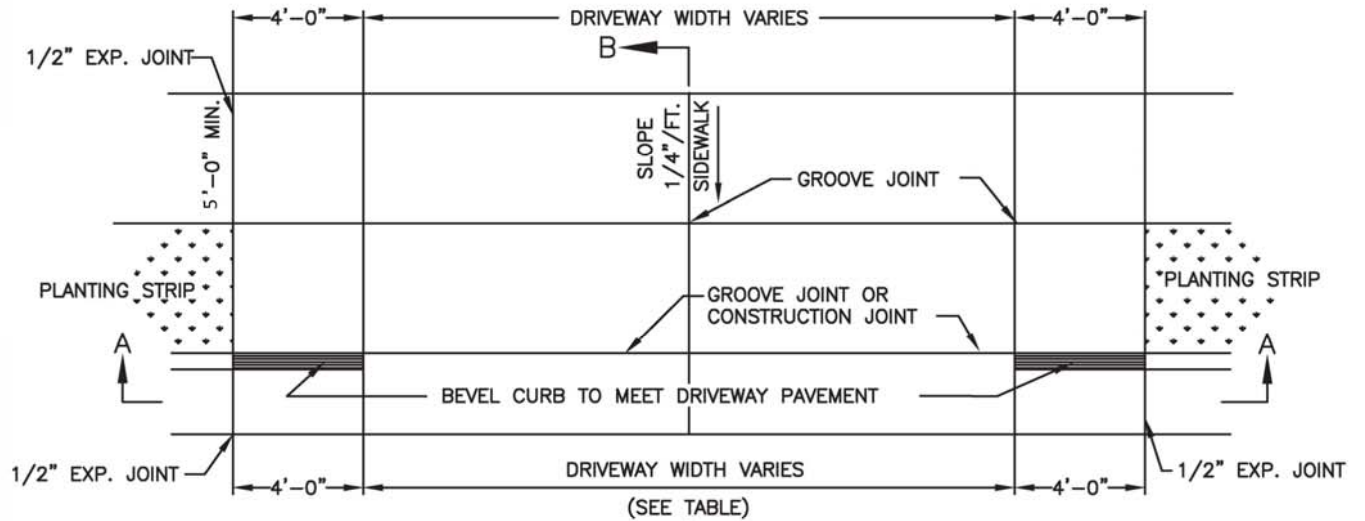


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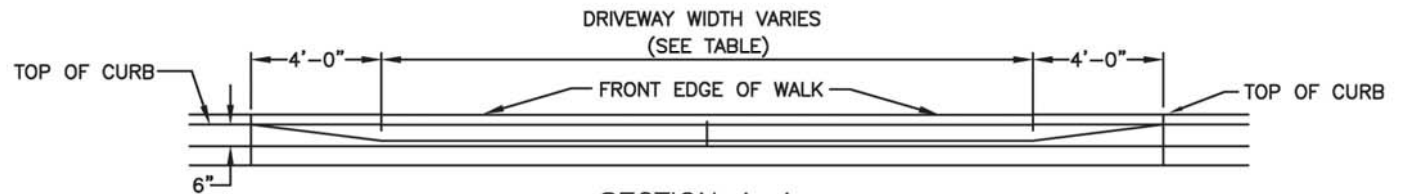
1. ALL CONCRETE TO BE 3600 P.S.I.
2. ALL CURB OR CURB AND GUTTER AND SIDEWALK ARE TO BE REMOVED TO THE NEAREST JOINT BEYOND NEW CONSTRUCTION OR CUT WITH A SAW AND REMOVED. SAW CUT OR JOINT TO BE PERPENDICULAR TO EDGE OF EXISTING PAVEMENT. SEE STD. NO. 102.1 FOR JOINT DETAIL.
3. ALL DRIVEWAYS MUST MEET THE CURRENT VILLAGE DRIVEWAY REGULATIONS AND NCDOT REQUIREMENTS FOR SPACING, SIGHT DISTANCE AND OFFSETS FROM PROPERTY LINES AND INTERSECTIONS.
4. "A" BREAKOVER SHALL BE 8% OR LESS (A = ALGEBRAIC DIFFERENCE).
5. PRIOR APPROVAL IS REQUIRED ON GRADES EXCEEDING WHAT ARE SHOWN.

DRIVEWAYS CLASSIFICATION		
TYPE DRIVEWAYS	MINIMUM	MAXIMUM
ONE-WAY TYPE II – COMMERCIAL	20'	30'
TWO-WAY TYPE II – COMMERCIAL	26'	50'*

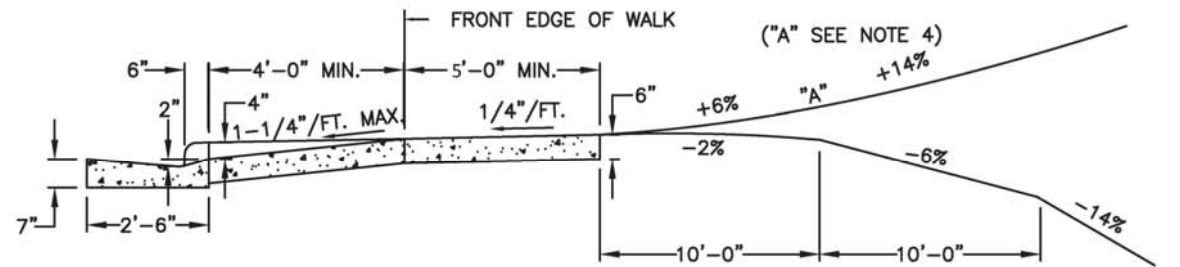
\* NEED MORE THAN ONE CONTRACTION  
JOINT IN CENTER.



PLAN VIEW



SECTION A-A



SECTION B-B

NOT TO SCALE

# Town of Oakboro

## Development Standards

COMMERCIAL DROP CURB TYPE II  
DRIVEWAY WITH PLANTING STRIP  
(2'-6" CURB AND GUTTER)

REV. DATE

STD. NO.

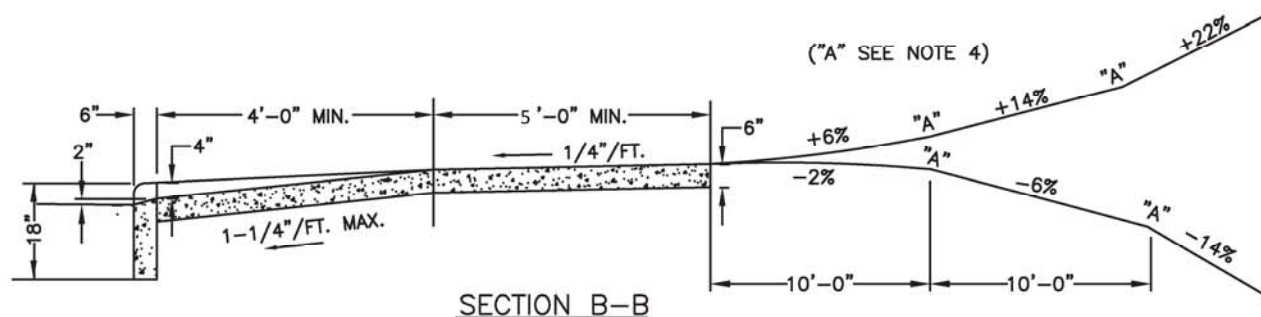
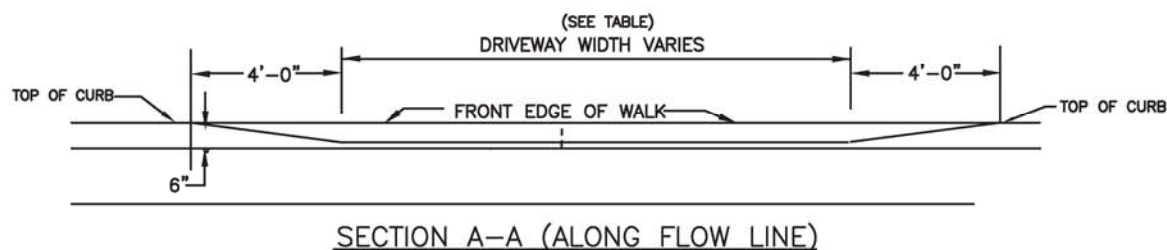
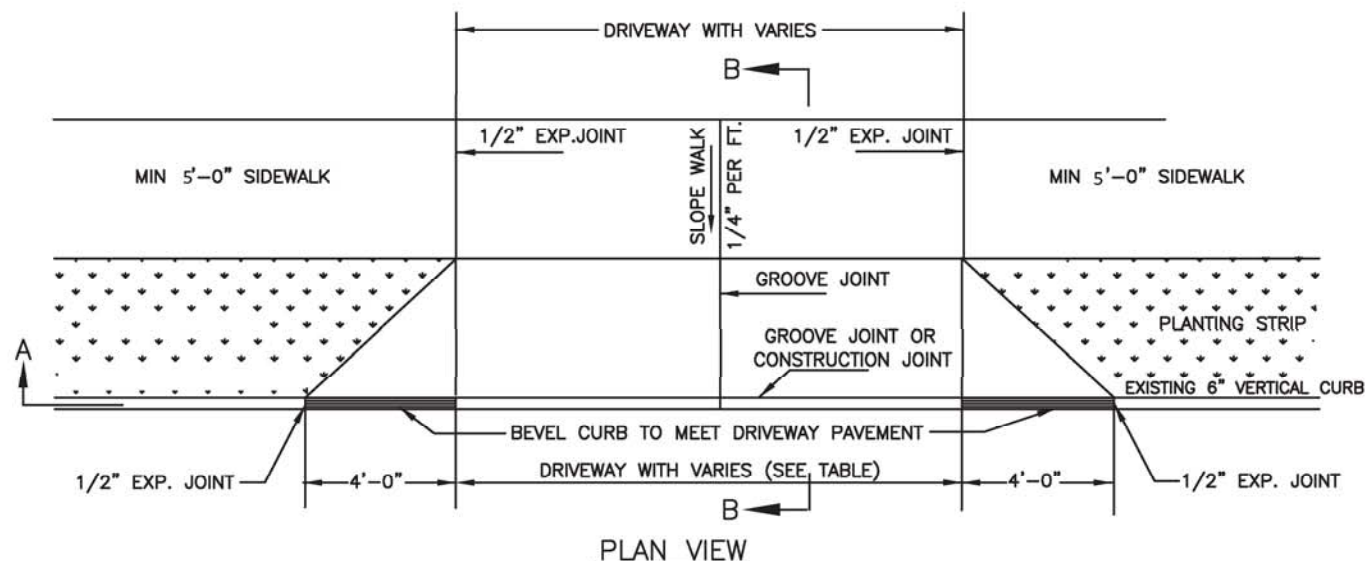
## 112.1



# NOTES:

1. ALL CONCRETE TO BE 3600 P.S.I.
2. ALL CURB OR CURB AND GUTTER AND SIDEWALK ARE TO BE REMOVED TO THE NEAREST JOINT BEYOND NEW CONSTRUCTION OR CUT WITH A SAW AND REMOVED. SAW CUT OR JOINT TO BE PERPENDICULAR TO EDGE OF EXISTING PAVEMENT. SEE STD. NO. 102.1 FOR JOINT DETAIL.
3. ALL DRIVEWAYS MUST MEET THE CURRENT VILLAGE DRIVEWAY REGULATIONS AND NCDOT REQUIREMENTS FOR SPACING, SIGHT DISTANCE AND OFFSETS FROM PROPERTY LINES AND INTERSECTIONS.
4. "A" BREAKOVER SHALL BE 8% OR LESS.
5. PRIOR APPROVAL IS REQUIRED ON GRADES EXCEEDING WHAT ARE SHOWN.

DRIVEWAY CLASSIFICATION		
TYPE DRIVEWAY	MINIMUM	MAXIMUM
TYPE I - RESIDENTIAL LOCAL/COLLECTOR	10'	30'
TYPE I - RESIDENTIAL THOROUGHFARE*	15'	30'



NOT TO SCALE

Town of Oakboro  
Development Standards

## RESIDENTIAL DROP CURB TYPE I DRIVEWAY WITH PLANTING STRIP (6" x 18" VERTICAL CURB)

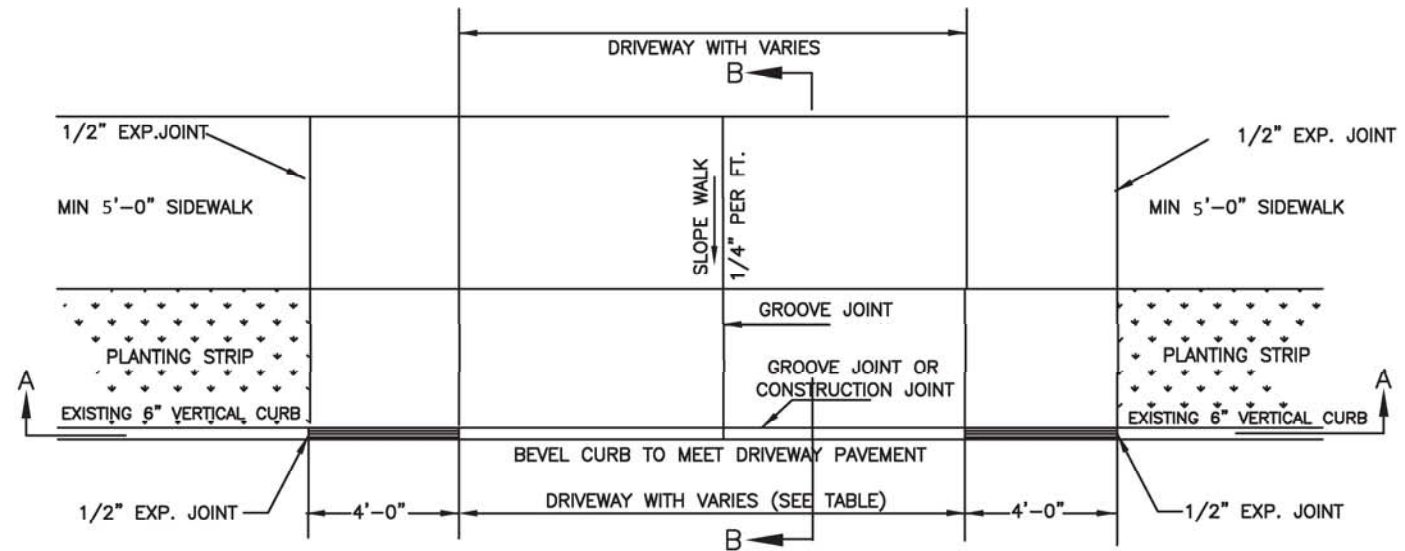
REV. DATE

STD. NO.

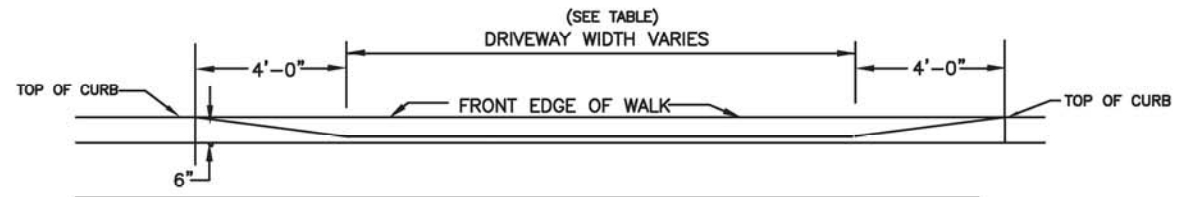
113.1

# NOTES:

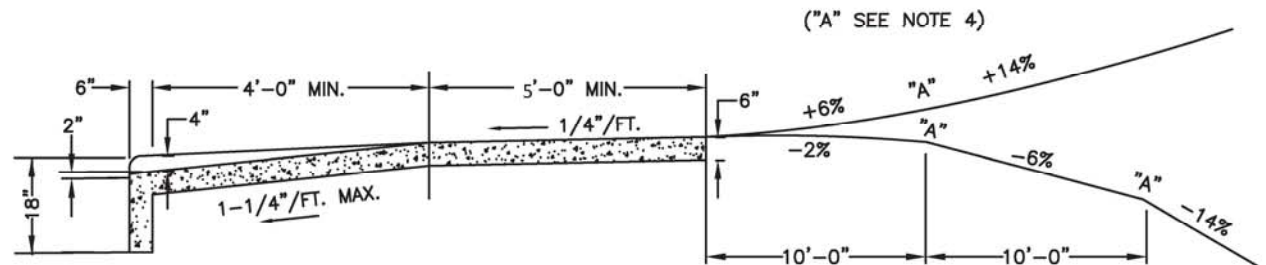
1. ALL CONCRETE TO BE 3600 P.S.I.
2. ALL CURB OR CURB AND GUTTER AND SIDEWALK ARE TO BE REMOVED TO THE NEAREST JOINT BEYOND NEW CONSTRUCTION OR CUT WITH A SAW AND REMOVED. SAW CUT OR JOINT TO BE PERPENDICULAR TO EDGE OF EXISTING PAVEMENT. SEE STD. NO. 102.1 FOR JOINT DETAIL.
3. ALL DRIVEWAYS MUST MEET THE CURRENT VILLAGE DRIVEWAY REGULATIONS AND NCDOT REQUIREMENTS FOR SPACING, SIGHT DISTANCE AND OFFSETS FROM PROPERTY LINES AND INTERSECTIONS.
4. "A" BREAKOVER SHALL BE 8% OR LESS (A = ALGEBRAIC DIFFERENCE).
5. PRIOR APPROVAL IS REQUIRED ON GRADES EXCEEDING WHAT ARE SHOWN.



PLAN VIEW



SECTION A-A (ALONG FLOW LINE)



SECTION B-B

NOT TO SCALE

DRIVEWAYS CLASSIFICATION		
TYPE DRIVEWAYS	MINIMUM	MAXIMUM
ONE-WAY TYPE II-COMMERCIAL	20'	30'
TWO-WAY TYPE II-COMMERCIAL	26'	50'*

Town of Oakboro  
Development Standards

## COMMERCIAL DROP CURB TYPE II DRIVEWAY WITH PLANTING STRIP (6" X 18" VERTICAL CURB)

REV. DATE

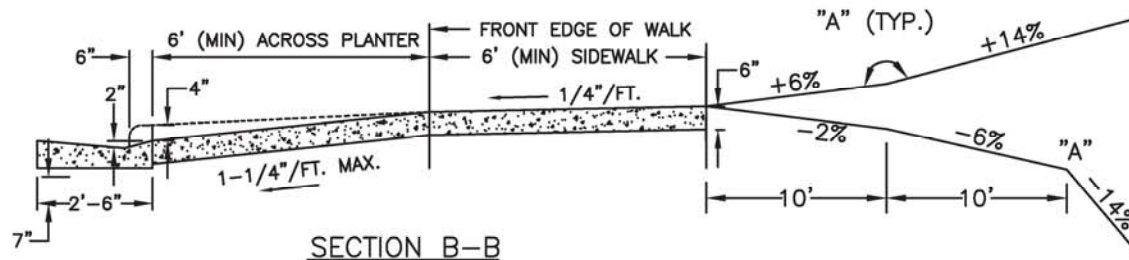
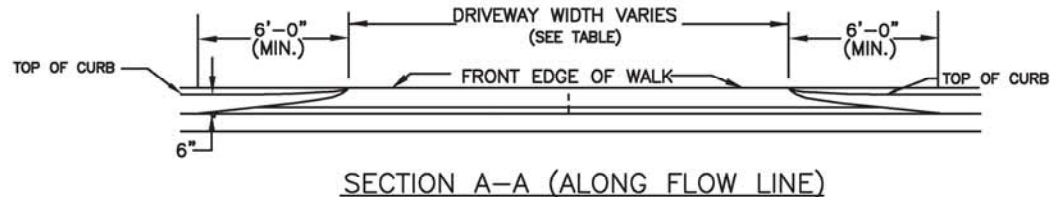
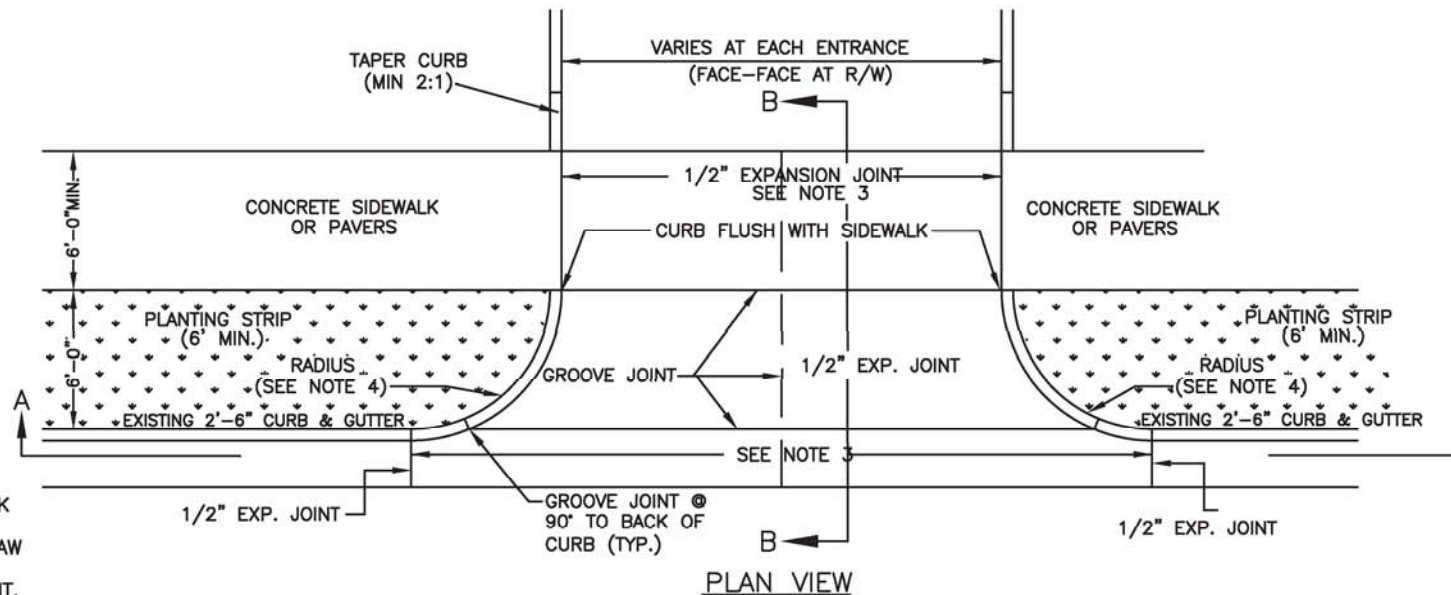
STD. NO.

114.1

DRIVEWAY DIMENSIONS		
OPERATION/RADIUS	MINIMUM	MAXIMUM
ONE-WAY WITH 6-12 FT. RADII	20'	30'
ONE-WAY WITH 13+ FT. RADII	15'	25'
TWO-WAY WITH 6-12 FT. RADII	26'	50'
TWO-WAY WITH 13+ FT. RADII	22'	40'

# NOTES:

- ALL CONCRETE TO BE 3600 P.S.I.
- ALL CURB OR CURB AND GUTTER AND SIDEWALK ARE TO BE REMOVED TO THE NEAREST JOINT BEYOND NEW CONSTRUCTION OR CUT WITH A SAW AND REMOVED. SAW CUT OR JOINT TO BE PERPENDICULAR TO EDGE OF EXISTING PAVEMENT. SEE STD. NO. 102.1 FOR JOINT DETAIL.
- ALL DRIVEWAYS MUST MEET THE CURRENT VILLAGE DRIVEWAY REGULATIONS AND NCDOT REQUIREMENTS FOR SPACING, SIGHT DISTANCE AND OFFSETS FROM PROPERTY LINES AND INTERSECTIONS.
- RADII MUST BE MINIMUM 6 FEET OR THE WIDTH OF THE PLANTING STRIP, WHICHEVER IS GREATER. RADII GREATER THAN THESE MINIMUMS MAY BE REQUIRED ON A CASE-BY-CASE BASIS. FOR RADII GREATER THAN 6 FEET, THE RADII ARE TO CONTINUE AS A BAND AT-GRADE THROUGH THE SIDEWALK.
- PAVERS USED IN DRIVEWAY MUST HAVE A THICKNESS OF 3 INCHES.
- "A" BREAKOVER SHALL BE 8% OR LESS (A = ALGEBRAIC DIFFERENCE).
- PRIOR APPROVAL IS REQUIRED ON GRADES EXCEEDING WHAT ARE SHOWN.



NOT TO SCALE

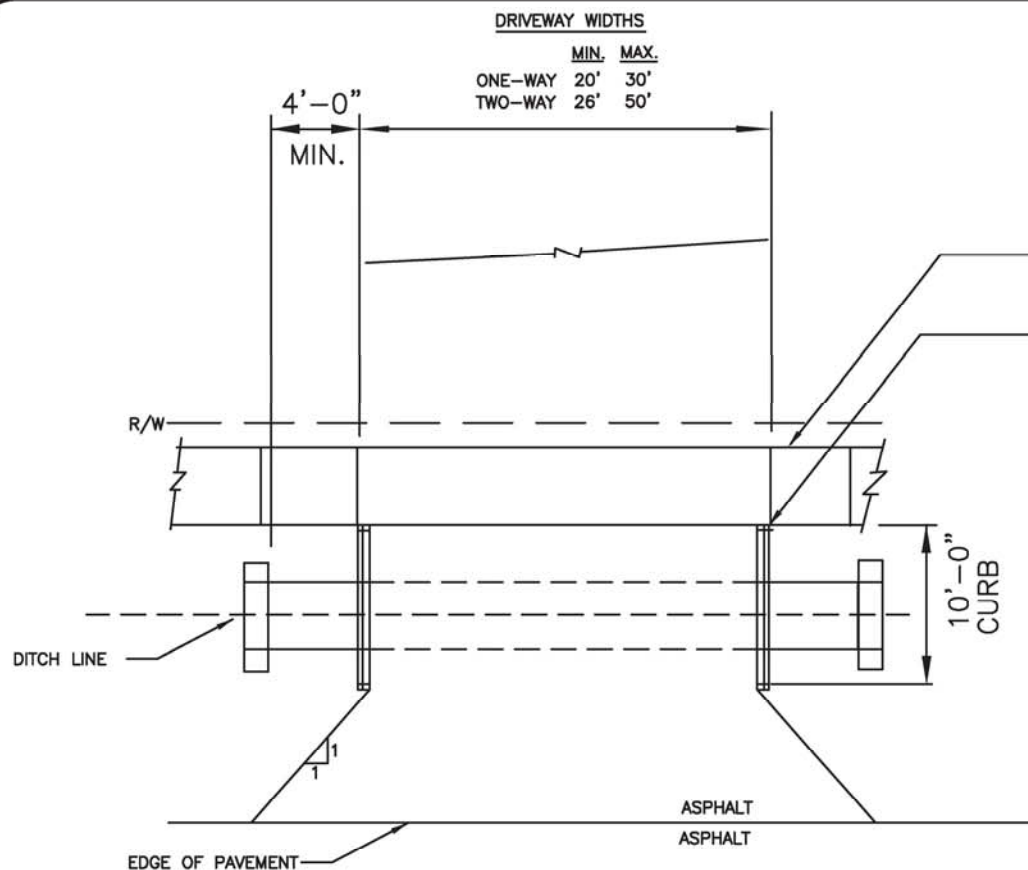
Town of Oakboro  
Development Standards

## TYPE II-MODIFIED DRIVEWAY DETAIL WITH WIDE PLANTING STRIP AND STANDARD CURB

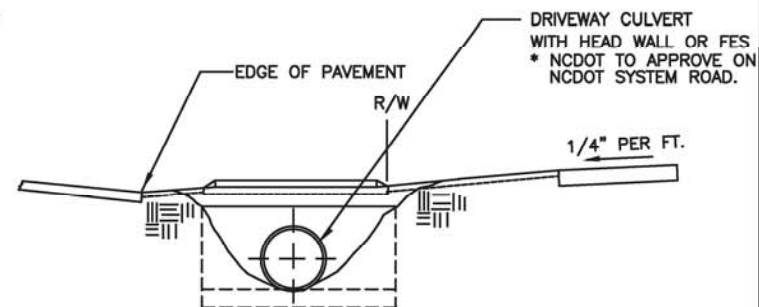
REV. DATE

STD. NO.

115.1



PLAN



SECTION

NOTE:

1. TO BE USED ON ROADS WITHOUT CURB AND GUTTER AND WHERE CURB AND GUTTER IS NOT BEING INSTALLED (MUST MEET BOTH CRITERIA).
2. ALL CONCRETE TO BE 3600 P.S.I. COMPRESSIVE STRENGTH.
3. USE OF THIS STANDARD FOR RESIDENTIAL DRIVEWAY CONSTRUCTION AT THE DISCRETION OF THE VILLAGE ENGINEER ONLY.

NOT TO SCALE

Town of Oakboro  
Development Standards

## COMMERCIAL TYPE IV DRIVEWAY STANDARD

REV. DATE

STD. NO.

116.1



## GENERAL NOTES:

ALL CONCRETE TO BE 3600 P.S.I. COMPRESSIVE STRENGTH.

A 1/2" EXPANSION JOINT WILL BE REQUIRED WHERE THE SIDEWALK JOINS ANY RIGID STRUCTURE. SEE STANDARD 106.1.

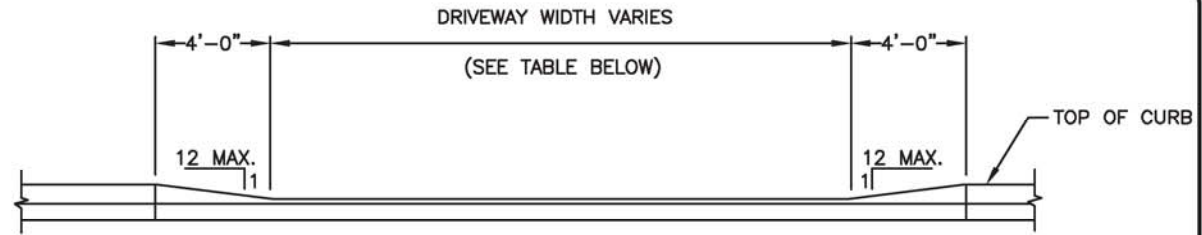
THIS DETAIL TO BE USED ONLY IN CONJUNCTION WITH MONOLITHIC SIDEWALK AS ON STANDARD NO. 107.1

## NOTES:

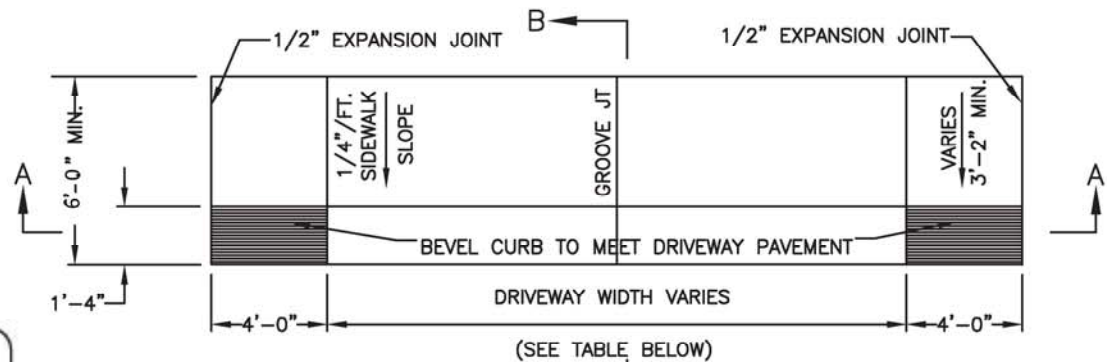
1. ALL DRIVEWAYS MUST MEET THE CURRENT VILLAGE DRIVEWAY REGULATIONS AND NCDOT REQUIREMENTS FOR SPACING, SIGHT DISTANCES, AND OFFSETS FROM PROPERTY LINES AND INTERSECTIONS.

### DRIVEWAY CLASSIFICATION

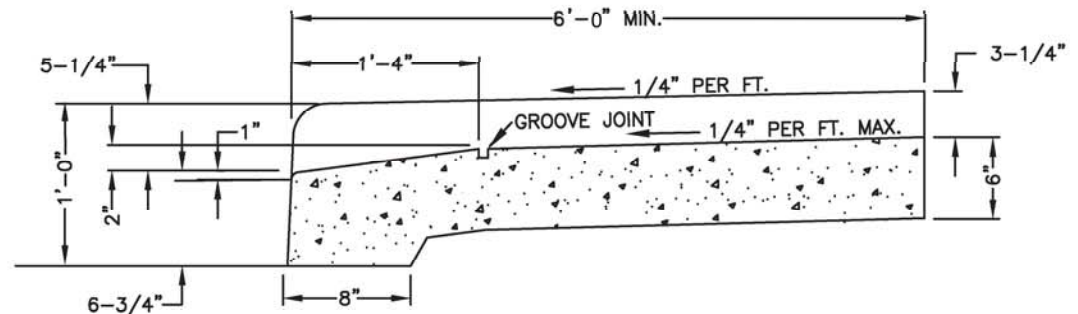
TYPE DRIVEWAY	MINIMUM	MAXIMUM
TYPE I-RESIDENTIAL LOCAL/COLLECTOR	10'	30'
TYPE I-RESIDENTIAL THOROUGHFARE	15'	30'
ONE-WAY TYPE II COMMERCIAL	20'	30'
TWO-WAY TYPE II COMMERCIAL	26'	50'



SECTION A-A



PLAN



SECTION B-B

NOT TO SCALE

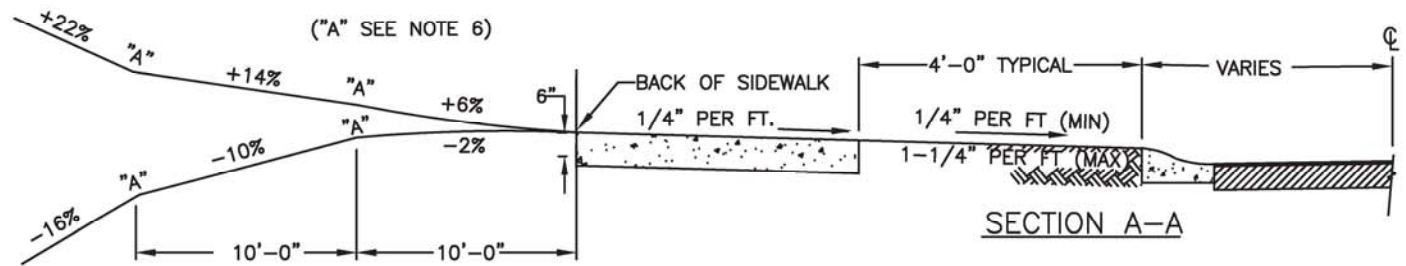
Town of Oakboro  
Development Standards

## DROP CURB DRIVEWAY MONOLITHIC CONCRETE CURB AND SIDEWALK

REV. DATE

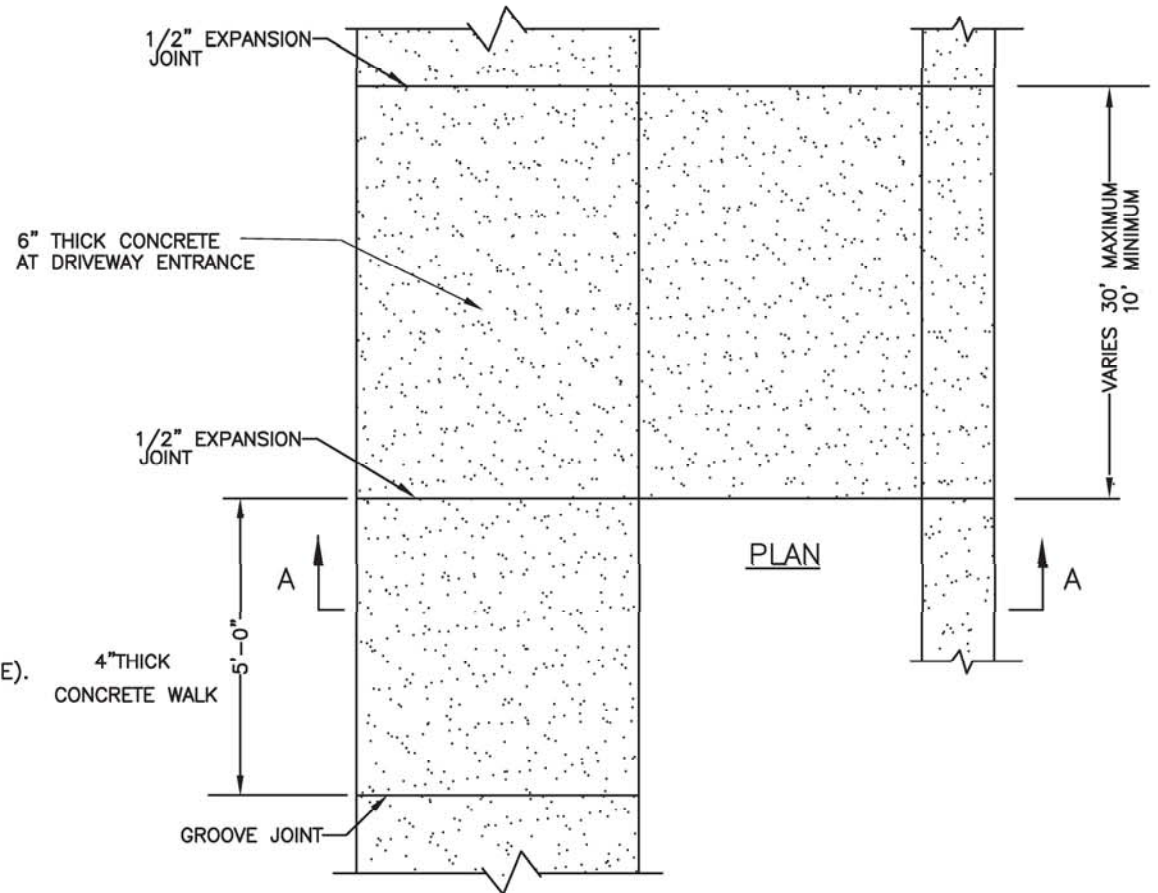
STD. NO.

117.1



# NOTES:

1. THE ELEVATION OF THE SIDEWALK SHALL BE NOT LESS THAN SIX INCHES OR MORE THAN EIGHTEEN INCHES ABOVE THE ROADWAY CROWN. THIS ELEVATION DIFFERENTIAL SHALL BE CONSISTENT WITHIN EACH BLOCK.
2. ALL CONCRETE TO BE 3600 PSI STRENGTH.
3. ALL CONSTRUCTION PRACTICES, INCLUDING COMPACTION, CURING, FINISHING, ETC. SHALL BE IN ACCORDANCE WITH THIS MANUAL.
4. PLANTING STRIP SHALL BE GRADED WITH A CROSS SLOPE BETWEEN 1/2 IN. PER FOOT AND 1 1/4 IN. PER FOOT EXCEPT WHERE EXCESSIVE NATURAL GRADES MAKE THIS REQUIREMENT IMPRACTICAL. IN SUCH CASES, THE ENGINEER MAY AUTHORIZE A SUITABLE GRADE.
5. ALL DRIVEWAYS MUST MEET THE CURRENT VILLAGE DRIVEWAY REGULATIONS AND NCDOT REQUIREMENTS, INCLUDING BUT NOT LIMITED TO SPACING, SIGHT DISTANCE, AND OFFSETS FROM PROPERTY LINES AND INTERSECTIONS.
6. "A" BREAKOVER SHALL BE 8% OR LESS (A = ALGEBRAIC DIFFERENCE).
7. PRIOR APPROVAL IS REQUIRED ON GRADES EXCEEDING WHAT ARE SHOWN.



NOT TO SCALE

Town of Oakboro  
Development Standards

## RESIDENTIAL DRIVEWAY (TYPE I) FOR VALLEY GUTTER

REV. DATE

STD. NO.

118.1

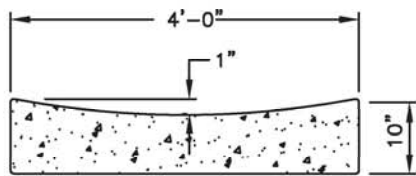
119.1



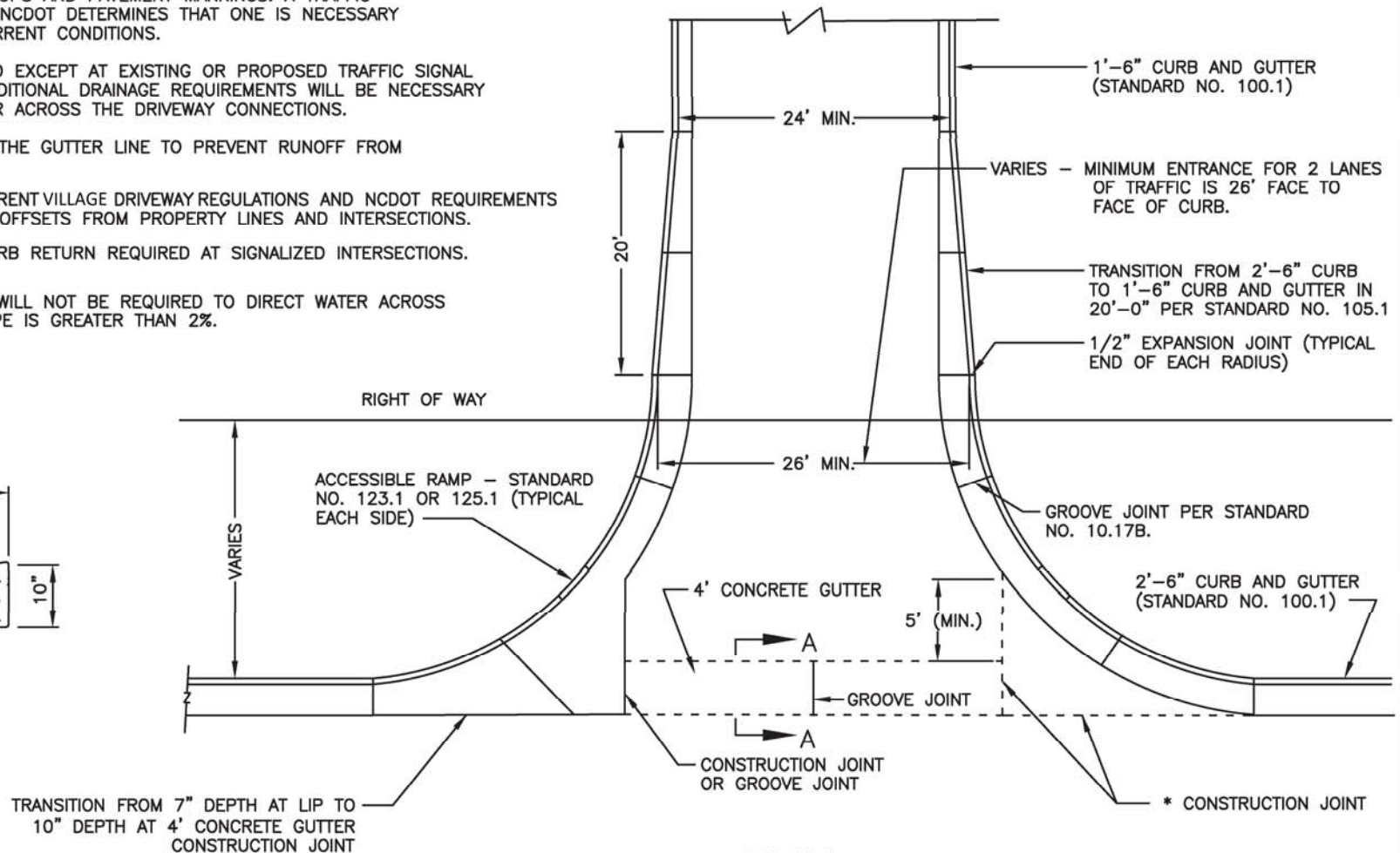
## NOTES:

1. WHERE A TYPE III DRIVEWAY IS APPROVED BY THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION (NCDOT) THAT CONNECTS TO AN EXISTING SIGNALIZED INTERSECTION, OR AT A LOCATION WHERE A TRAFFIC SIGNAL INSTALLATION IS PROPOSED BY NCDOT BASED ON A TRAFFIC IMPACT/SIGNAL WARRANT STUDY, A FULL DEPTH ASPHALT PAVEMENT (2-1/2" S-9.5 B/C AND 6" B-25.0 B/C) IS REQUIRED. THIS PAVEMENT DESIGN IS REQUIRED IN THE DRIVEWAY EASEMENT (100-FOOT MINIMUM) TO MAINTAIN DETECTOR LOOPS AND PAVEMENT MARKINGS. A TRAFFIC SIGNAL WILL BE INSTALLED ONLY IF NCDOT DETERMINES THAT ONE IS NECESSARY BASED ON A TRAFFIC STUDY OF CURRENT CONDITIONS.
2. A CONCRETE GUTTER IS TO BE USED EXCEPT AT EXISTING OR PROPOSED TRAFFIC SIGNAL LOCATIONS. AT THESE LOCATIONS ADDITIONAL DRAINAGE REQUIREMENTS WILL BE NECESSARY TO ELIMINATE THE NEED FOR GUTTER ACROSS THE DRIVEWAY CONNECTIONS.
3. THE DRIVEWAY MUST RISE 6" FROM THE GUTTER LINE TO PREVENT RUNOFF FROM ENTERING DRIVEWAY.
4. ALL DRIVEWAYS MUST MEET THE CURRENT VILLAGE DRIVEWAY REGULATIONS AND NCDOT REQUIREMENTS FOR SPACING, SIGHT DISTANCE, AND OFFSETS FROM PROPERTY LINES AND INTERSECTIONS.
5. TWO (2) ACCESSIBLE RAMP PER CURB RETURN REQUIRED AT SIGNALIZED INTERSECTIONS.

\* FOUR (4) FOOT GUTTER AND WINGS WILL NOT BE REQUIRED TO DIRECT WATER ACROSS DRIVE IF THE DRIVEWAY GUTTER SLOPE IS GREATER THAN 2%.



SECTION A-A



PLAN

NOT TO SCALE

Town of Oakboro  
Development Standards

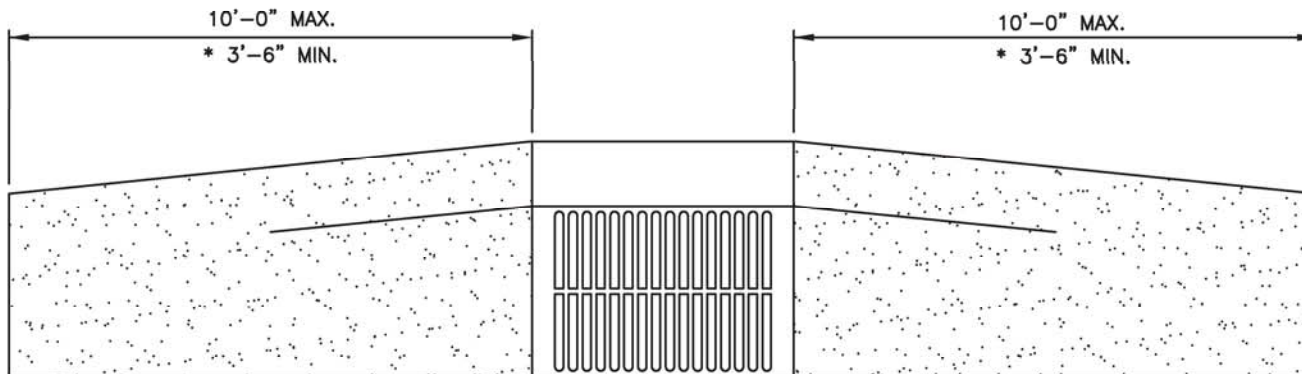
## TYPE III DRIVEWAY ENTRANCE

REV. DATE

STD. NO.

120.1





PLAN

NOTE:

- \* TRANSITION FROM 2'-6" STANDARD CURB TO VALLEY CURB AT A DRAINAGE INLET ONLY.
- SEE STANDARD 104.1 FOR CROSS SECTION GEOMETRY.

NOT TO SCALE

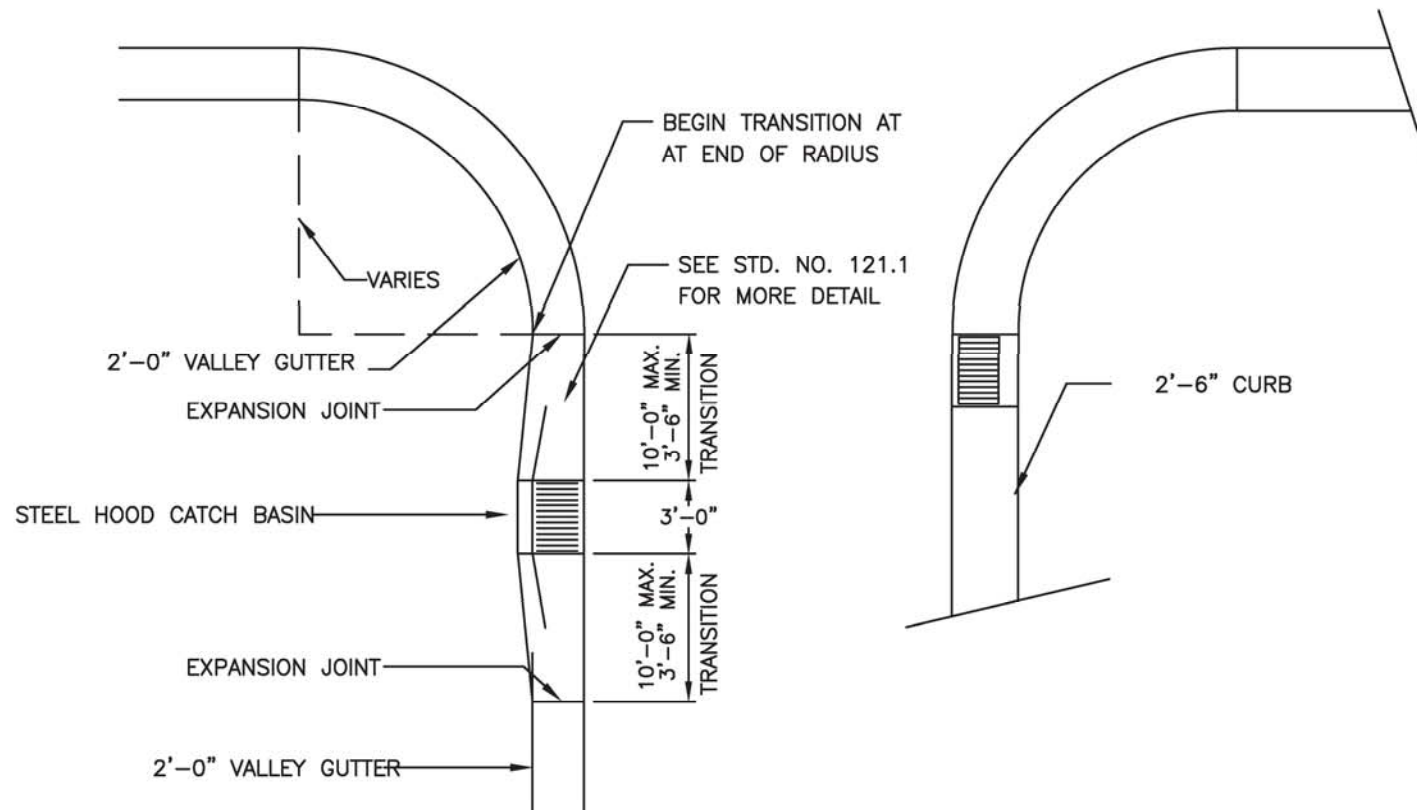
Town of Oakboro  
Development Standards

# CATCH BASIN FRAME IN VALLEY GUTTER

REV. DATE

STD. NO.

121.1



NOTE:

1. WHERE 2'-6" CURB AND GUTTER IS USED, CATCH BASINS MAY BE LOCATED AT END OF RADIUS.
2. RADIUS AT INTERSECTION MAY VARY.

NOT TO SCALE

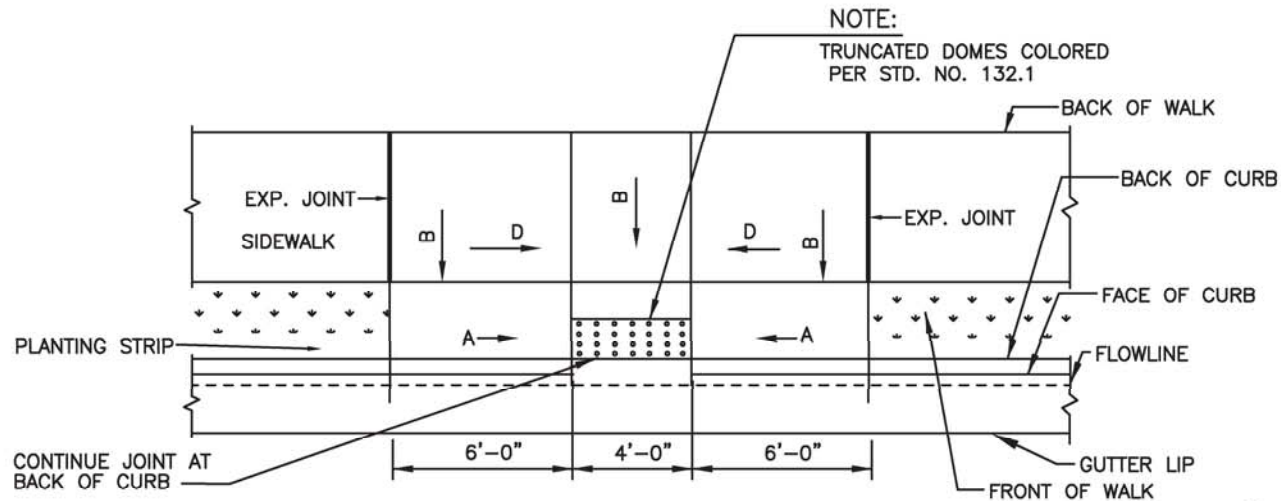
Town of Oakboro  
Development Standards

# CATCH BASIN PLACEMENT AT INTERSECTIONS

REV. DATE

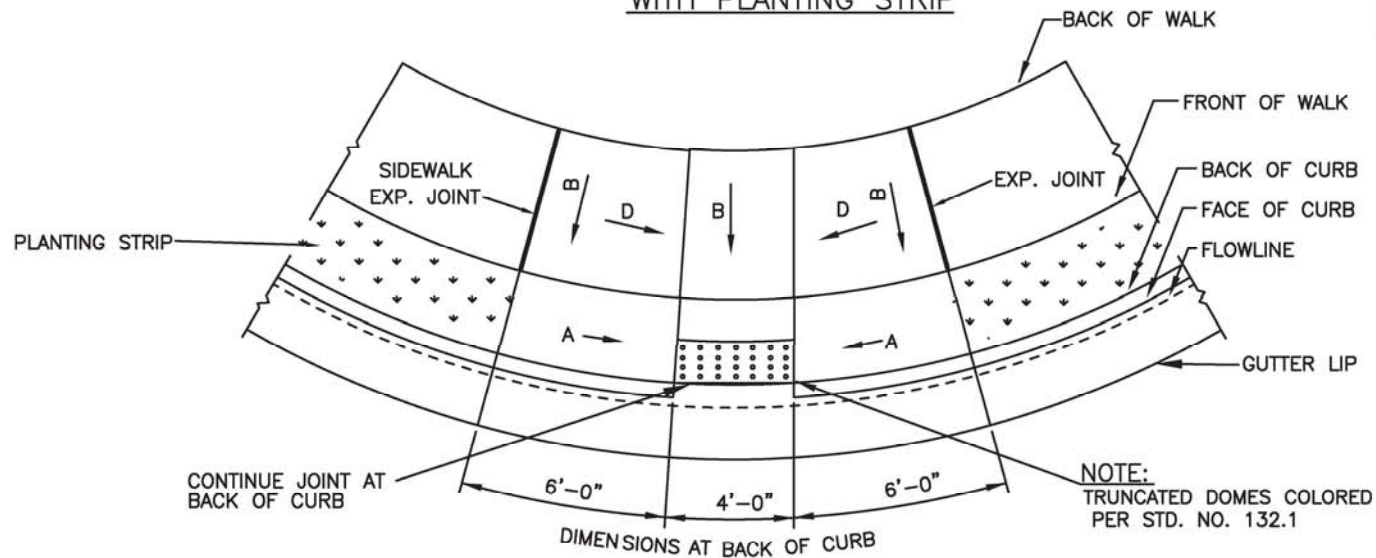
STD. NO.

122.1



PLAN VIEW-PARALLEL RAMP  
WITH PLANTING STRIP

SLOPE "A"	12:1
SLOPE "B"	1/4"/FT
SLOPE "D"	3/8"/FT



PLAN VIEW-DIAGONAL RAMP WITH PLANTING STRIP

NOT TO SCALE

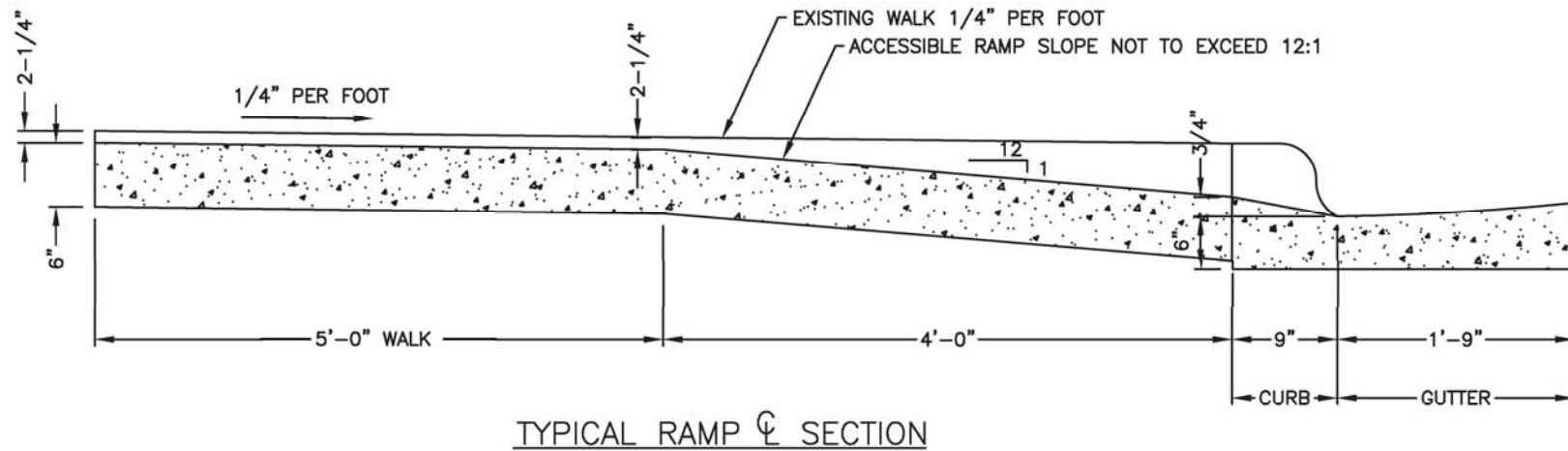
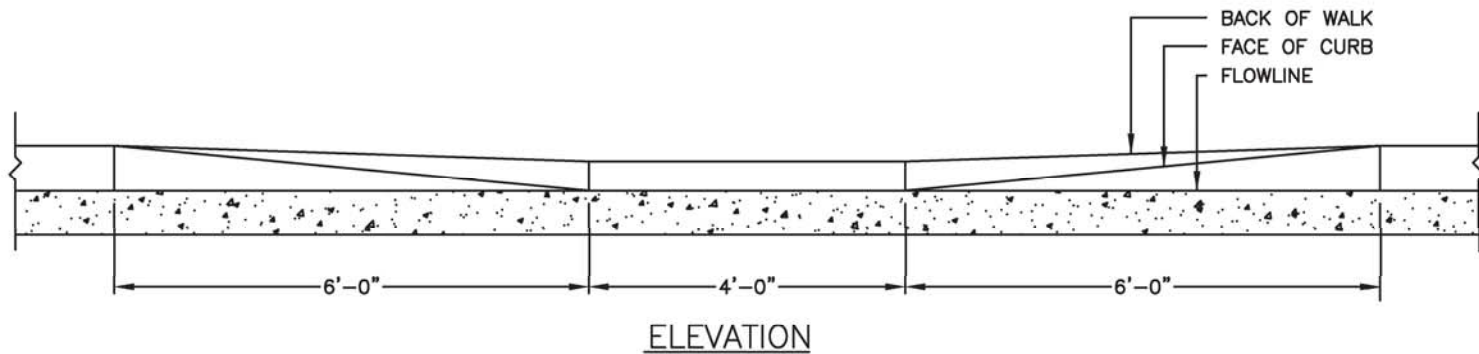
Town of Oakboro  
Development Standards

# ACCESSIBLE RAMP STANDARD WITH PLANTING STRIP AND 2'-6" CURB AND GUTTER

REV. DATE

STD. NO.

123.1



NOT TO SCALE

Town of Oakboro  
Development Standards

ACCESSIBLE RAMP SECTIONS WITH  
PLANTING STRIP AND  
2'-6" CURB AND GUTTER

REV. DATE

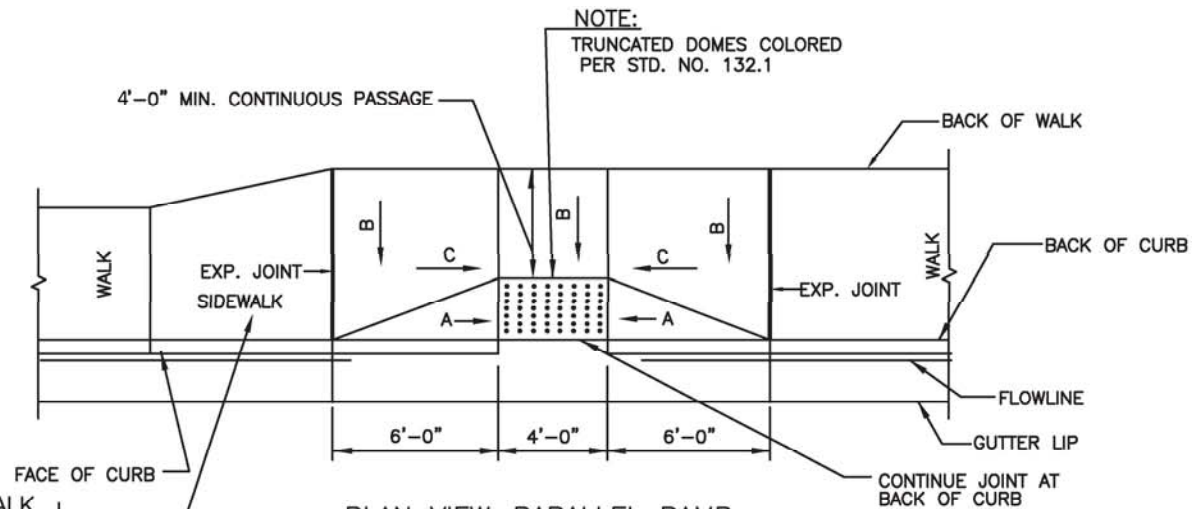
STD. NO.

124.1

**NOTES:**

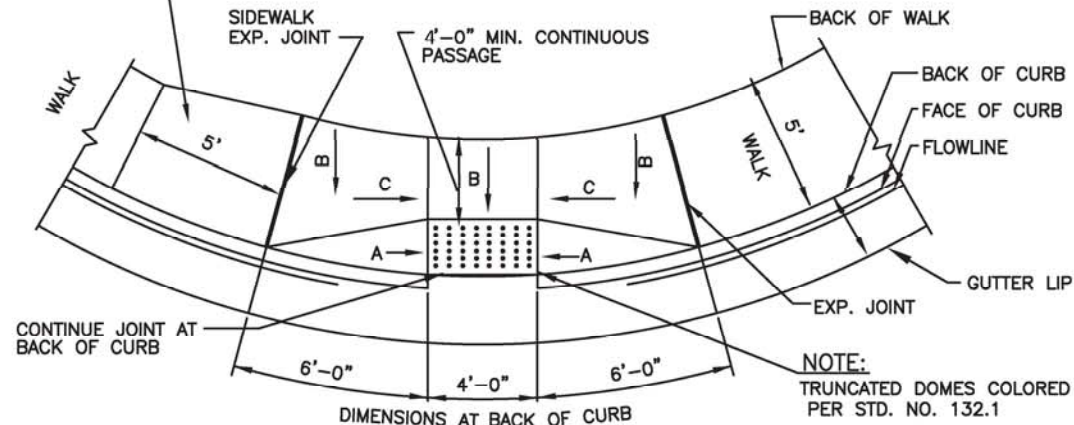
1. IF TURNING SPACE IS CONFINED BY CURB OR VERTICAL SURFACE AT BACK OF THE TURNING SPACE, THE MINIMUM WIDTH MUST INCREASE TO 5'-0" MIN.
2. ENSURE FLUSH CONDITIONS AT CURB RAMP TO GUTTER TRANSITION.

5' TRANSITION FROM 6' WALK  
ALL WALKS MUST BE A MIN. 5' WIDTH AT RAMP.



**PLAN VIEW—PARALLEL RAMP  
WITHOUT PLANTING STRIP**

SLOPE "A"	12:1
SLOPE "B"	1/4"/FT
SLOPE "C"	5/8"/FT



**PLAN VIEW—DIAGONAL RAMP WITHOUT PLANTING STRIP**

NOT TO SCALE

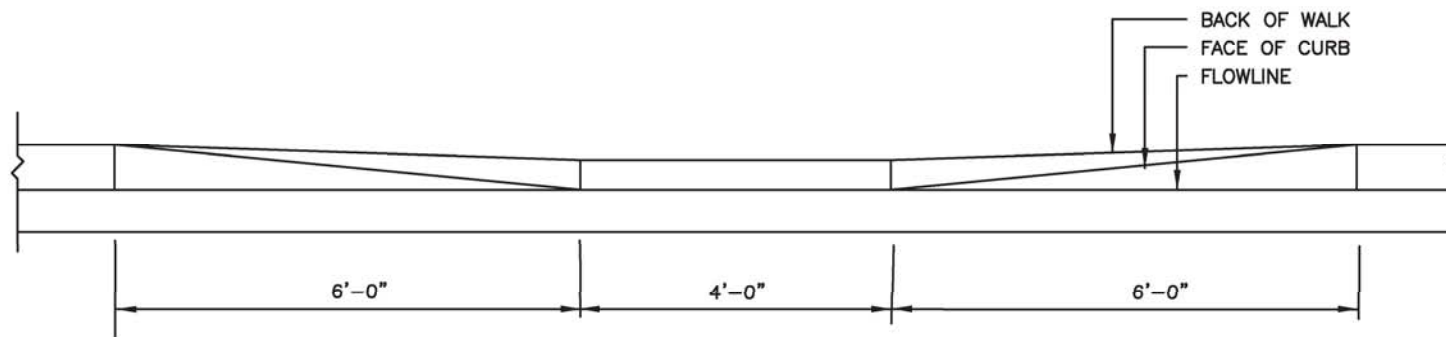
Town of Oakboro  
Development Standards

# ACCESSIBLE RAMP STANDARD WITHOUT PLANTING STRIP AND 2'-6" CURB AND GUTTER

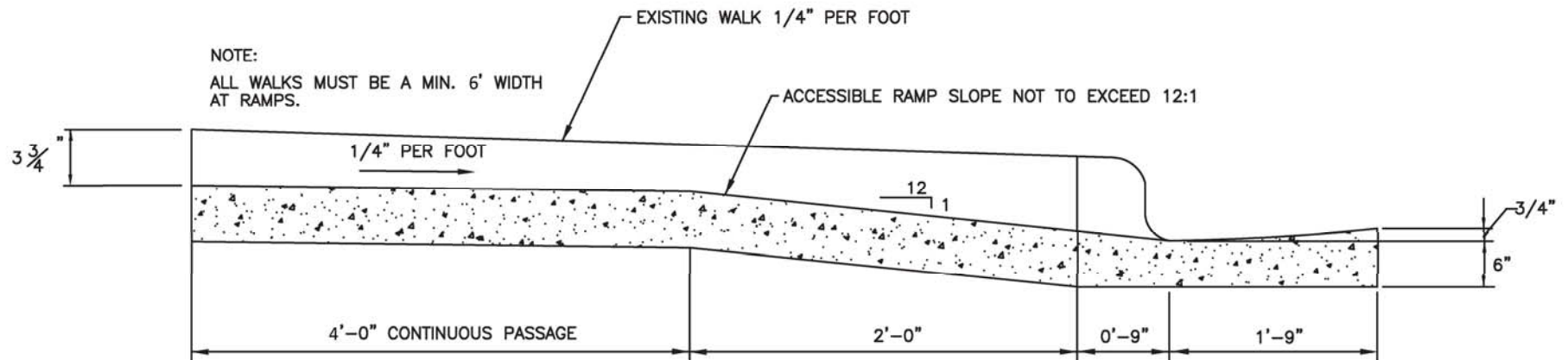
REV. DATE

STD. NO.

125.1



SECTION THROUGH FLOWLINE



TYPICAL RAMP L SECTION

NOT TO SCALE

Town of Oakboro  
Development Standards

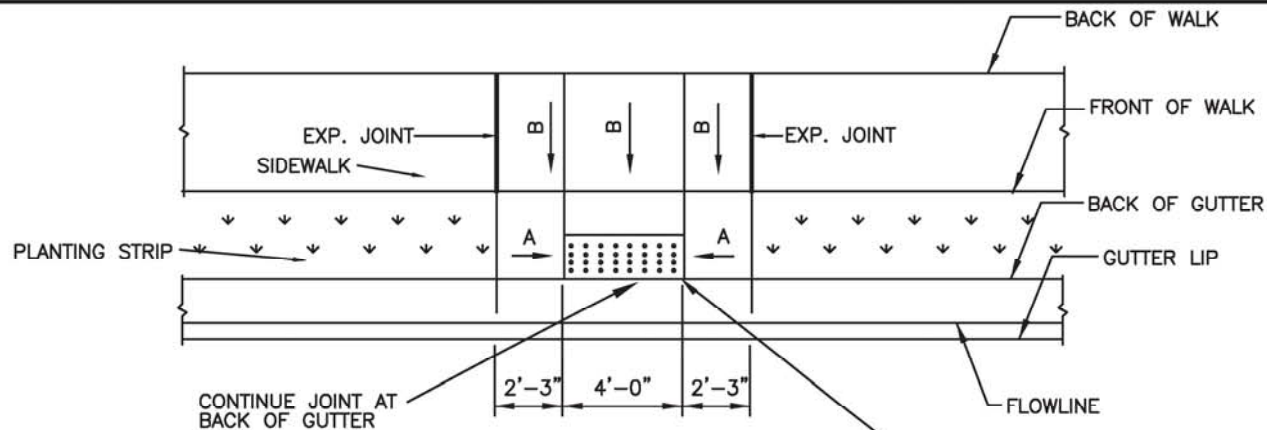
ACCESSIBLE RAMP SECTIONS WITHOUT  
PLANTING STRIP AND  
2'-6" CURB AND GUTTER

REV. DATE

STD. NO.

126.1

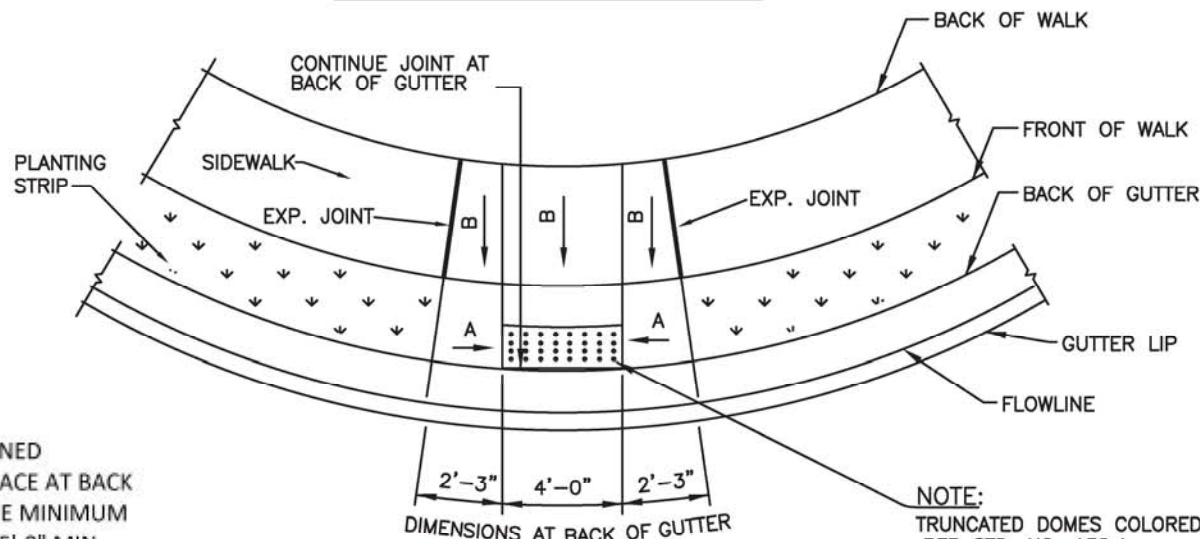




SLOPE "A"	12:1
SLOPE "B"	1/4"/FT

NOTE:  
TRUNCATED DOMES COLORED  
PER STD. NO. 132.1

PLAN VIEW-PARALLEL  
RAMP WITH PLANTING STRIP



NOTE:  
TRUNCATED DOMES COLORED  
PER STD. NO. 132.1

PLAN VIEW-DIAGONAL RAMP  
WITH PLANTING STRIP

NOTES:

1. IF TURNING SPACE IS CONFINED BY CURB OR VERTICAL SURFACE AT BACK OF THE TURNING SPACE, THE MINIMUM WIDTH MUST INCREASE TO 5'-0" MIN.
2. ENSURE FLUSH CONDITIONS AT CURB RAMP TO GUTTER TRANSITION.

NOT TO SCALE

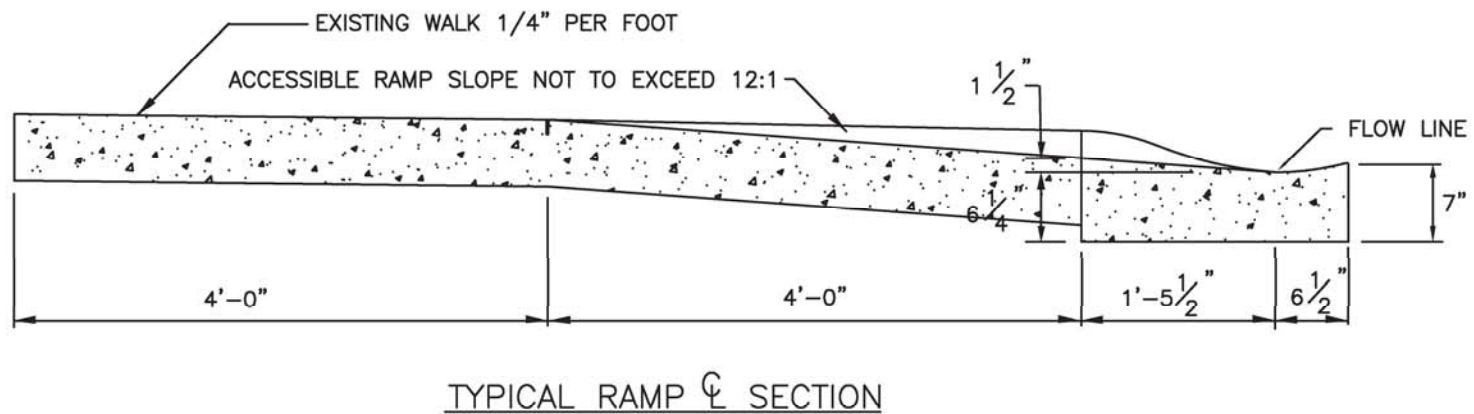
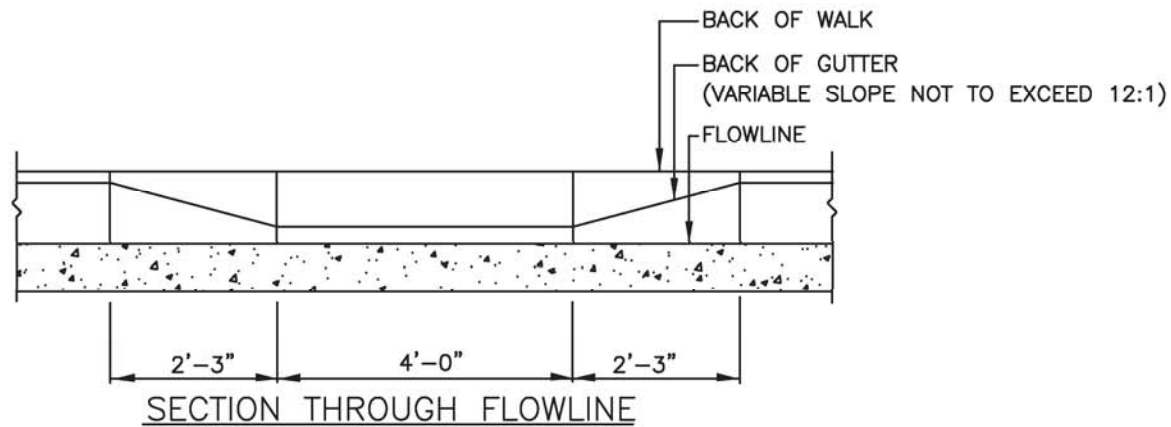
Town of Oakboro  
Development Standards

ACCESSIBLE RAMP STANDARD  
2'-0" VALLEY GUTTER

REV. DATE

STD. NO.

127.1



NOT TO SCALE

Town of Oakboro  
Development Standards

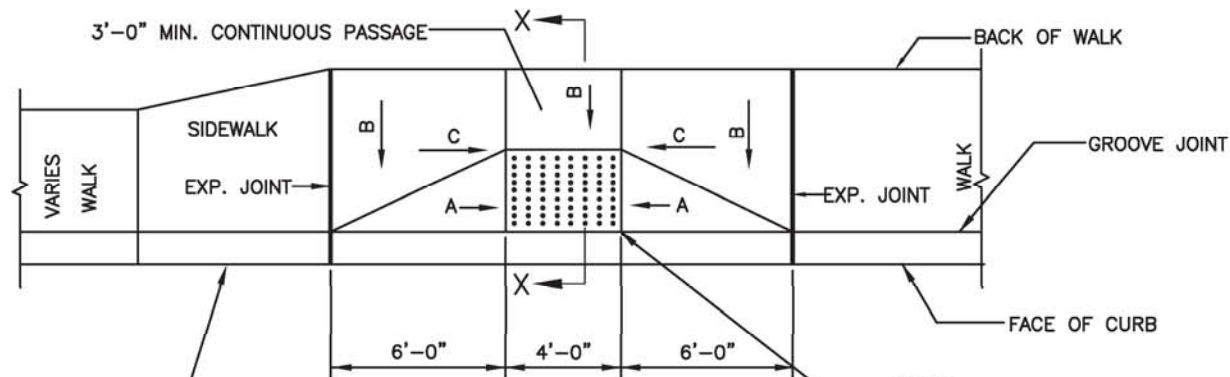
# ACCESSIBLE RAMP SECTIONS 2'-0" VALLEY GUTTER

REV. DATE

STD. NO.

128.1



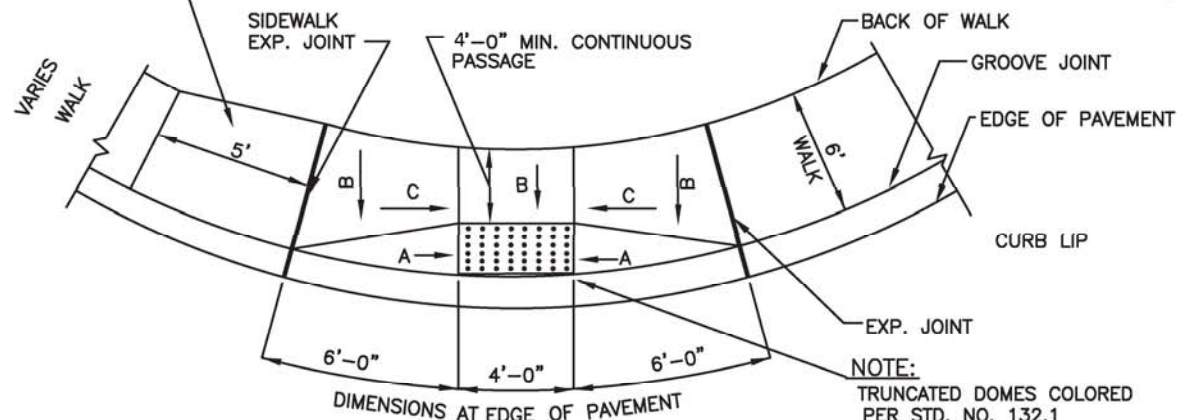


NOTE:  
TRUNCATED DOMES COLORED  
PER STD. NO. 132.1

PLAN VIEW-PARALLEL RAMP

5' TRANSITION FROM 6' WALK.  
ALL WALKS MUST BE A MIN. 6'  
WIDTH AT RAMP.

SLOPE "A"	12:1
SLOPE "B"	1/4"/FT
SLOPE "C"	1/2"/FT



NOTE:  
TRUNCATED DOMES COLORED  
PER STD. NO. 132.1

PLAN VIEW-DIAGONAL RAMP

NOT TO SCALE

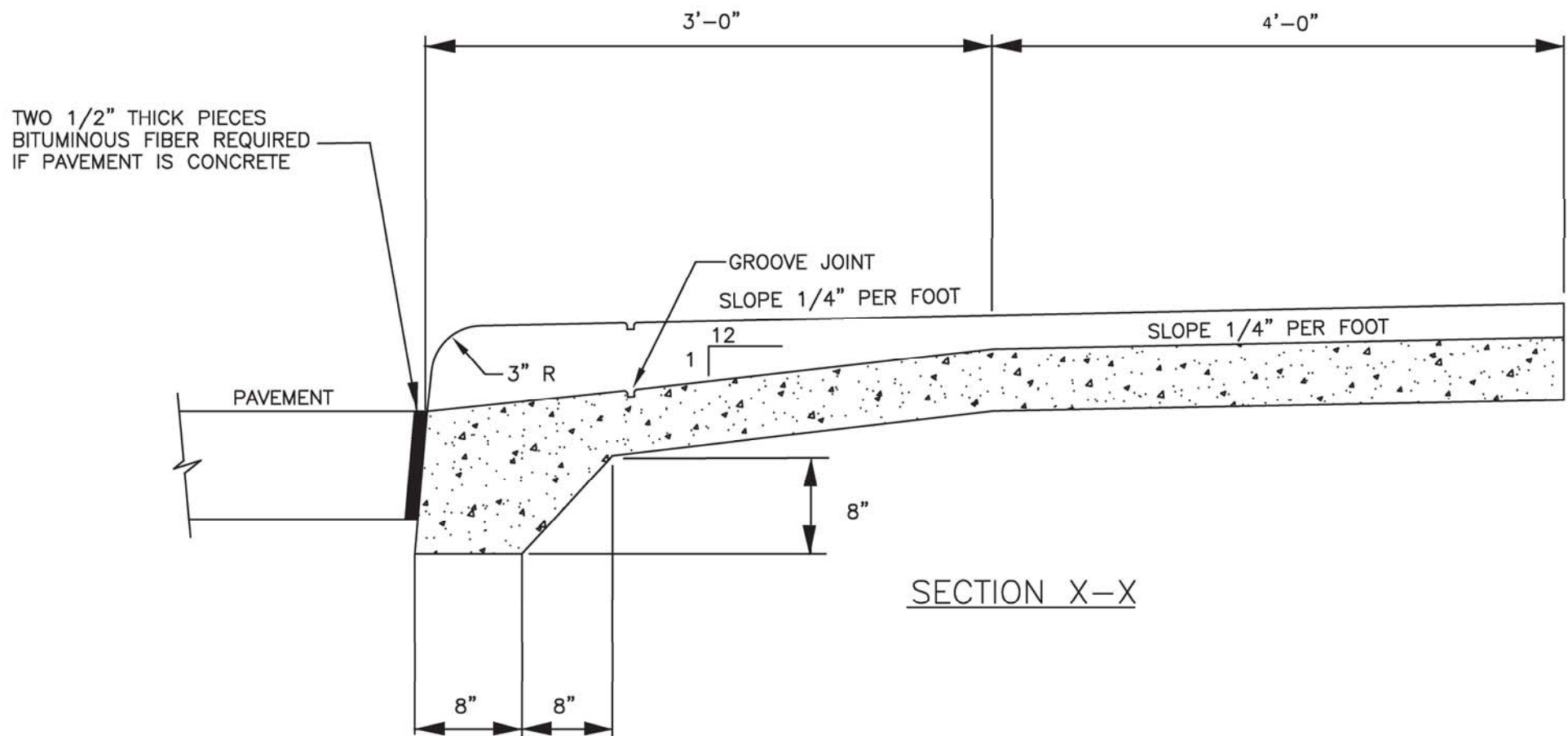
Town of Oakboro  
Development Standards

# ACCESSIBLE RAMP STANDARD MONOLITHIC CURB AND SIDEWALK

REV. DATE

STD. NO.

129.1



SECTION X-X

NOT TO SCALE

Town of Oakboro  
Development Standards

# ACCESSIBLE RAMP SECTIONS MONOLITHIC CURB AND SIDEWALK

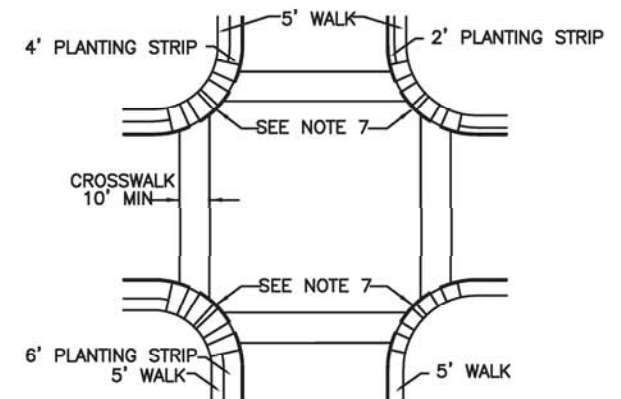
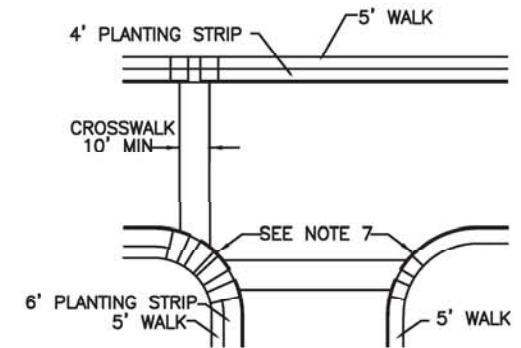
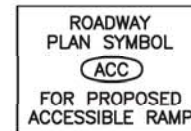
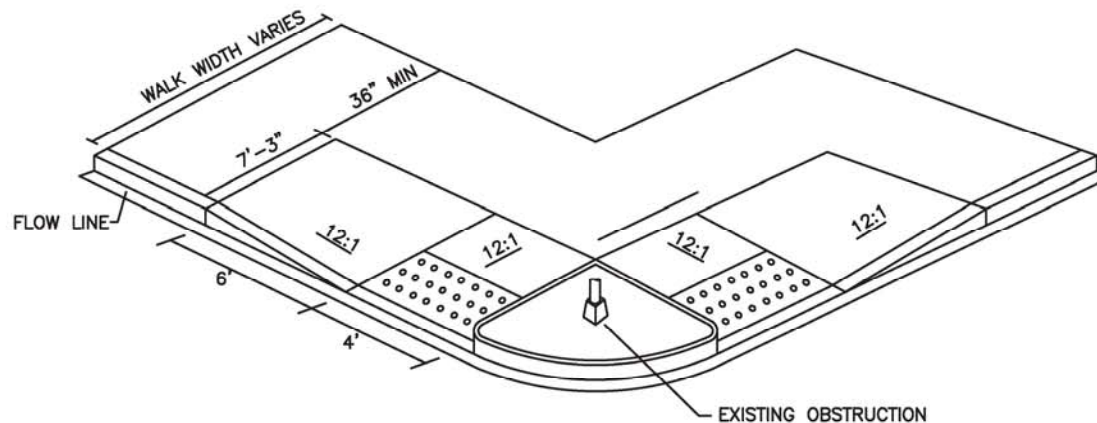
REV. DATE

STD. NO.

130.1

## NOTES:

1. RAMP AND WING SLOPES SHALL NOT BE STEEPER THAN 12:1.
2. GUTTER FLOW LINE AND PLAN PROFILE SHALL BE MAINTAINED THROUGH THE RAMP AREA.
3. THE SURFACE OF THE RAMP SHALL BE FLUSH WITH THE FLOWLINE OF THE CURB AND GUTTER.
4. THE RAMP OPENING (AT THE FULLY DEPRESSED CURB) SHALL BE LOCATED WITHIN THE PARALLEL BOUNDARIES OF THE CROSSWALK MARKINGS. THE RAMP CENTERLINE SHALL BE LOCATED AT THE CORNER RADIUS CENTERLINE UNLESS OTHERWISE DIRECTED BY THE ENGINEER. DIAGONAL CURB RAMP SHALL HAVE A SEGMENT OF STRAIGHT CURB AT LEAST 24 INCHES LONG LOCATED ON EACH SIDE OF THE WING SLOPE AND WITHIN THE CROSSWALK MARKINGS.
5. THE WING AND RAMP SURFACES SHALL BE 3600 PSI CONCRETE WITH A SIDEWALK FINISH IN ACCORDANCE WITH CURRENT EDITION NCDOT STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES.
6. DRAINAGE STRUCTURES, MAST ARMS, LIGHT POLES AND OTHER OBSTRUCTIONS SHALL NOT BE PLACED IN LINE WITH RAMPS. LOCATION OF THE RAMP SHALL TAKE PRECEDENCE OVER LOCATION OF OBSTRUCTIONS EXCEPT WHERE EXISTING OBSTRUCTIONS ARE BEING UTILIZED IN THE NEW CONSTRUCTION.
7. AT ALL LOCATIONS, NOT LESS THAN 2 FEET OF FULL HEIGHT CURB SHALL BE PLACED BETWEEN THE RAMPS.
8. SEE STANDARD DRAWING 132.1 FOR DETECTABLE WARNING INSTALLATION.



TYPICAL LOCATION OF ACCESSIBLE  
RAMPS AND PEDESTRIAN CROSSWALKS ON

NOT TO SCALE

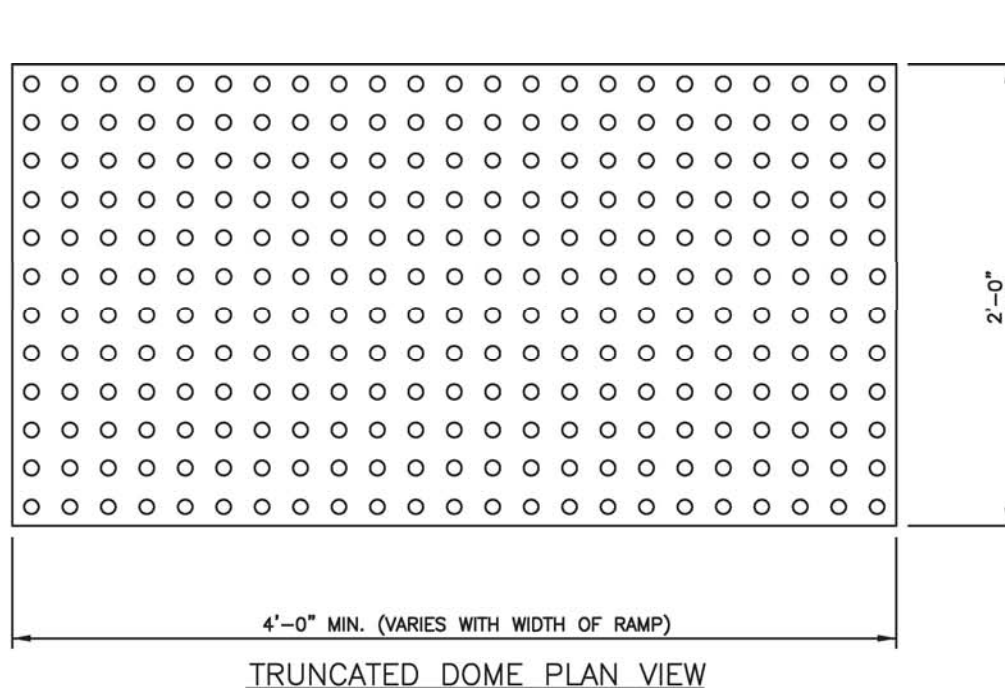
Town of Oakboro  
Development Standards

## STANDARD PLACEMENT OF ACCESSIBLE RAMP AND GENERAL NOTES

REV. DATE

STD. NO.

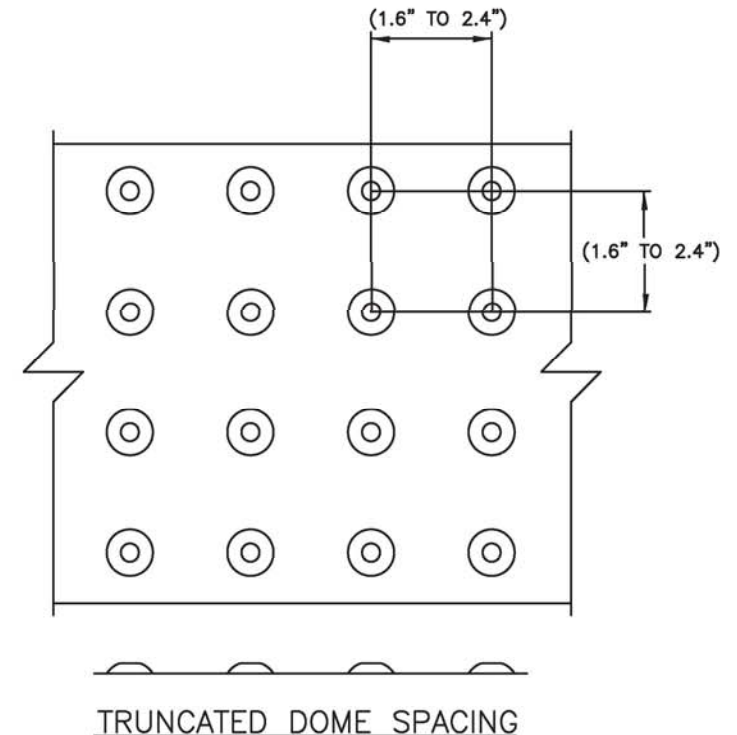
131.1



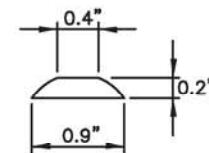
TRUNCATED DOME PLAN VIEW

NOTES:

1. ALL DETECTABLE WARNING DEVICES USED IN NEW CONSTRUCTION SHALL BE OF A RIGID PRECAST OR EMBEDDED PRODUCT APPROVED BY THE ENGINEER. RETRO FIT MATS WILL ONLY BE ALLOWED ON EXISTING RAMPS WITH PRIOR APPROVAL OF THE ENGINEER FOR MATERIAL TYPE AND INSTALLATION (IE. RESURFACING).
2. WIDTH OF DETECTABLE WARNING AREA SHALL BE A MINIMUM OF 4 FEET AND VARY WITH WIDTH OF RAMP.
3. LENGTH OF DETECTABLE WARNING AREA SHALL BE 2 FEET REGARDLESS OF SECTION WIDTH.
4. DETECTABLE WARNING AREA CAN BE SQUARE WHERE USED IN A CURB RADIUS.
5. DETECTABLE WARNING DOMES SHALL BE ALIGNED ON A SQUARE GRID IN THE PREDOMINANT DIRECTION OF OF TRAVEL TO PERMIT WHEELS TO ROLL BETWEEN DOMES.
6. DETECTABLE WARNING AREA SHALL BE COLORED BLACK IN ALL LOCATIONS.
7. IF PAVERS ARE TO BE USED, PAVERS SHALL BE 6" THICK AND CAST FROM 5000 psi CONCRETE.
8. MATS ARE TO BE RIGID WITH TURN DOWN EDGES EMBEDDED IN CONCRETE TO ELIMINATE TRIP HAZARD.



TRUNCATED DOME SPACING



TRUNCATED DOME SECTION

NOT TO SCALE

Town of Oakboro  
Development Standards

TRUNCATED DOMES  
PLAN AND CROSS SECTION

REV. DATE

STD. NO.

132.1

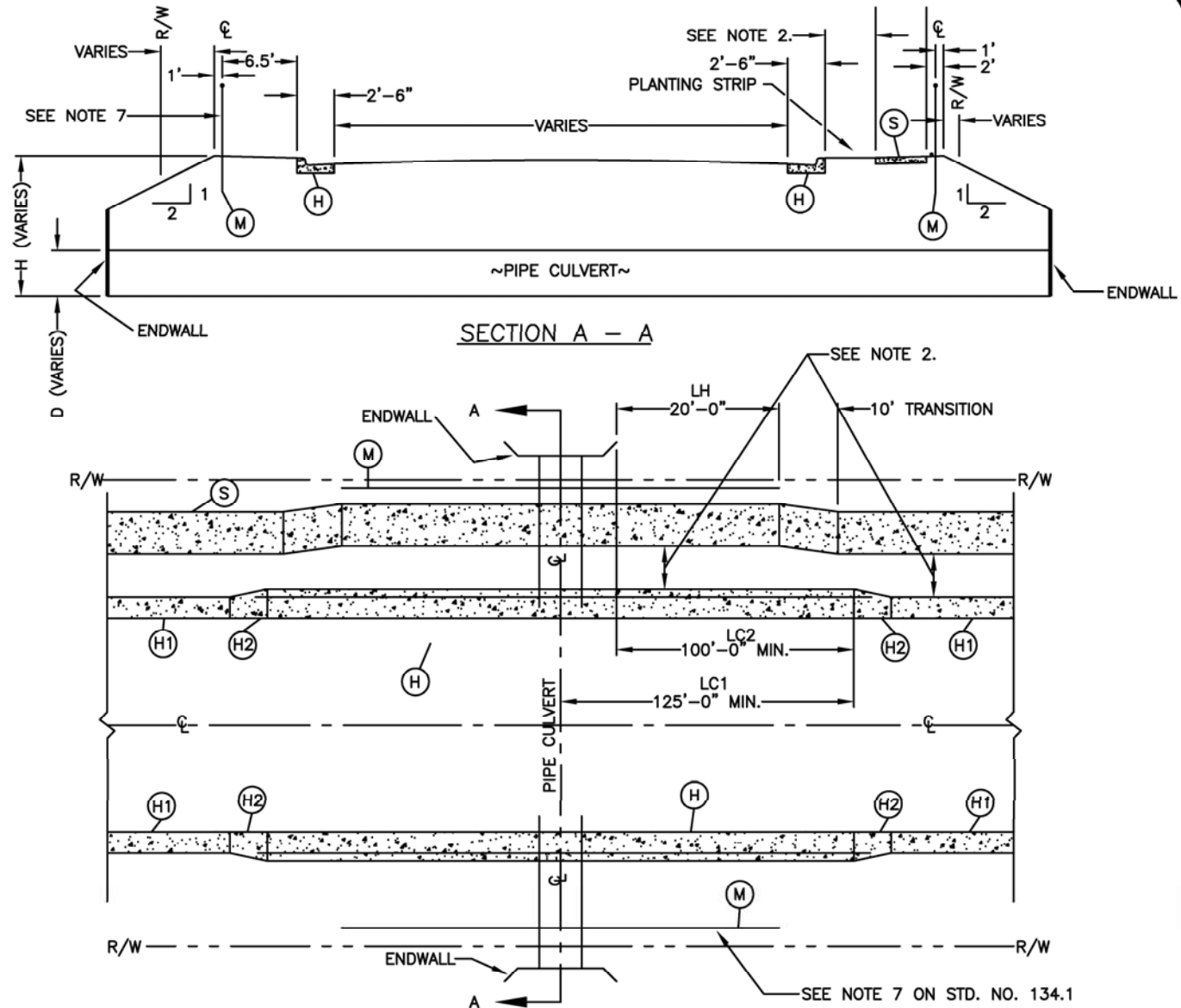


- (H) 2'-6" CURB AND GUTTER, STD. 100.1  
 (M) HANDRAIL, STD. 700.1 & 701.1  
 (S) 5'-0" SIDEWALK  
 (H1) 2'-0" VALLEY GUTTER, STD. 101.1  
 (H2) CURB TRANSITION 2'-6" CURB AND GUTTER TO 2'-0" VALLEY GUTTER, STD. 104.1

LH = DISTANCE FROM END OF WINGWALL TO  
END OF HANDRAIL.  
 LC1 = DISTANCE FROM  $\phi$  OF CULVERT  
TO END OF 2'-6" CURB AND GUTTER  
GUTTER.  
 LC2 = DISTANCE FROM END OF WINGWALL  
TO END OF 2'-6" CURB AND GUTTER.

#### NOTES:

1. SEE STD. NO. 134.1 FOR GENERAL  
NOTES AND CLEAR ZONE DISTANCES
2. PLANTING STRIP WIDTH TO BE IN  
ACCORDANCE WITH CROSS SECTION  
PER VILLAGE REQUIREMENTS.



NOT TO SCALE

Town of Oakboro  
Development Standards

## CULVERT CROSSINGS ON RESIDENTIAL AND COMMERCIAL STREETS

REV. DATE

STD. NO.

133.1

GENERAL NOTES:

1. UNLESS OTHERWISE DETERMINED BY THE VILLAGE ENGINEER, THE MEASURES ILLUSTRATED SHALL BE USED WHEN CULVERT DIAMETER, D, IS GREATER THAN OR EQUAL TO 24 INCHES AND WHEN THE DIFFERENCE IN ELEVATION BETWEEN THE CULVERT INVERT AND THE TOP OF SLOPE, H, IS GREATER THAN OR EQUAL TO 5 FEET.
2. INSTALLATION OF 2'-6" CURB AND GUTTER MAY NOT BE REQUIRED WHEN AN ADEQUATE CLEAR ZONE IS PROVIDED FOR VEHICLES WITH A MAXIMUM OF 6:1 SLOPE (SEE TABLE 1).
3. INSTALLATION OF HANDRAIL MAY NOT BE REQUIRED WHEN A 10-FOOT PEDESTRIAN CLEAR ZONE IS PROVIDED BEHIND THE SIDEWALK WITH A MAXIMUM OF 6:1 SLOPE. WHERE NO SIDEWALK IS REQUIRED, INSTALLATION OF HANDRAIL MAY NOT BE REQUIRED WHEN A 15-FOOT PEDESTRIAN CLEAR ZONE IS PROVIDED BEHIND THE CURB WITH A MAXIMUM OF 6:1 SLOPE.
4. FOR CULVERT CROSSINGS WITHOUT ENDWALLS, LH AND LC2 SHALL BE MEASURED FROM THE OUTSIDE OF THE NEAREST WALL OF THE CULVERT BARREL.
5. FOR MULTIPLE BARREL CULVERT CROSSINGS, LC1 SHALL BE MEASURED FROM THE CENTERLINES OF THE OUTBOARD CULVERT BARRELS.
6. WHEN NECESSARY, AS DETERMINED BY THE VILLAGE ENGINEER, ADDITIONAL MEASURES MAY BE REQUIRED.
7. INSTALLATION OF HANDRAIL IS REQUIRED ON BOTH SIDES OF STREET IF SIDEWALK IS REQUIRED ON BOTH SIDES.
8. INSTALLATION OF HANDRAIL IS REQUIRED ON BOTH SIDES OF STREET IF NO SIDEWALK IS REQUIRED EXCEPT WHEN A 15-FOOT PEDESTRIAN CLEAR ZONE IS PROVIDED BEHIND THE CURB WITH A MAXIMUM OF 6:1 SLOPE.
9. INSTALLATION OF HANDRAIL IS REQUIRED ON THE SIDEWALK SIDE OF STREET IF SIDEWALK IS ONLY REQUIRED ON ONE SIDE OF STREET. PROVIDE HANDRAIL OR 15 FOOT CLEAR ZONE ON SIDE WITHOUT SIDEWALK.
10. DESIGN ADT IS CALCULATED ASSUMING A TRIP GENERATION OF 10 DAILY TRIPS PER SINGLE FAMILY DWELLING UNIT.

TABLE 1.  
CLEAR ZONE DISTANCES  
LOCAL, COLLECTOR, AND COMMERCIAL STREETS

DESIGN ADT	CLEAR ZONE FROM EDGE OF PAVEMENT	
	TANGENT SECTION	CURVE (WITHIN 125' OF CULVERT)
UNDER 750	10'	15'
750 - 1500	12'	18'
1501 - 6000	14'	21'
OVER 6000	16'	24'

SEE STD. NO. 133.1 FOR PLAN AND CROSS SECTIONAL SCHEMATICS.

NOT TO SCALE

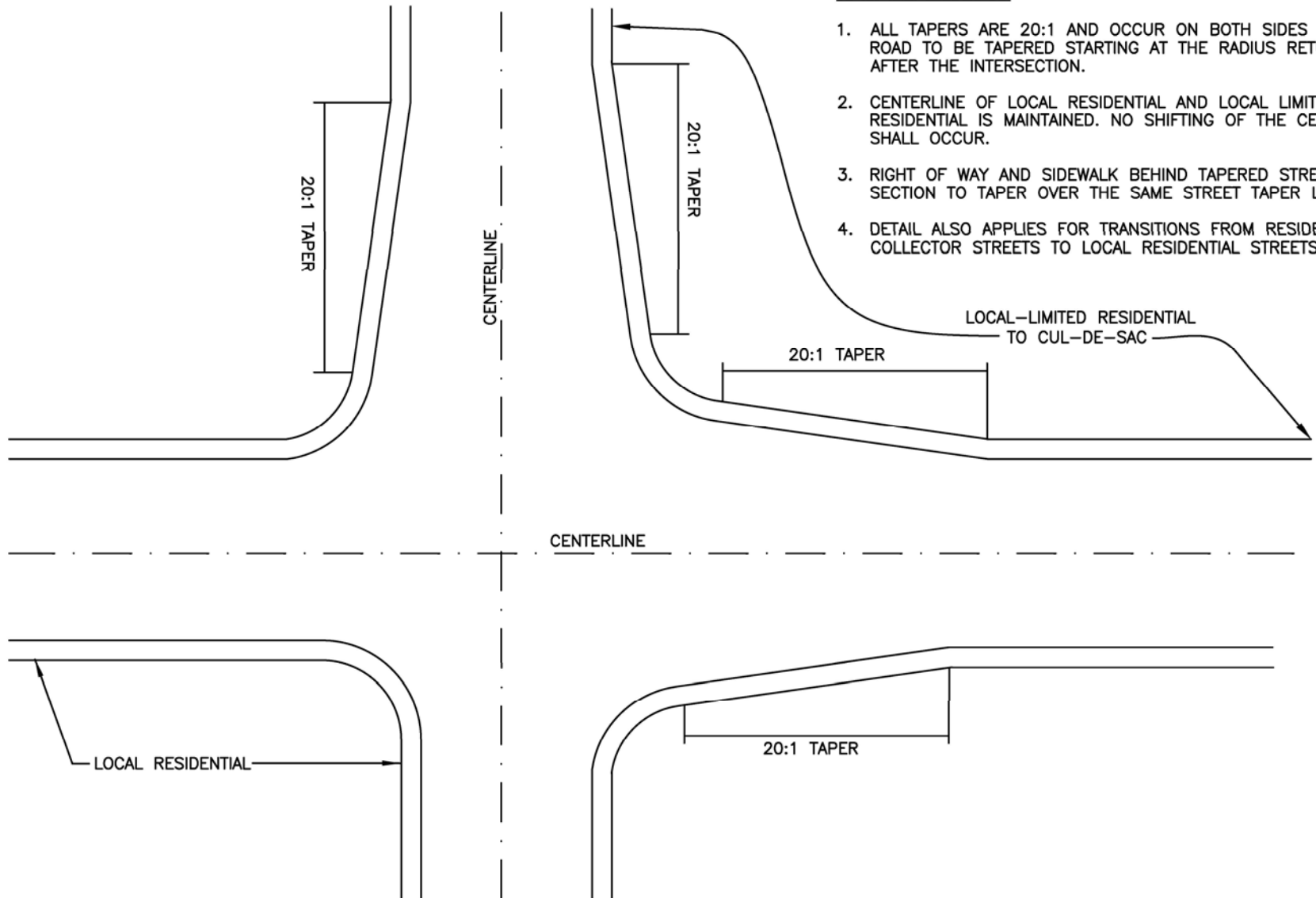
Town of Oakboro  
Development Standards

# CULVERT CROSSINGS ON RESIDENTIAL AND COMMERCIAL STREETS

REV. DATE

STD. NO.

134.1



GENERAL NOTES:

1. ALL TAPERS ARE 20:1 AND OCCUR ON BOTH SIDES OF THE ROAD TO BE TAPERED STARTING AT THE RADIUS RETURN AFTER THE INTERSECTION.
2. CENTERLINE OF LOCAL RESIDENTIAL AND LOCAL LIMITED RESIDENTIAL IS MAINTAINED. NO SHIFTING OF THE CENTERLINE SHALL OCCUR.
3. RIGHT OF WAY AND SIDEWALK BEHIND TAPERED STREET SECTION TO TAPER OVER THE SAME STREET TAPER LENGTH.
4. DETAIL ALSO APPLIES FOR TRANSITIONS FROM RESIDENTIAL COLLECTOR STREETS TO LOCAL RESIDENTIAL STREETS.

NOT TO SCALE

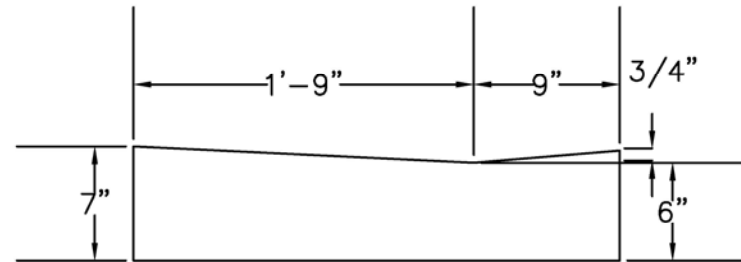
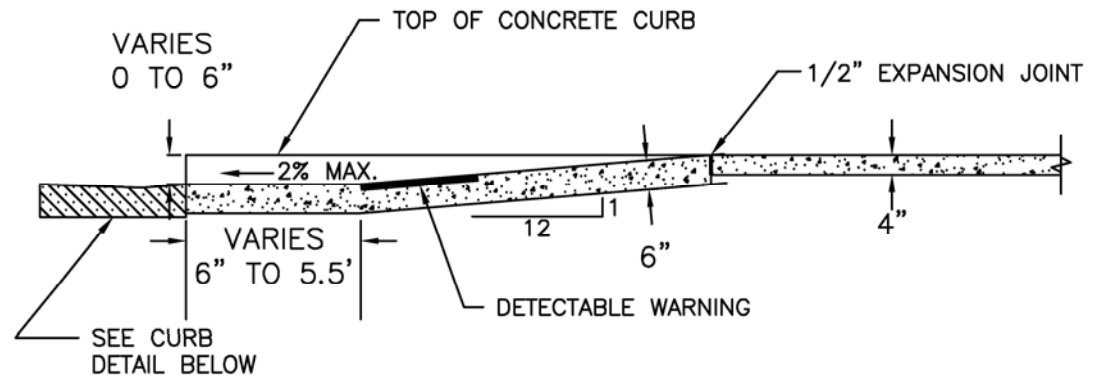
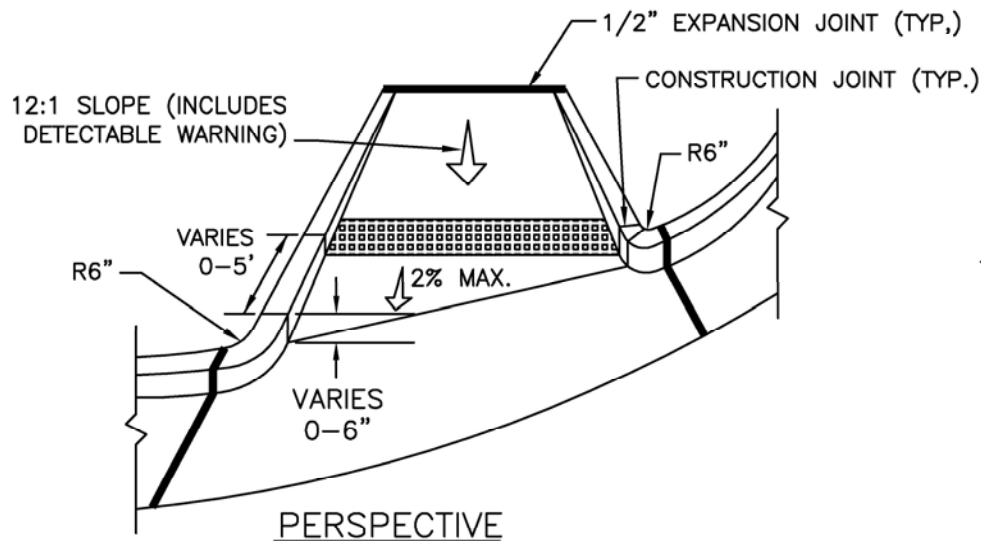
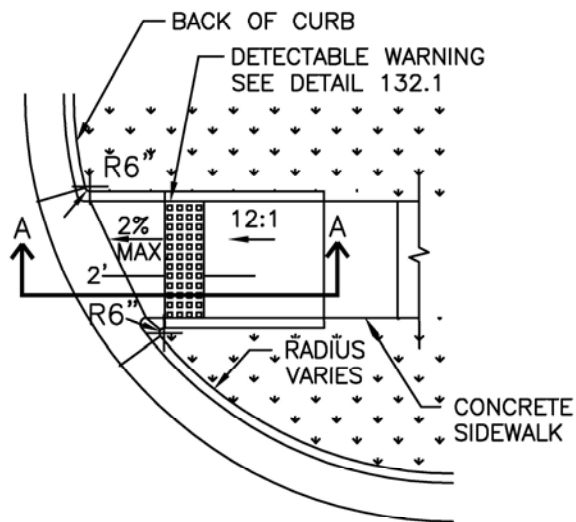
Town of Oakboro  
Development Standards

**TYPICAL LOCAL RESIDENTIAL  
TO LOCAL LIMITED RESIDENTIAL  
STREET TAPER**

REV. DATE

STD. NO.

135.1



#### NOTES:

1. DIRECTIONAL RAMPS MAY BE USED WHEN A PLANTING STRIP IS PROVIDED. DO NOT USE THIS DETAIL IF THERE IS HARDSCAPE INSTEAD OF A PLANTING STRIP.
2. ALL CONCRETE SHALL BE AT LEAST 3600 PSI.

NOT TO SCALE

Town of Oakboro  
Development Standards

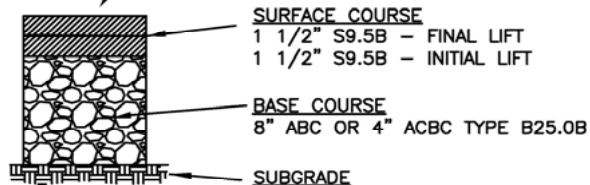
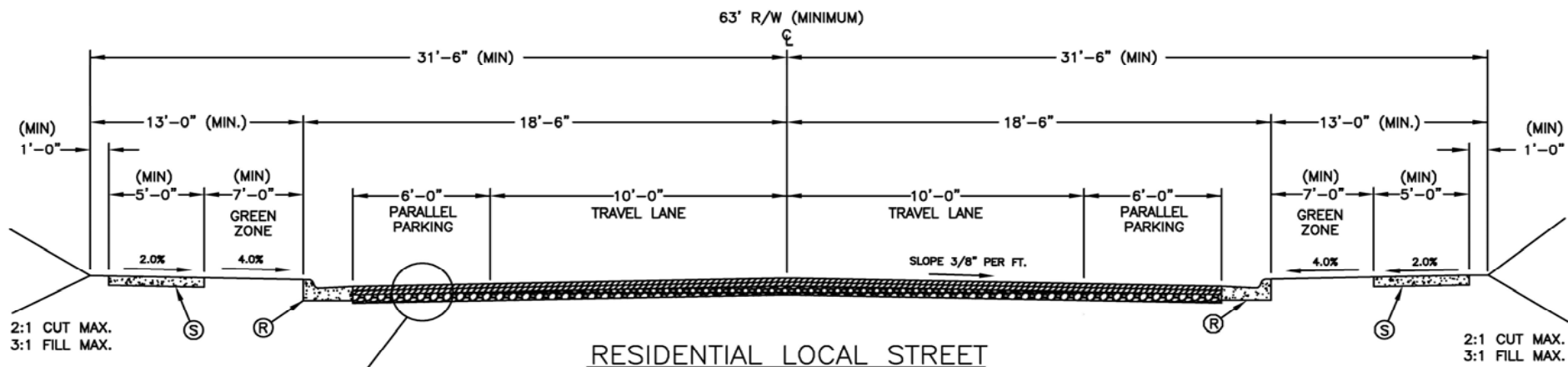
## DIRECTIONAL ACCESSIBLE RAMP

REV. DATE

STD. NO.

136.1





TYPICAL PAVEMENT SECTION

KEY

- (R) 2'-6" STD. CURB AND GUTTER
- (S) 4" CONCRETE SIDEWALK

NOTES:

1. SIDEWALK SHALL BE PROVIDED ON BOTH SIDES OF THE STREET.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. REFER TO STANDARD DRAWING 285.1 FOR PARALLEL PARKING LAYOUT.

NOT TO SCALE

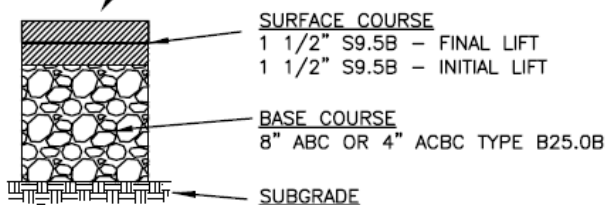
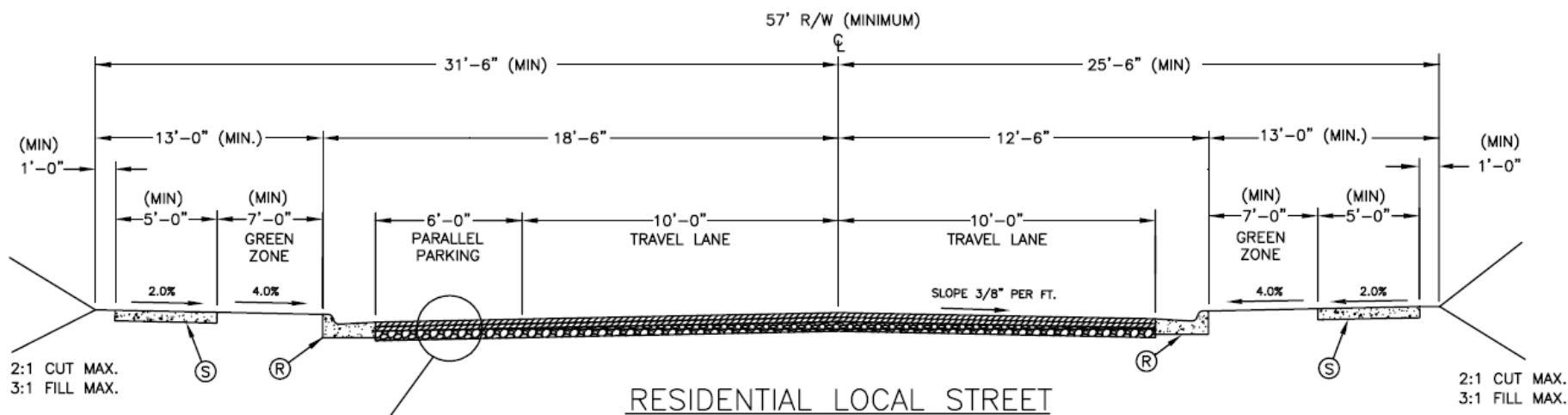
Town of Oakboro  
Development Standards

RESIDENTIAL LOCAL STREET  
PARKING ON BOTH SIDES OF STREET  
TYPICAL SECTION

REV. DATE

STD. NO.

200.1



TYPICAL PAVEMENT SECTION

KEY

- (R) 2'-6" STD. CURB AND GUTTER
- (S) 4" CONCRETE SIDEWALK

NOTES:

1. SIDEWALK SHALL BE PROVIDED ON BOTH SIDES OF THE STREET.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. 2'-0" VALLEY GUTTER MAY BE SUBSTITUTED FOR 2'-6" CURB AND GUTTER ON THE SIDE OF THE STREET WITHOUT PARALLEL PARKING. THIS REDUCES THE MINIMUM RIGHT-OF-WAY BY SIX INCHES. 2'-0" VALLEY GUTTER MAY NOT BE SUBSTITUTED FOR 2'-6" CURB AND GUTTER ON THE SIDE OF THE STREET WITH PARALLEL PARKING.
4. REFER TO STANDARD DRAWING 285.1 FOR PARALLEL PARKING LAYOUT.

NOT TO SCALE

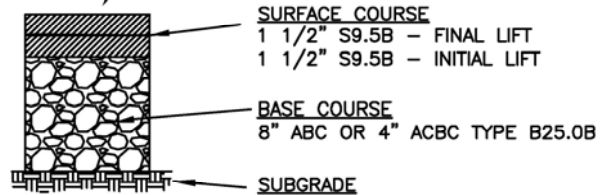
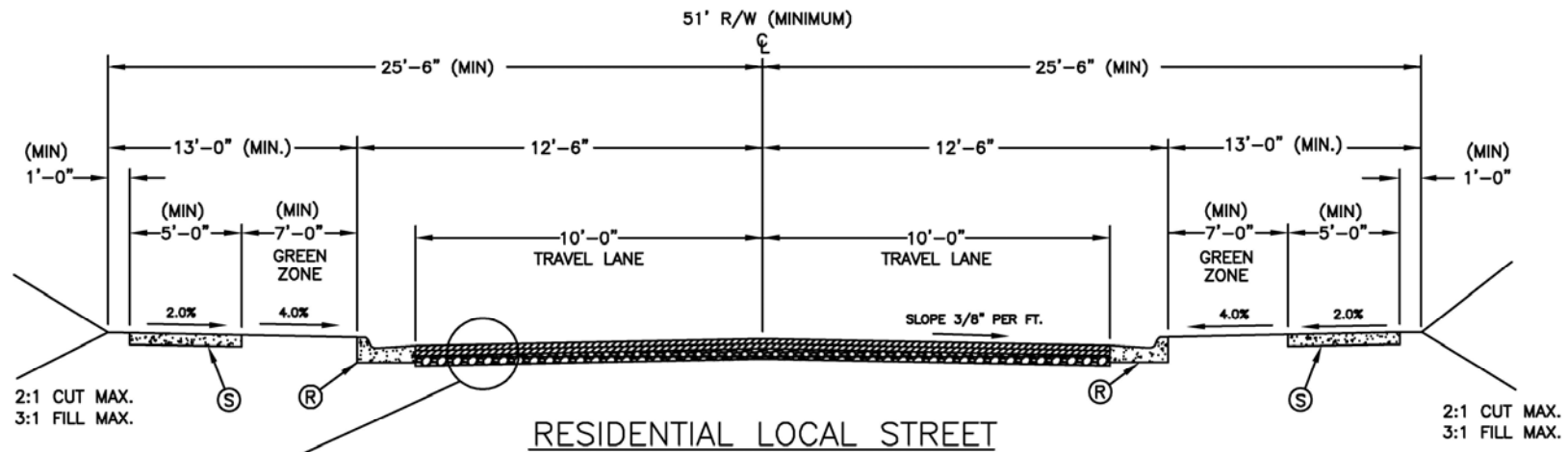
Town of Oakboro  
Development Standards

RESIDENTIAL LOCAL STREET  
PARKING ON ONE SIDE OF STREET  
TYPICAL SECTION

REV. DATE

STD. NO.

200.2



TYPICAL PAVEMENT SECTION

KEY

- (R) 2'-6" STD. CURB AND GUTTER
- (S) 4" CONCRETE SIDEWALK

NOTES:

1. SIDEWALK SHALL BE PROVIDED ON BOTH SIDES OF THE STREET.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. 2'-0" VALLEY GUTTER MAY BE SUBSTITUTED FOR 2'-6" CURB AND GUTTER. THIS REDUCES THE MINIMUM RIGHT-OF-WAY BY ONE FOOT.

NOT TO SCALE

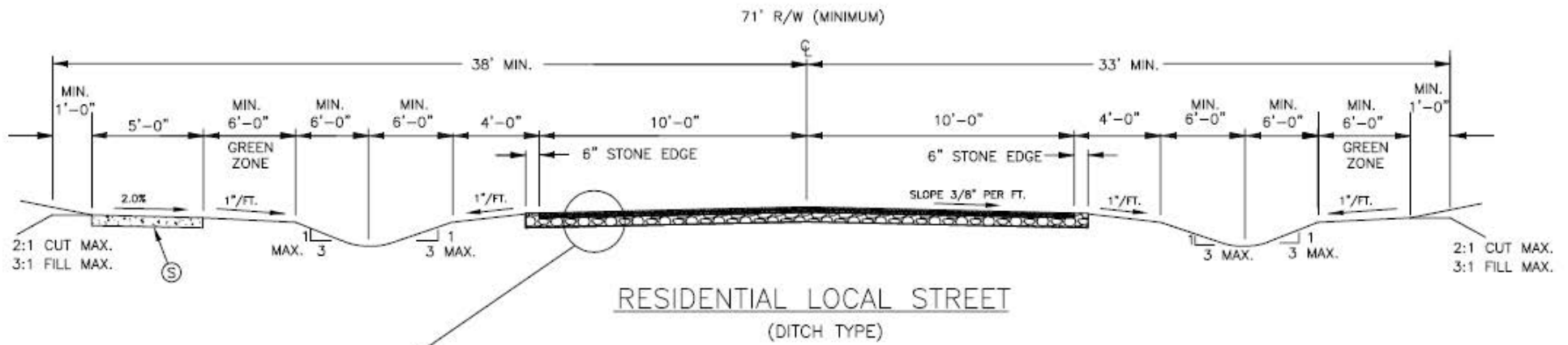
Town of Oakboro  
Development Standards

RESIDENTIAL LOCAL STREET  
NO ON STREET PARKING  
TYPICAL SECTION

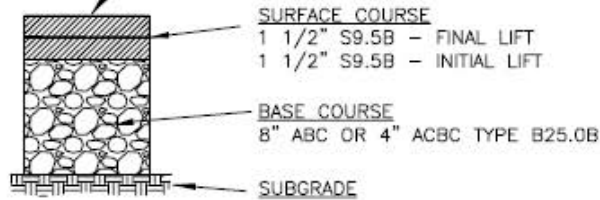
REV. DATE

STD. NO.

200.3



RESIDENTIAL LOCAL STREET  
(DITCH TYPE)



TYPICAL PAVEMENT SECTION

KEY

Ⓢ 4" CONCRETE SIDEWALK

NOTES:

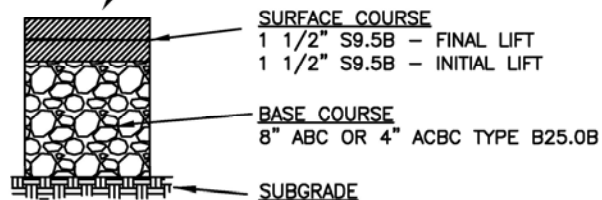
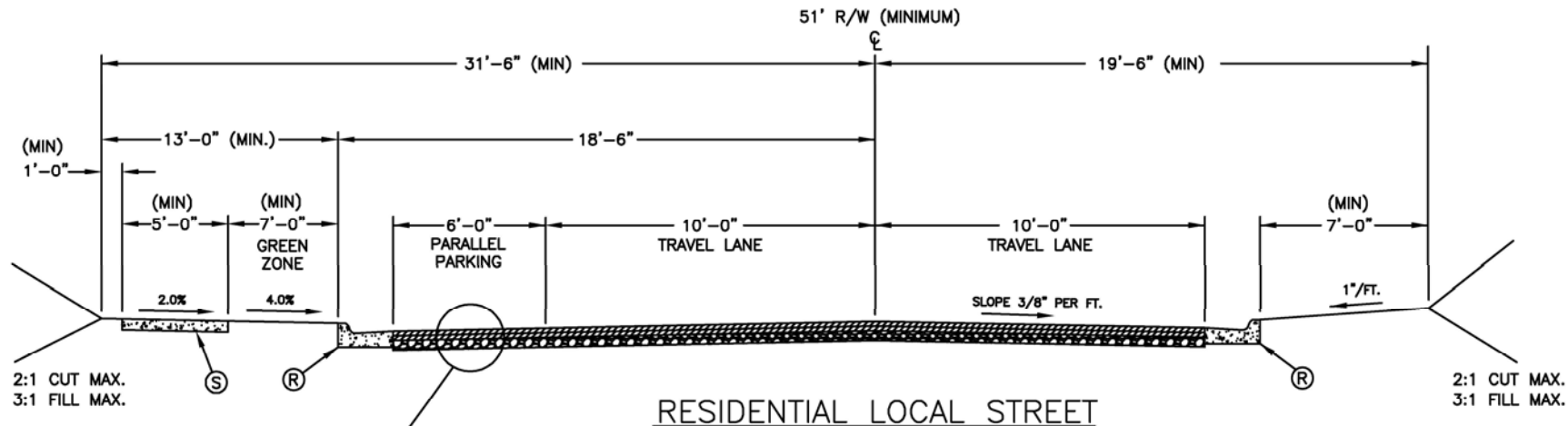
1. APPROVAL BY THE ENGINEER IS REQUIRED PRIOR TO USING DITCH TYPE SECTION.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. TREES TO BE PLACED IN THE GREEN ZONE 3.5 FEET FROM EDGE OF SIDEWALK.

NOT TO SCALE

Town of Oakboro  
Development Standards

**RESIDENTIAL LOCAL STREET  
DITCH TYPE  
TYPICAL SECTION**

REV. DATE
STD. NO.
200.4



TYPICAL PAVEMENT SECTION

KEY

- (R) 2'-6" STD. CURB AND GUTTER
- (S) 4" CONCRETE SIDEWALK

NOTES:

1. SIDEWALK SHALL BE PROVIDED ON THE BUILDING SIDE OF STREET.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. 2'-0" VALLEY GUTTER MAY BE SUBSTITUTED FOR 2'-6" CURB AND GUTTER ON THE SIDE OF THE STREET WITHOUT PARALLEL PARKING. THIS REDUCES THE MINIMUM RIGHT-OF-WAY BY SIX INCHES. 2'-0" VALLEY GUTTER MAY NOT BE SUBSTITUTED FOR 2'-6" CURB AND GUTTER ON THE SIDE OF THE STREET WITH PARALLEL PARKING.
4. REFER TO STANDARD DRAWING 285.1 FOR PARALLEL PARKING LAYOUT.

NOT TO SCALE

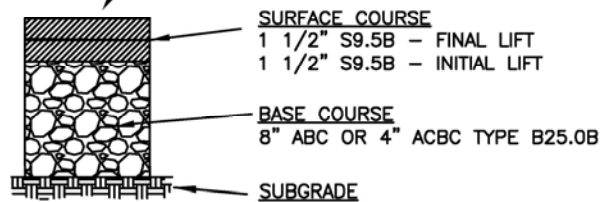
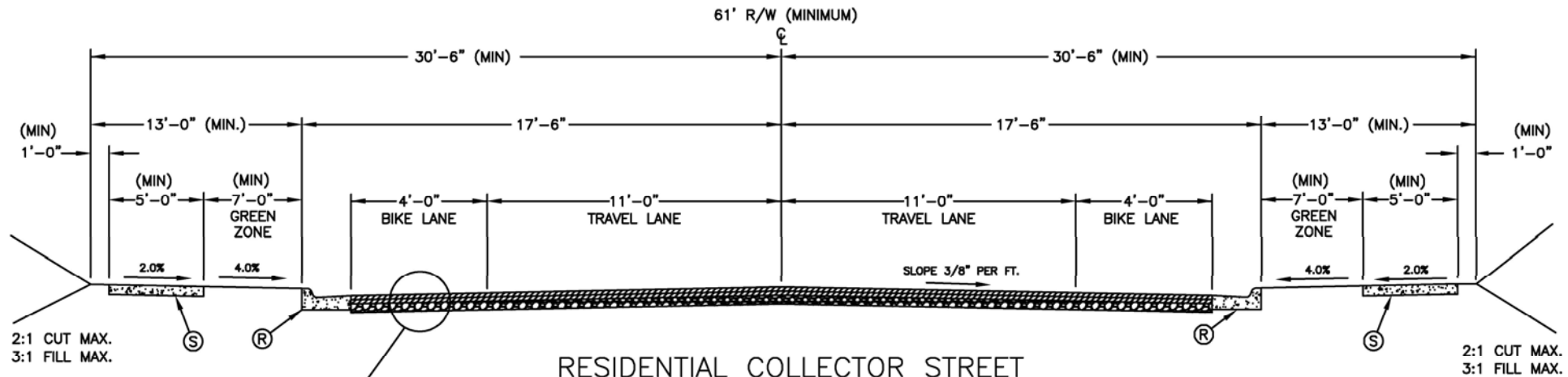
Town of Oakboro  
Development Standards

RESIDENTIAL LOCAL STREET  
PARKING ON ONE SIDE/OPEN SPACE ON OTHER  
TYPICAL SECTION

REV. DATE

STD. NO.

200.5



TYPICAL PAVEMENT SECTION

KEY

- (R) 2'-6" STD. CURB AND GUTTER
- (S) 4" CONCRETE SIDEWALK

NOTES:

1. SIDEWALK SHALL BE PROVIDED ON BOTH SIDES OF THE STREET.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. BIKE LANE TO BE STRIPED.

NOT TO SCALE

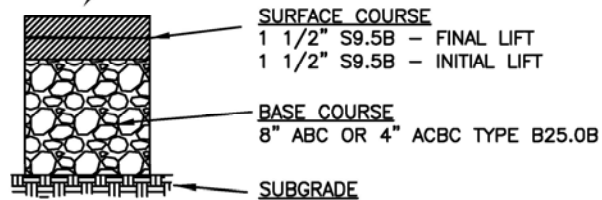
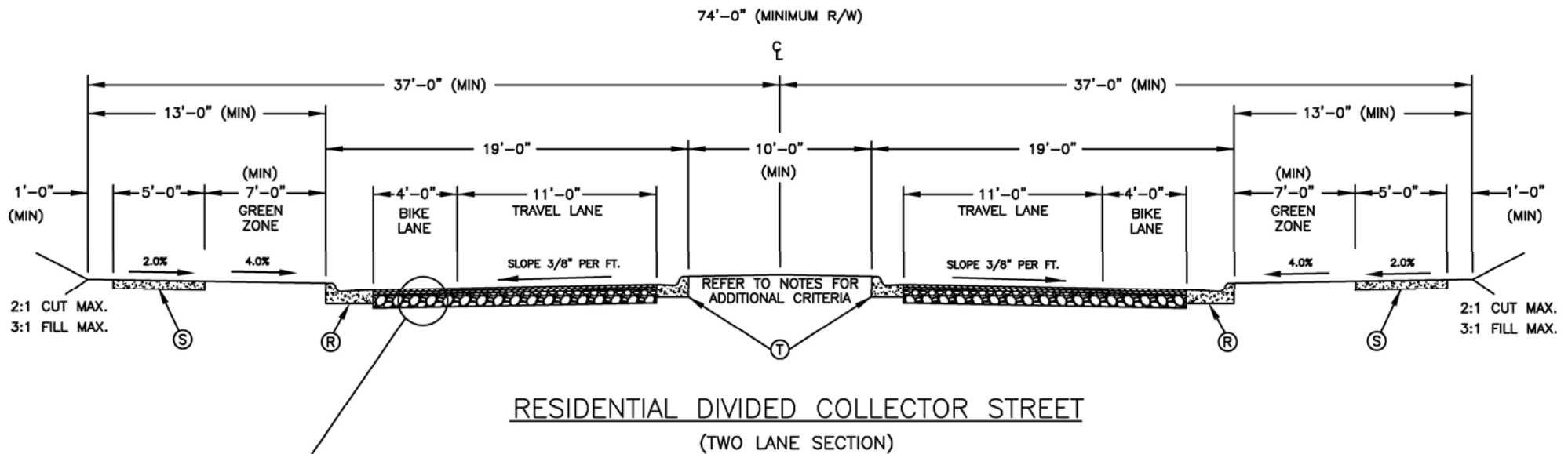
Town of Oakboro  
Development Standards

**RESIDENTIAL COLLECTOR STREET  
WITH BIKE LANES  
TYPICAL SECTION**

REV. DATE

STD. NO.

210.1



TYPICAL PAVEMENT SECTION

KEY

- (R) 2'-6" STD. CURB AND GUTTER
- (S) 4" CONCRETE SIDEWALK
- (T) 1'-6" MEDIAN CURB AND GUTTER

NOTES:

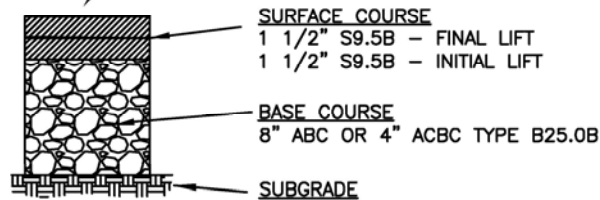
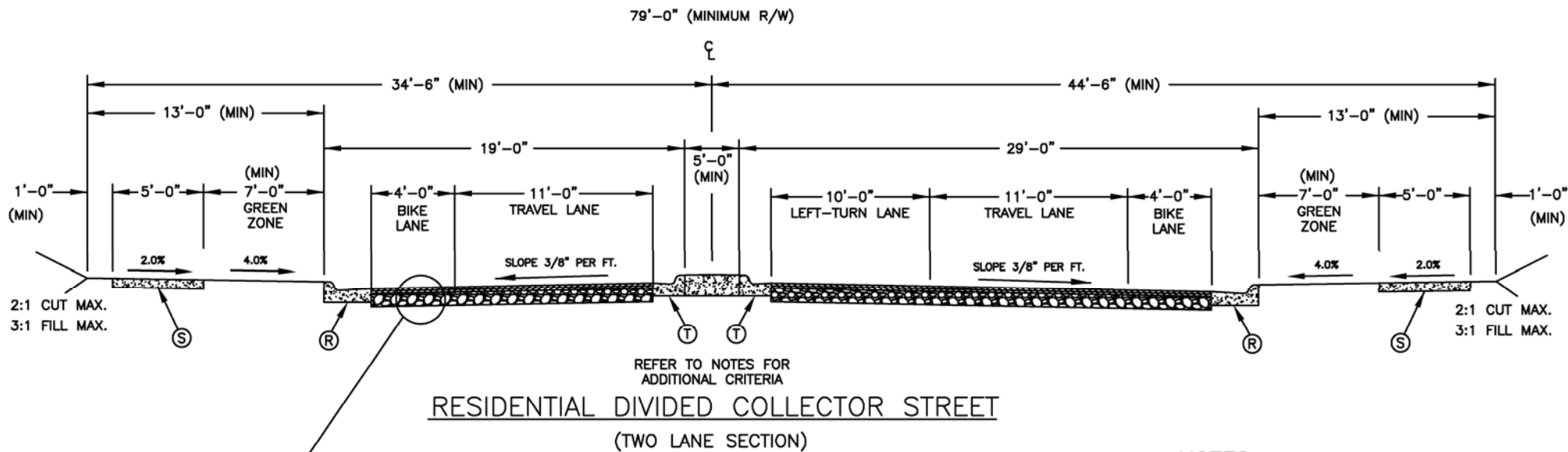
1. CURB RETURN RADIUS DIMENSIONS AT INTERSECTIONS MAY VARY DEPENDING ON MEDIAN WIDTH AND WILL BE APPROVED ON A CASE BY CASE BASIS.
2. SUBDRAINS ARE REQUIRED ON ALL MEDIANS. (TO BE TIED INTO STORM DRAINAGE SYSTEM.) REFER TO SUBDRAIN STANDARD DETAIL 312.1.
3. MEDIAN PLANTINGS SHALL NOT OBSTRUCT INTERSECTION SIGHT DISTANCE REQUIREMENTS.
4. A TEN (10) FOOT WIDE MEDIAN IS REQUIRED FOR SMALL MATURING TREES. A TWENTY (20) FOOT WIDE MEDIAN IS REQUIRED FOR LARGE MATURING TREES.
5. BIKE LANE TO BE STRIPED.
6. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.

NOT TO SCALE

Town of Oakboro  
Development Standards

# RESIDENTIAL DIVIDED COLLECTOR STREET TYPICAL SECTION

REV. DATE
STD. NO.
210.2



**TYPICAL PAVEMENT SECTION**

**KEY**

- (R) 2'-6" STANDARD CURB AND GUTTER
- (S) 4" CONCRETE SIDEWALK
- (T) 1'-6" MEDIAN CURB AND GUTTER

**NOTES:**

1. CURB RETURN RADIUS DIMENSIONS AT INTERSECTIONS MAY VARY DEPENDING ON MEDIAN WIDTH AND WILL BE APPROVED ON A CASE BY CASE BASIS.
2. SUBDRAINS ARE REQUIRED ON ALL MEDIANS. (TO BE TIED INTO STORM DRAINAGE SYSTEM.) REFER TO SUBDRAIN STANDARD DETAIL 312.1.
3. MEDIAN PLANTINGS SHALL NOT OBSTRUCT INTERSECTION SIGHT DISTANCE REQUIREMENTS.
4. TEN (10) FOOT WIDE MEDIANS CAN ACCOMMODATE SMALL MATURING TREES. TWENTY (20) FOOT WIDE MEDIAN IS REQUIRED FOR LARGE MATURING TREES.
5. MONOLITHIC CONCRETE MEDIANS WITH BEVELED EDGES AND A MINIMUM WIDTH OF 6 FEET CAN BE USED IN LIEU OF LANDSCAPED MEDIANS.
6. BIKE LANE TO BE STRIPED.
7. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.

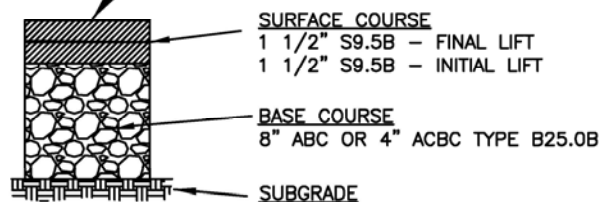
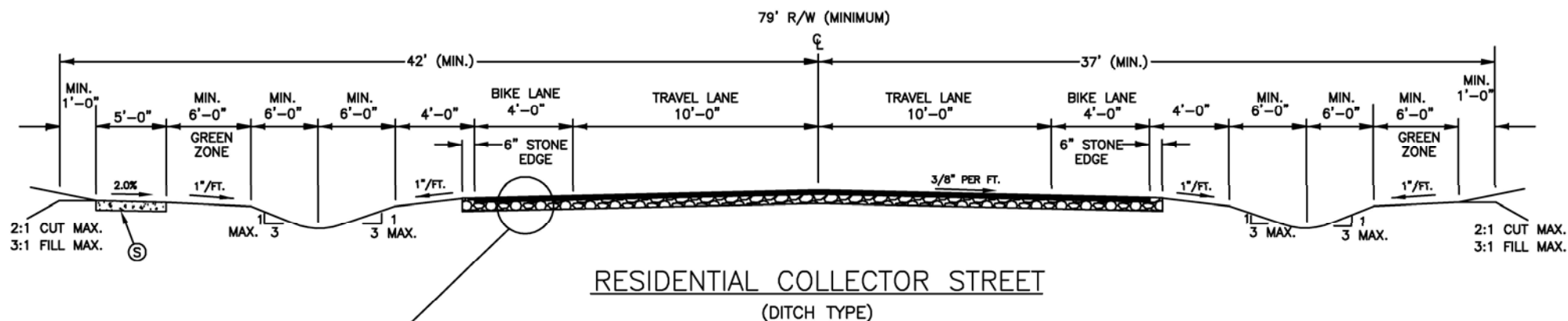
NOT TO SCALE

Town of Oakboro  
Development Standards

**RESIDENTIAL DIVIDED COLLECTOR STREET  
WITH LEFT-TURN LANE  
TYPICAL SECTION**

REV. DATE
STD. NO.
210.3





**KEY**

- Ⓢ 4" CONCRETE SIDEWALK

**NOTES:**

1. SIDEWALK LOCATED OUTSIDE OF STREET RIGHT-OF-WAY SHALL BE LOCATED IN A PERMANENT SIDEWALK EASEMENT EXTENDING 1 FOOT BEYOND BACK OF SIDEWALK.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. TREES TO BE PLACED IN GREEN ZONE 3.5 FEET FROM FACE OF SIDEWALK.
4. BIKE LANE TO BE STRIPED.

NOT TO SCALE

Town of Oakboro  
Development Standards

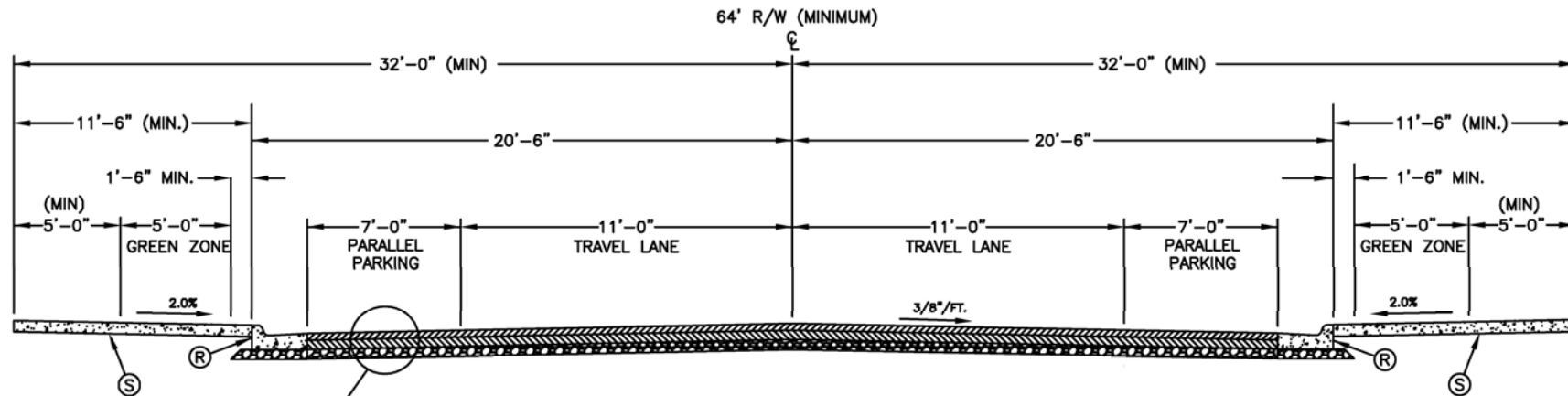
**RESIDENTIAL COLLECTOR STREET  
DITCH TYPE  
TYPICAL SECTION**

REV. DATE

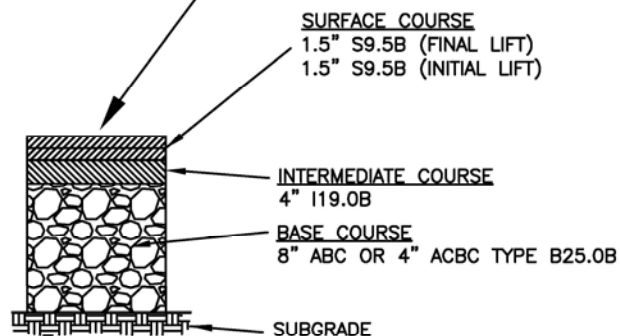
STD. NO.

210.4





### RETAIL/MIXED USE LOCAL STREET



TYPICAL PAVEMENT SECTION

#### KEY

- (R) 2'-6" STD. CURB AND GUTTER
- (S) 4" CONCRETE SIDEWALK

#### NOTES:

1. SIDEWALK SHALL BE PROVIDED ON BOTH SIDES OF THE STREET.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. TREE GRATES SHALL BE PROVIDED WHEN TREES ARE LOCATED IN THE GREEN ZONE.
4. BASE COURSE TO EXTEND SIX INCHES BEYOND BACK OF CURB THEN TAPER OUT AT A FORTY-FIVE DEGREE ANGLE.
5. REFER TO STANDARD DRAWING 285.1 FOR PARALLEL PARKING LAYOUT.

NOT TO SCALE

Town of Oakboro  
Development Standards

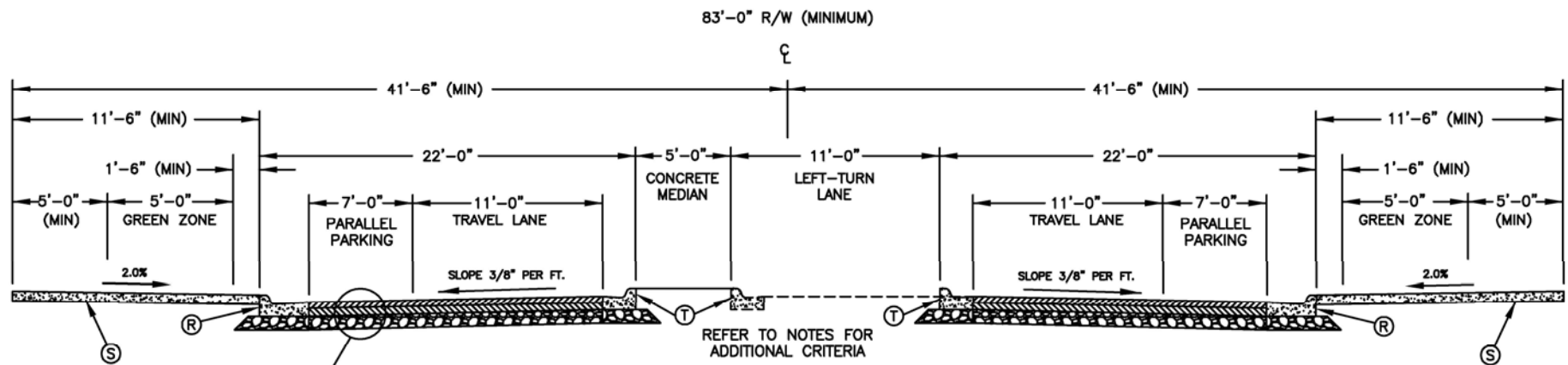
## RETAIL/MIXED USE LOCAL STREET PARKING ON BOTH SIDES OF STREET TYPICAL SECTION

REV. DATE

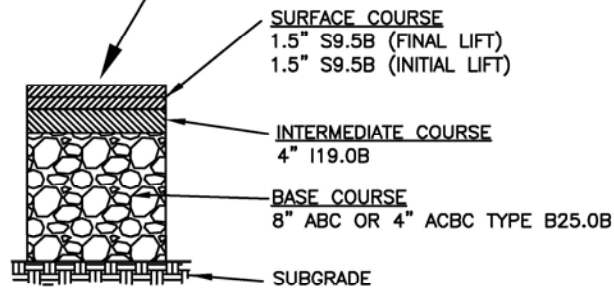
STD. NO.

220.1





# RETAIL/MIXED USE LOCAL STREET (TWO LANE SECTION)



TYPICAL PAVEMENT SECTION

## KEY

- (R) 2'-6" STANDARD CURB AND GUTTER
- (S) 4" CONCRETE SIDEWALK
- (T) 1'-6" MEDIAN CURB AND GUTTER

## NOTES:

1. SIDEWALK SHALL BE PROVIDED ON BOTH SIDES OF THE STREET.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. TREE GRATES SHALL BE PROVIDED WHEN TREES ARE LOCATED IN THE GREEN ZONE.
4. FOR MEDIAN DIVIDED FACILITIES, A MINIMUM SIXTEEN (16) FOOT WIDE MEDIAN WITH ONE FOOT SIX INCH CURB AND GUTTER IS NEEDED. WHERE A LEFT-TURN LANE IS NOT INSTALLED, THE MEDIAN SHALL BE LANDSCAPED.
5. BASE COURSE TO EXTEND SIX INCHES BEYOND BACK OF CURB THEN TAPER OUT AT A FORTY-FIVE DEGREE ANGLE.
6. REFER TO STANDARD DRAWING 285.1 FOR PARALLEL PARKING LAYOUT.

NOT TO SCALE

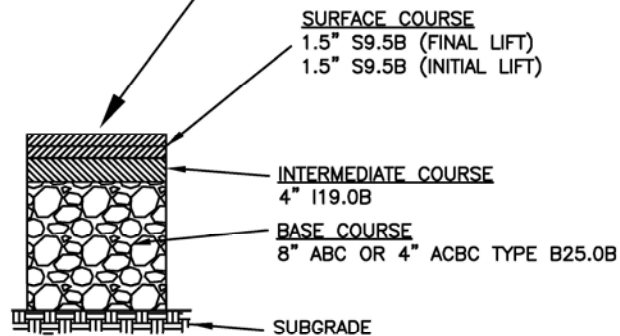
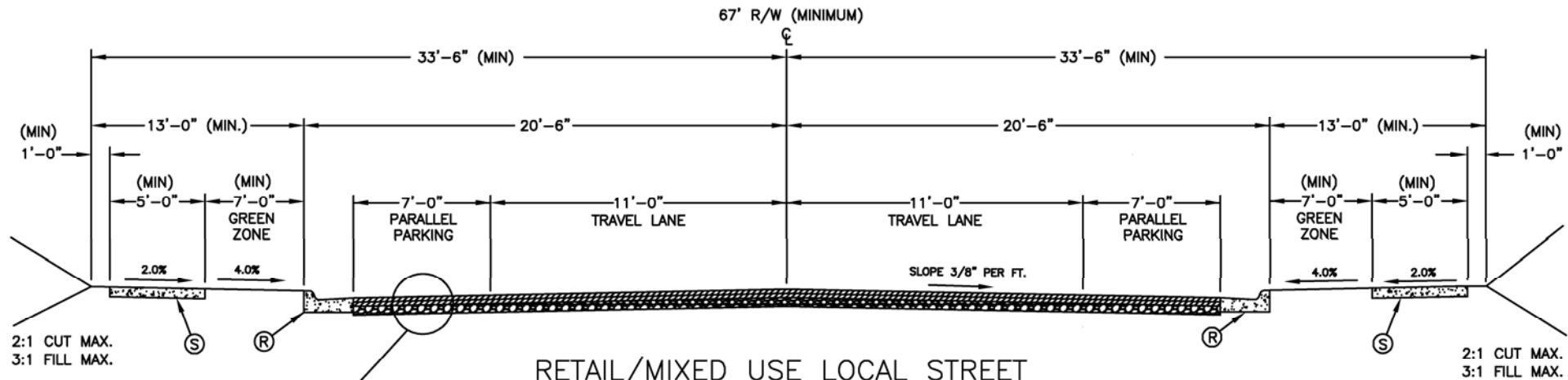
Town of Oakboro  
Development Standards

# RETAIL/MIXED USE LOCAL STREET WITH MEDIAN AND PARKING TYPICAL SECTION

REV. DATE

STD. NO.

220.3



TYPICAL PAVEMENT SECTION

KEY

- (R) 2'-6" STD. CURB AND GUTTER
- (S) 4" CONCRETE SIDEWALK

NOTES:

1. SIDEWALK SHALL BE PROVIDED ON BOTH SIDES OF THE STREET.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. BASE COURSE TO EXTEND SIX INCHES BEYOND BACK OF CURB THEN TAPER OUT AT A FOURTY-FIVE DEGREE ANGLE.
4. REFER TO STANDARD DRAWING 285.1 FOR PARALLEL PARKING LAYOUT.

NOT TO SCALE

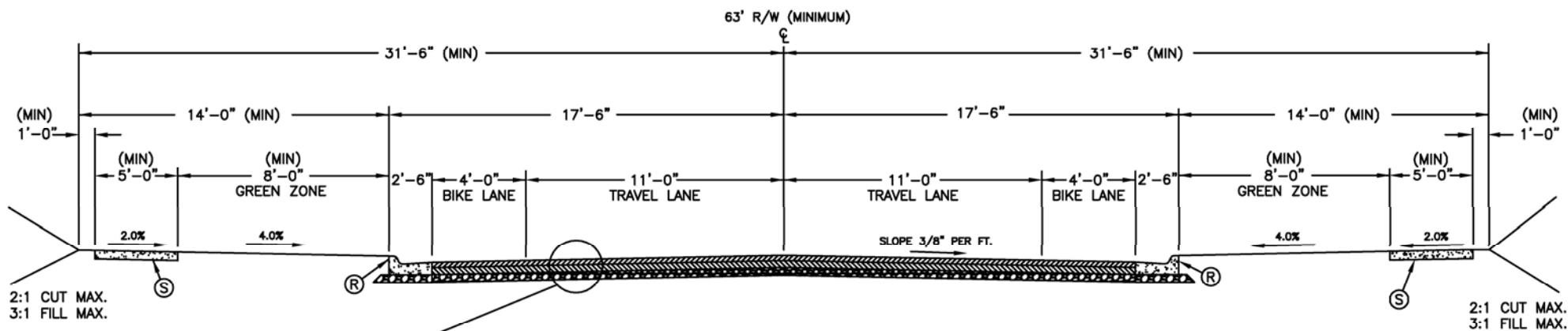
Town of Oakboro  
Development Standards

RETAIL/MIXED USE LOCAL STREET  
PARKING AND GREEN ZONE ON BOTH SIDES  
TYPICAL SECTION

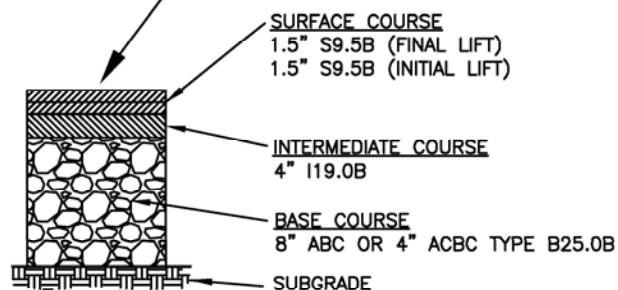
REV. DATE

STD. NO.

220.4



### RETAIL/MIXED USE COLLECTOR STREET



TYPICAL PAVEMENT SECTION

#### NOTES:

1. SIDEWALK SHALL BE PROVIDED ON BOTH SIDES OF THE STREET.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. BASE COURSE TO EXTEND SIX INCHES BEYOND BACK OF CURB THEN TAPER OUT AT A FORTY-FIVE DEGREE ANGLE.

#### KEY

- (R) 2'-6" STANDARD CURB AND GUTTER  
(S) 4" CONCRETE SIDEWALK

NOT TO SCALE

Town of Oakboro  
Development Standards

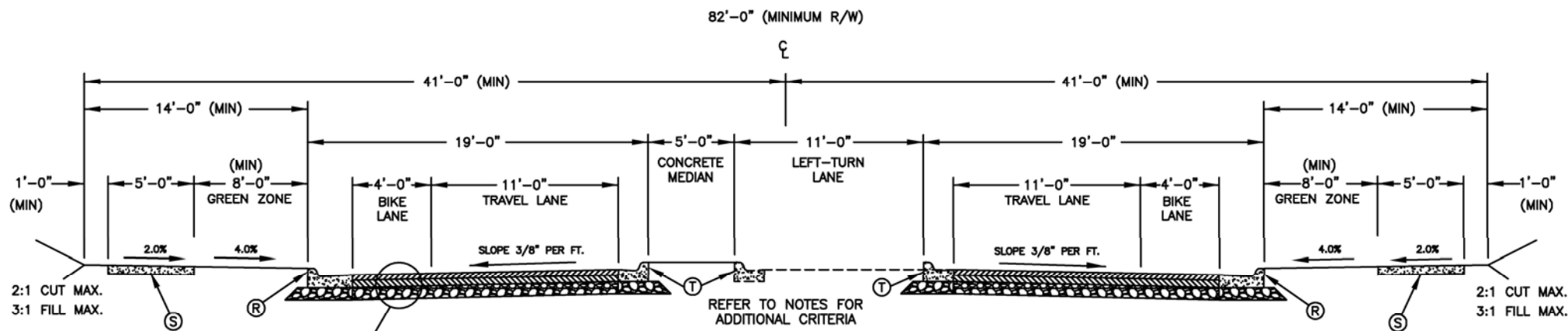
## RETAIL/MIXED USE COLLECTOR STREET WITH BIKE LANES TYPICAL SECTION

REV. DATE

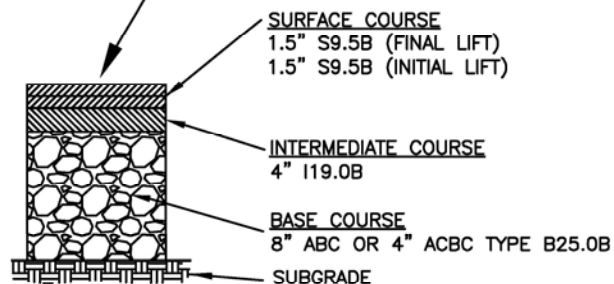
STD. NO.

230.1





# RETAIL/MIXED USE COLLECTOR STREET (TWO LANE SECTION)



TYPICAL PAVEMENT SECTION

## KEY

- (R) 2'-6" STANDARD CURB AND GUTTER
- (S) 4" CONCRETE SIDEWALK
- (T) 1'-6" MEDIAN CURB AND GUTTER

## NOTES:

1. SIDEWALK SHALL BE PROVIDED ON BOTH SIDES OF THE STREET.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. FOR MEDIAN DIVIDED FACILITIES, A MINIMUM SIXTEEN (16) FOOT WIDE MEDIAN WITH ONE FOOT SIX INCH CURB AND GUTTER IS NEEDED. IF A LEFT-TURN LANE IS NOT NEEDED, THE MEDIAN SHALL BE LANDSCAPED.
4. BASE COURSE TO EXTEND SIX INCHES BEYOND BACK OF CURB THEN TAPER OUT AT A FORTY-FIVE DEGREE ANGLE.

NOT TO SCALE

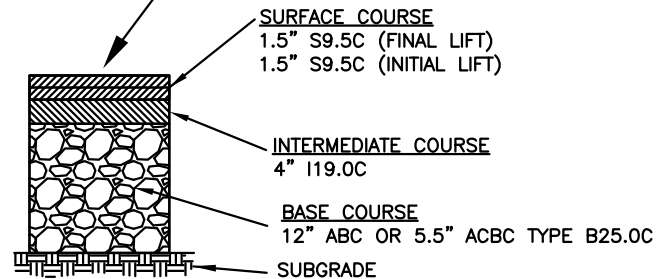
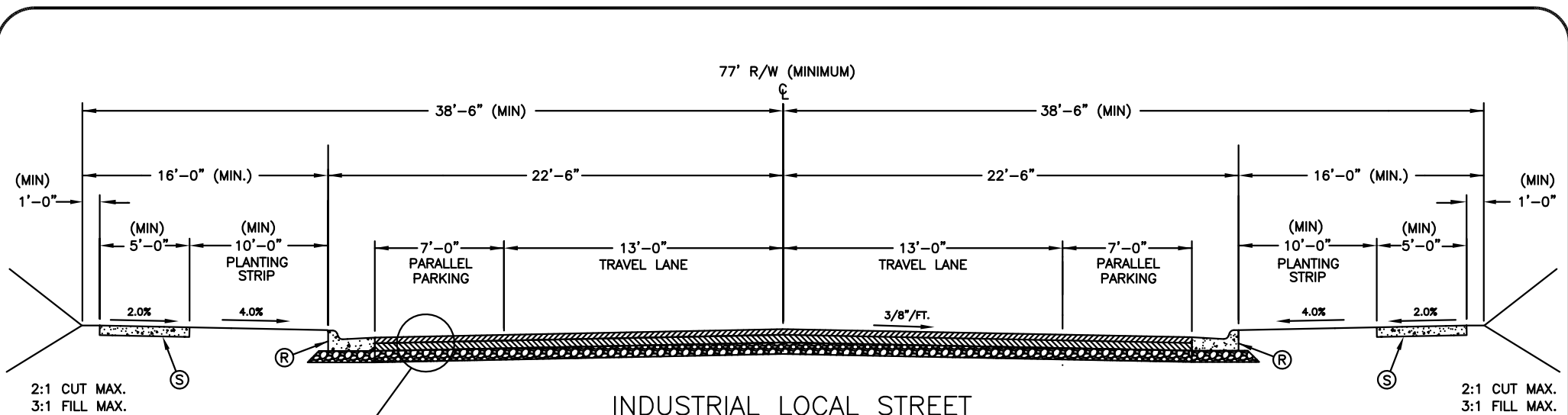
Town of Oakboro  
Development Standards

# RETAIL/MIXED USE COLLECTOR STREET WITH MEDIAN AND BIKE LANES TYPICAL SECTION

REV. DATE

STD. NO.

230.2



TYPICAL PAVEMENT SECTION

KEY

- (R) 2'-6" STANDARD CURB AND GUTTER
- (S) 4" CONCRETE SIDEWALK

NOTES:

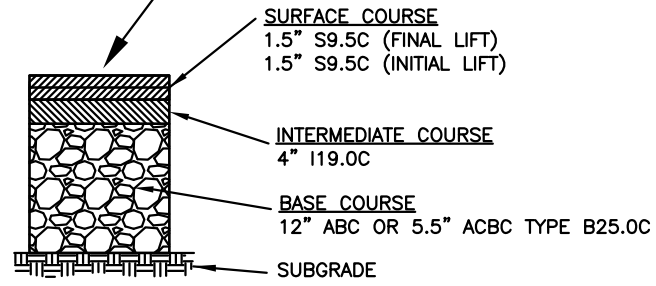
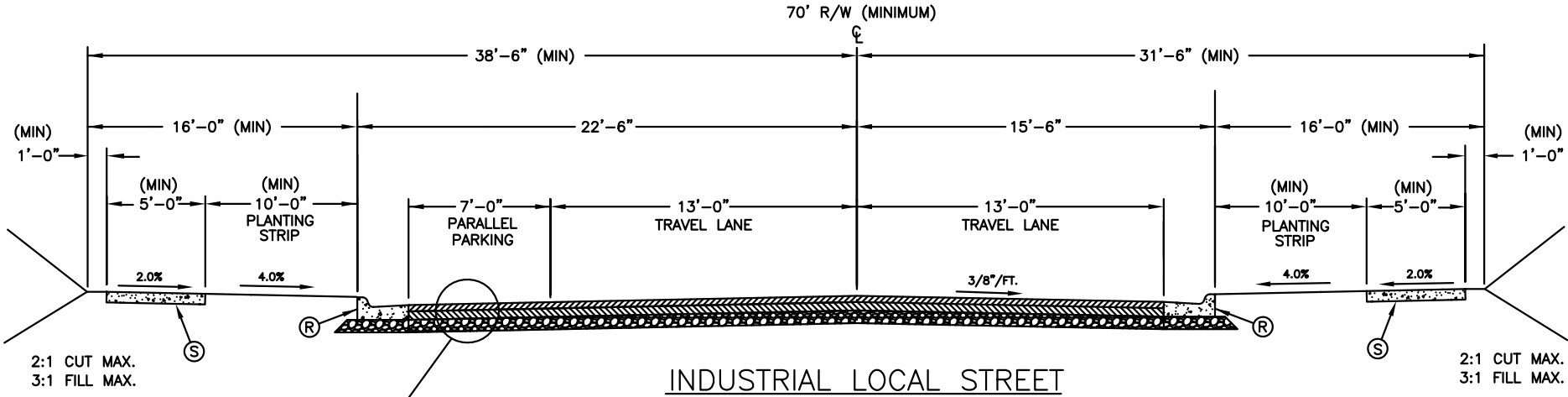
1. SIDEWALK SHALL BE PROVIDED ON BOTH SIDES OF THE STREET.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. BASE COURSE TO EXTEND SIX INCHES BEYOND BACK OF CURB THEN TAPER OUT AT A FORTY-FIVE DEGREE ANGLE.
4. TREE TO BE PLANTED FOUR FEET FROM SIDEWALK.

NOT TO SCALE

Town of Oakboro  
Development Standards

INDUSTRIAL LOCAL STREET  
PARKING ON BOTH SIDES OF STREET  
TYPICAL SECTION

REV. DATE
STD. NO.
240.1



TYPICAL PAVEMENT SECTION

NOTES:

1. SIDEWALK SHALL BE PROVIDED ON BOTH SIDES OF THE STREET.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. BASE COURSE TO EXTEND SIX INCHES BEYOND BACK OF CURB THEN TAPER OUT AT A FORTY-FIVE DEGREE ANGLE.
4. TREE TO BE PLANTED FOUR FEET FROM SIDEWALK.

KEY

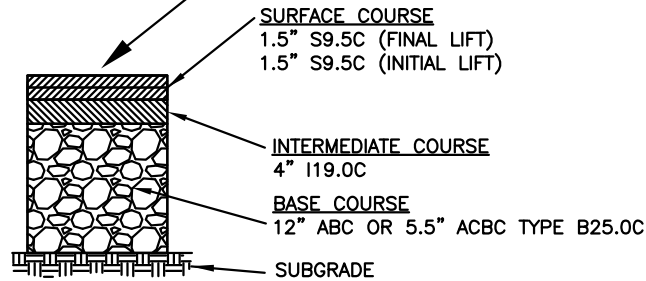
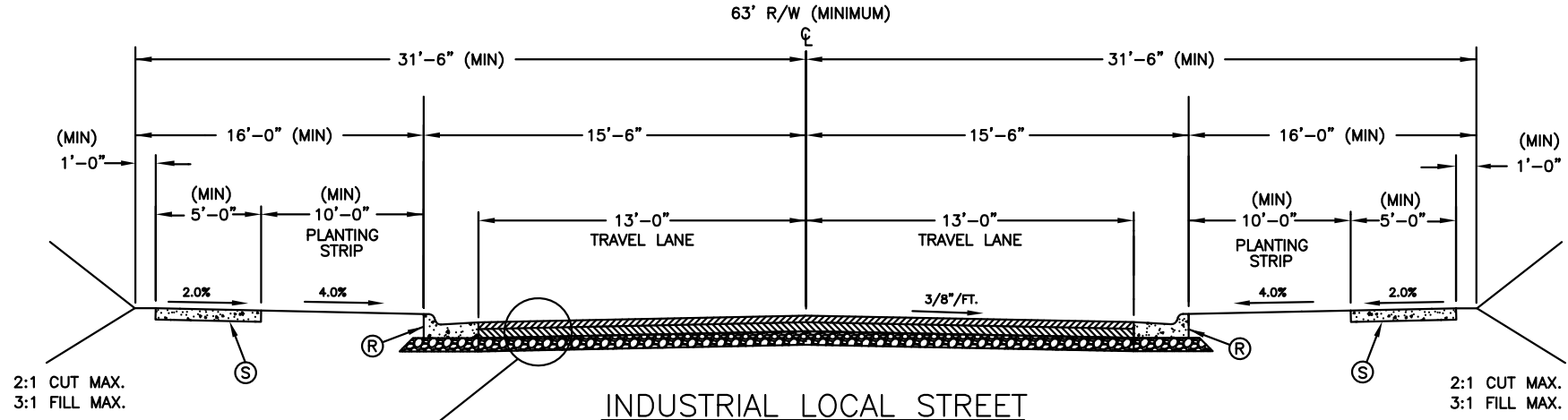
- (R) 2'-6" STANDARD CURB AND GUTTER
- (S) 4" CONCRETE SIDEWALK

NOT TO SCALE

Town of Oakboro  
Development Standards

INDUSTRIAL LOCAL STREET  
PARKING ON ONE SIDE OF STREET  
TYPICAL SECTION

REV.	DATE
STD. NO.	
240.2	



TYPICAL PAVEMENT SECTION

KEY

- (R) 2'-6" STANDARD CURB AND GUTTER
- (S) 4" CONCRETE SIDEWALK

NOTES:

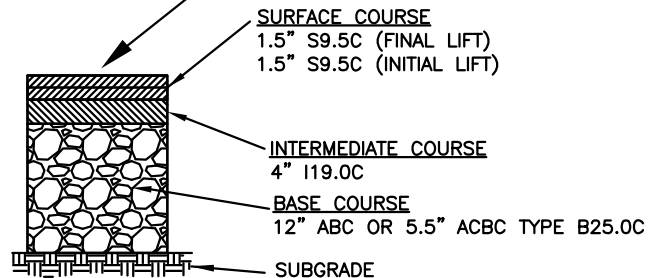
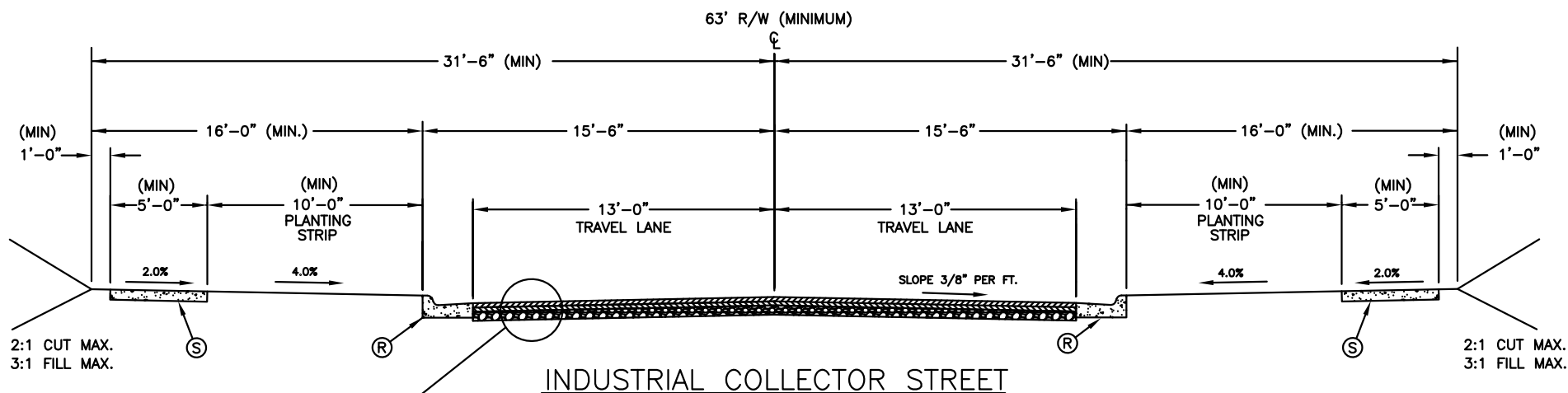
1. SIDEWALK SHALL BE PROVIDED ON BOTH SIDES OF THE STREET.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. BASE COURSE TO EXTEND SIX INCHES BEYOND BACK OF CURB THEN TAPER OUT AT A FORTY-FIVE DEGREE ANGLE.
4. TREE TO BE PLANTED FOUR FEET FROM SIDEWALK.

NOT TO SCALE

Town of Oakboro  
Development Standards

INDUSTRIAL LOCAL STREET  
NO PARKING  
TYPICAL SECTION

REV. DATE
STD. NO.
240.3



TYPICAL PAVEMENT SECTION

KEY

- (R) 2'-6" STANDARD CURB AND GUTTER
- (S) 4" CONCRETE SIDEWALK

NOTES:

1. SIDEWALK SHALL BE PROVIDED ON BOTH SIDES OF THE STREET.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. BASE COURSE TO EXTEND SIX INCHES BEYOND BACK OF CURB THEN TAPER OUT AT A FORTY-FIVE DEGREE ANGLE.
4. TREE TO BE PLANTED FOUR FEET FROM SIDEWALK.

NOT TO SCALE

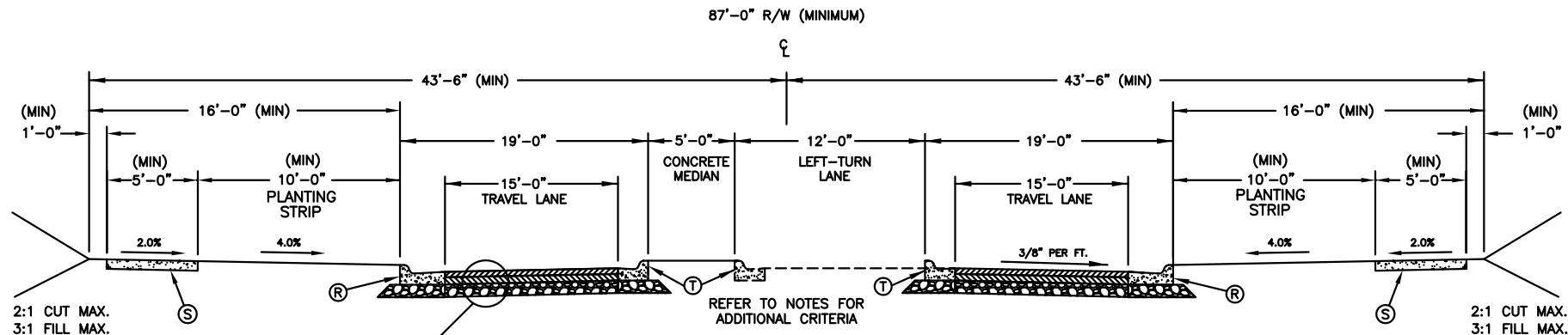
Town of Oakboro  
Development Standards

INDUSTRIAL COLLECTOR STREET  
NO ON-STREET PARKING  
TYPICAL SECTION

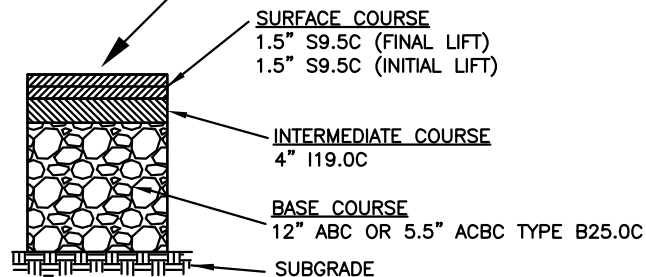
REV. DATE

STD. NO.

250.1



## INDUSTRIAL COLLECTOR STREET (TWO LANE SECTION)



TYPICAL PAVEMENT SECTION

### KEY

- (R) 2'-6" STANDARD CURB AND GUTTER
- (S) 4" CONCRETE SIDEWALK
- (T) 1'-6" MEDIAN CURB AND GUTTER

### NOTES:

1. SIDEWALK SHALL BE PROVIDED ON BOTH SIDES OF THE STREET.
2. SEE SECTION II. B. FOR ADDITIONAL DESIGN CRITERIA.
3. FOR MEDIAN DIVIDED FACILITIES, A MINIMUM TWENTY (20) FOOT WIDE MEDIAN WITH ONE FOOT SIX INCH CURB AND GUTTER IS NEEDED. IF A LEFT-TURN LANE IS NOT NEEDED, THE MEDIAN SHALL BE LANDSCAPED.
4. BASE COURSE TO EXTEND SIX INCHES BEYOND BACK OF CURB THEN TAPER OUT AT A FORTY-FIVE DEGREE ANGLE.
5. TREE TO BE PLANTED FOUR FEET FROM SIDEWALK.

NOT TO SCALE

Town of Oakboro  
Development Standards

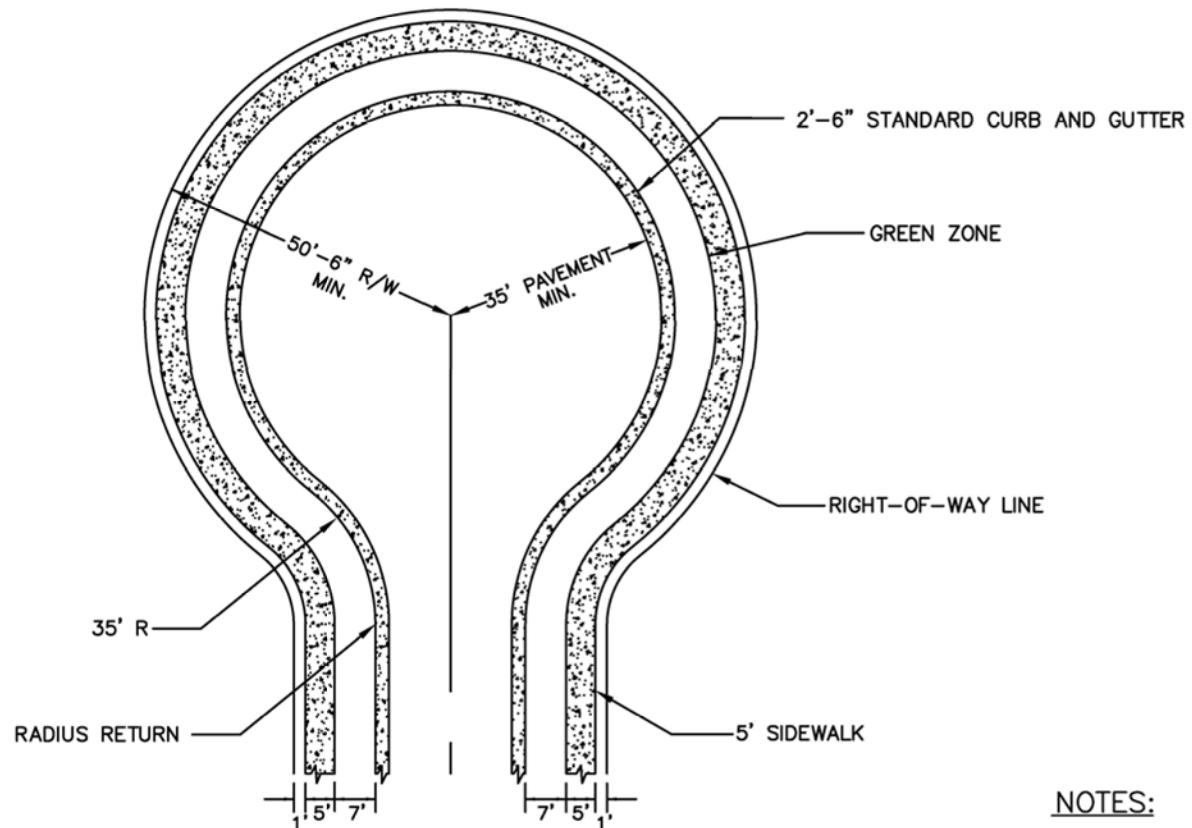
INDUSTRIAL COLLECTOR STREET  
WITH MEDIAN AND NO PARKING  
TYPICAL SECTION

REV. DATE

STD. NO.

250.2



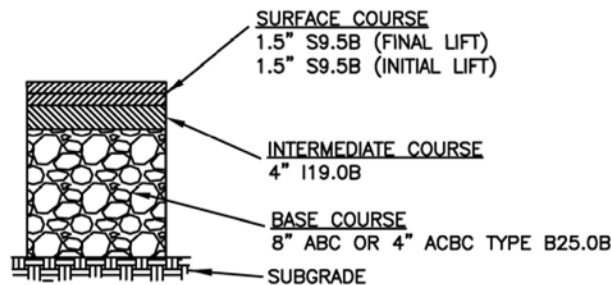


# RESIDENTIAL LOCAL STREET

## NOTES:

1. VALLEY GUTTER MAY BE USED INSTEAD OF STANDARD CURB AND GUTTER.
2. CENTRAL ISLANDS ARE PERMITTED AS LONG AS A B-40 (DESIGN VEHICLE) STAYS ON THE PAVEMENT WHILE TRAVERSING THE CUL-DE-SAC.
3. THE CROWN FOR THE PAVEMENT SHALL BE 1/4" PER FOOT FROM THE CENTER OF THE CUL-DE-SAC.
4. PAVEMENT TYPICAL SECTION APPLIES TO CUL-DE-SAC AND THROAT AREA TO 25 FEET PAST RADIUS RETURN.

NOT TO SCALE



TYPICAL PAVEMENT SECTION

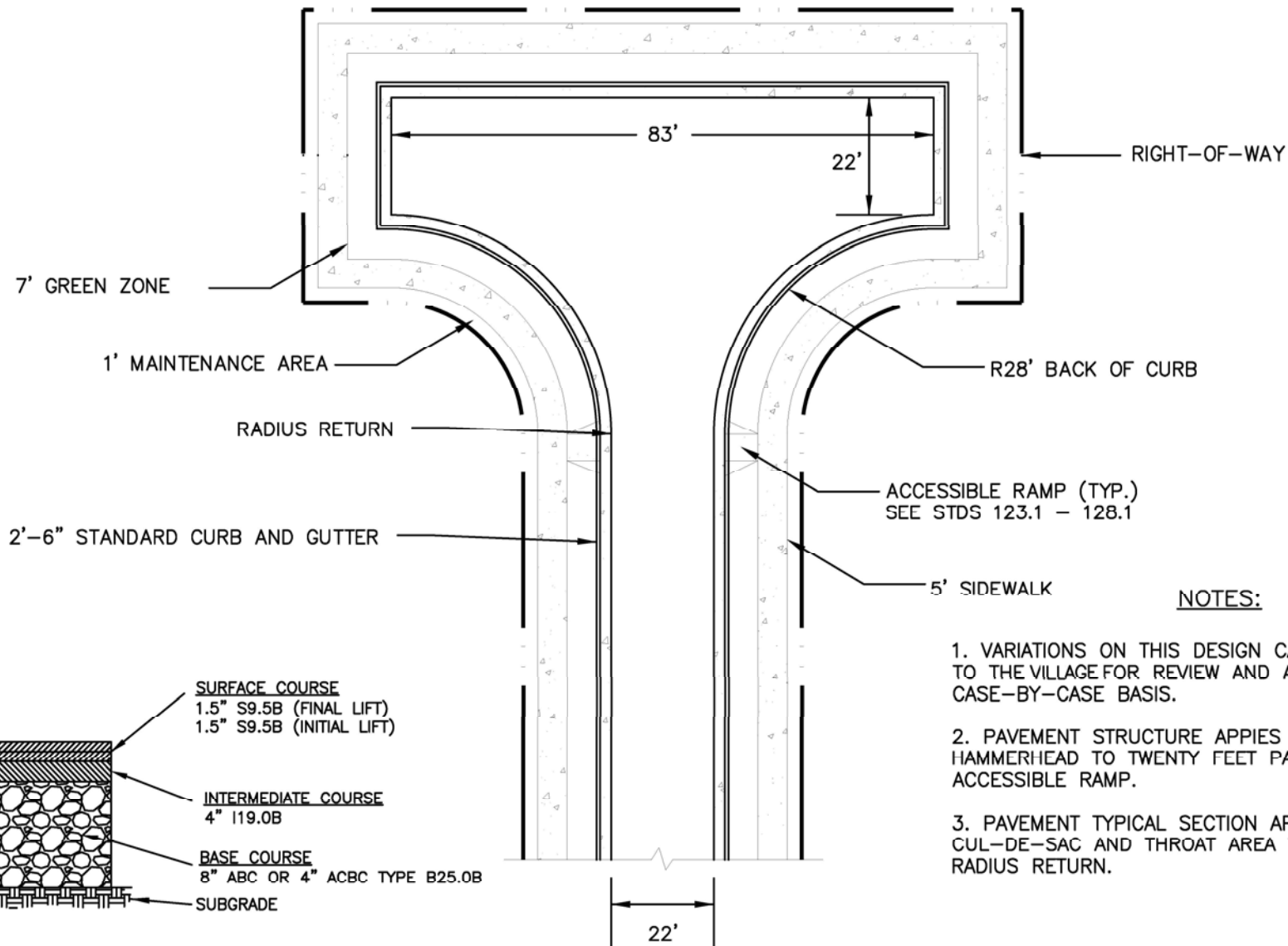
Town of Oakboro  
Development Standards

## RESIDENTIAL LOCAL STREET CUL-DE-SAC DETAIL

REV. DATE

STD. NO.

280.1



**NOTES:**

1. VARIATIONS ON THIS DESIGN CAN BE SUBMITTED TO THE VILLAGE FOR REVIEW AND APPROVAL ON A CASE-BY-CASE BASIS.
2. PAVEMENT STRUCTURE APPLIES WITHIN THE HAMMERHEAD TO TWENTY FEET PAST THE ACCESSIBLE RAMP.
3. PAVEMENT TYPICAL SECTION APPLIES TO CUL-DE-SAC AND THROAT AREA TO 25 FEET PAST RADIUS RETURN.

NOT TO SCALE

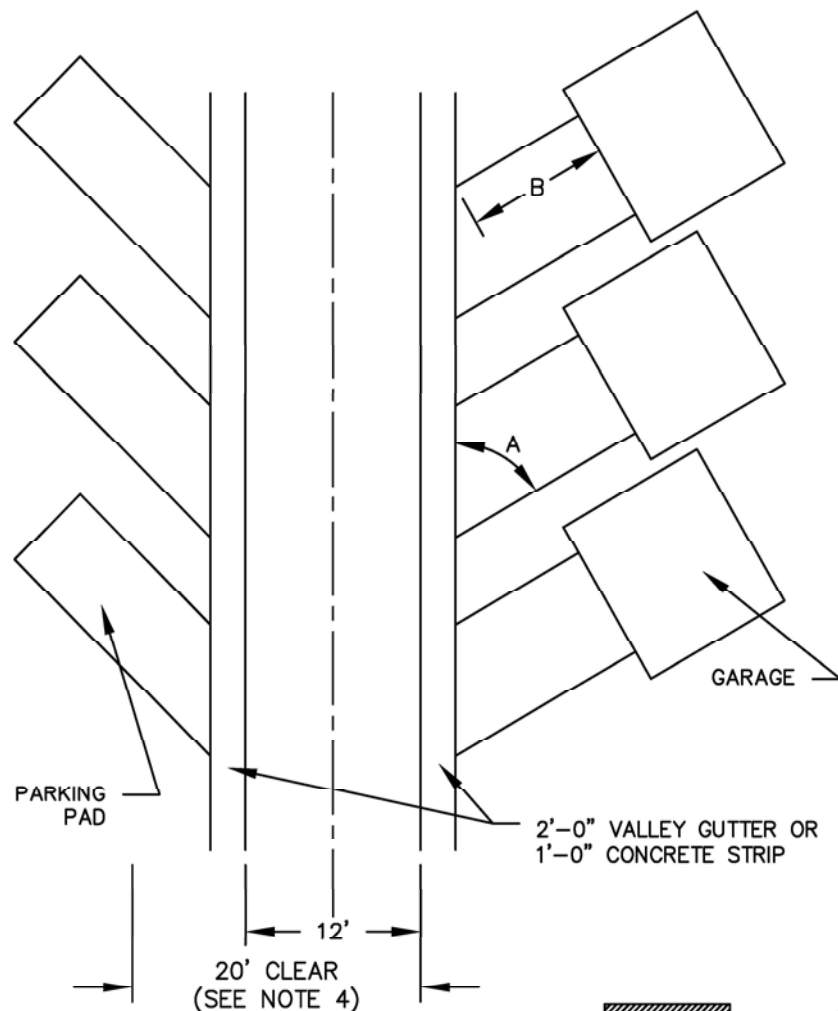
Town of Oakboro  
Development Standards

# RETAIL/MIXED USE LOCAL STREET HAMMERHEAD DETAIL

REV. DATE

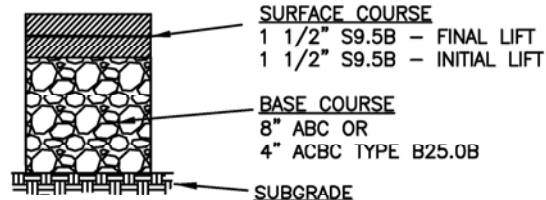
STD. NO.

280.2

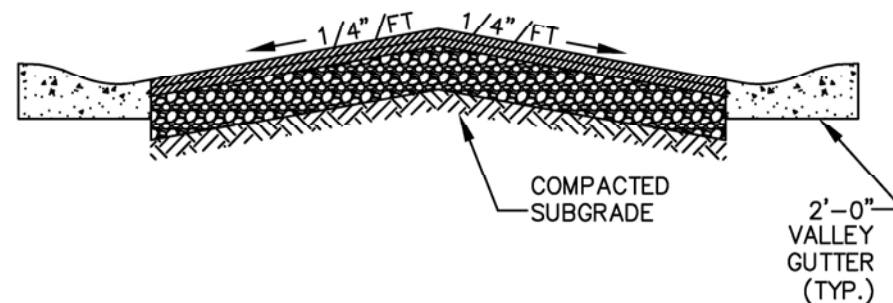


PLAN

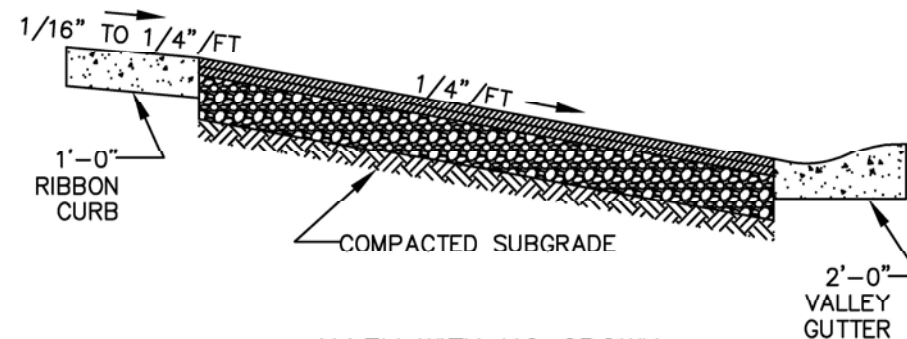
A - LESS THAN 60 DEGREES  
B - LESS THAN 3 FEET OR GREATER THAN 20 FEET



TYPICAL PAVEMENT SECTION



ALLEY WITH NORMAL CROWN



ALLEY WITH NO CROWN

# NOTES:

1. ALLEYS SHALL BE CONSIDERED PRIVATE EASEMENTS AND WILL NOT BE ACCEPTED FOR MAINTENANCE.
2. SUBGRADE SHALL BE COMPACTED TO PUBLIC STREET STANDARDS.
3. STORM DRAINAGE (NOT SHOWN) SHALL BE PROVIDED AS NECESSARY.
4. DETAIL APPLIES TO SINGLE- OR DOUBLE-LOADED ALLEYS. FOR SINGLE-LOADED ALLEYS, THERE SHALL BE A 20-FOOT CLEAR ZONE FREE OF CUT SLOPES, OBSTRUCTIONS, HEDGES, ETC. FROM THE LOADED SIDE EDGE OF PAVEMENT.
5. RIBBON CURB TO BE TEN INCHES THICK.

NOT TO SCALE

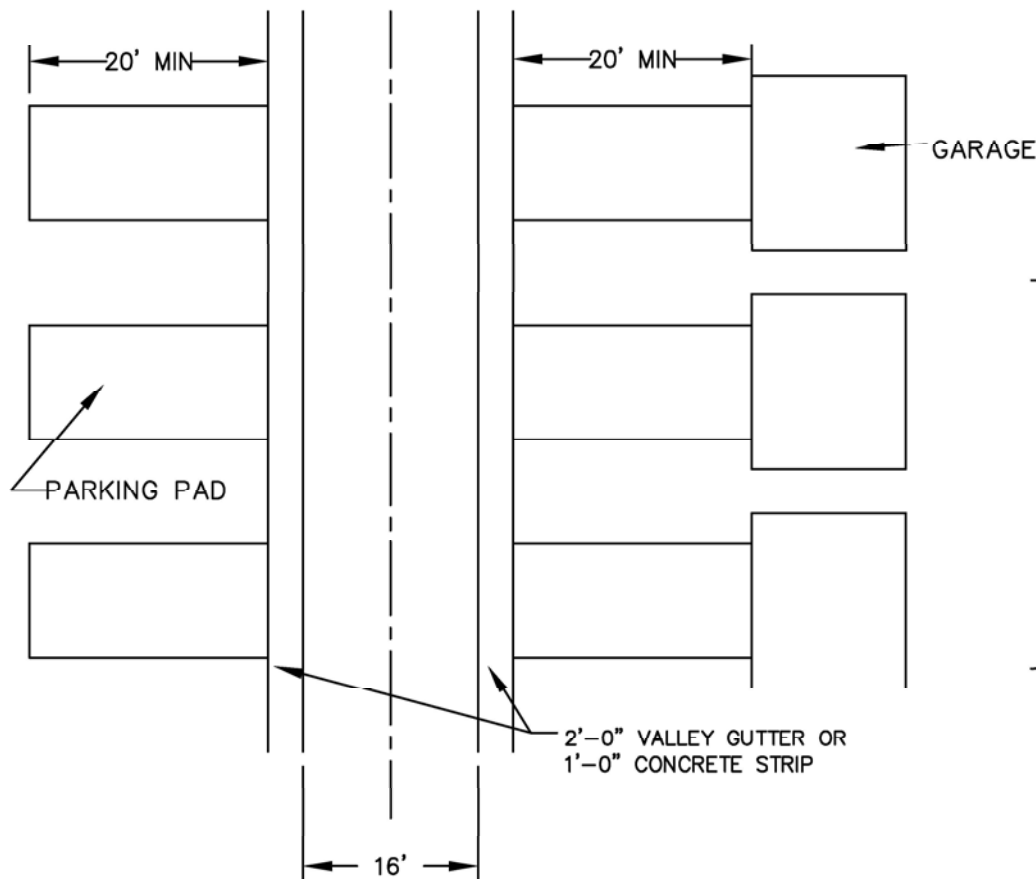
Town of Oakboro  
Development Standards

RESIDENTIAL ALLEY  
ONE-WAY OPERATION  
TYPICAL SECTION

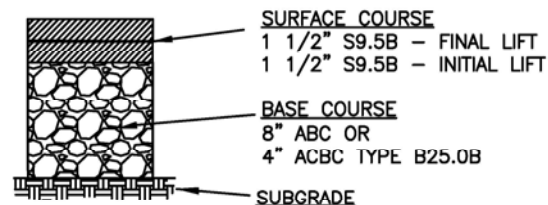
REV. DATE

STD. NO.

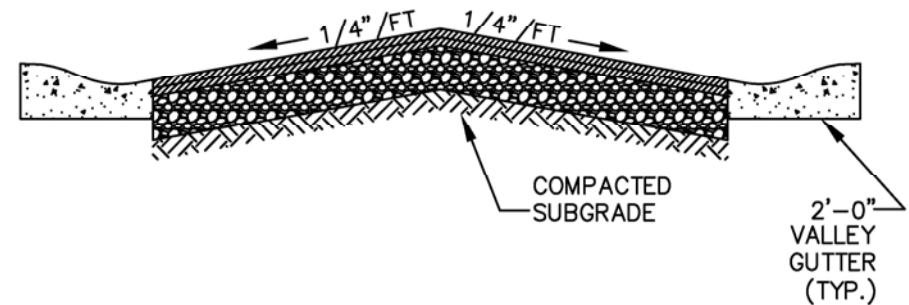
280.3



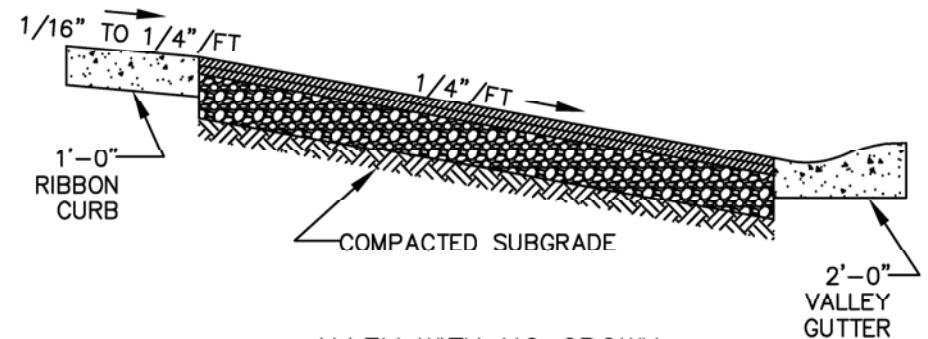
PLAN



TYPICAL PAVEMENT SECTION



ALLEY WITH NORMAL CROWN



ALLEY WITH NO CROWN

**NOTES:**

1. ALLEYS SHALL BE CONSIDERED PRIVATE EASEMENTS AND WILL NOT BE ACCEPTED FOR MAINTENANCE.
2. SUBGRADE SHALL BE COMPACTED TO PUBLIC STREET STANDARDS.
3. STORM DRAINAGE (NOT SHOWN) SHALL BE PROVIDED AS NECESSARY.
4. RIBBON CURB TO BE TEN INCHES THICK.

NOT TO SCALE

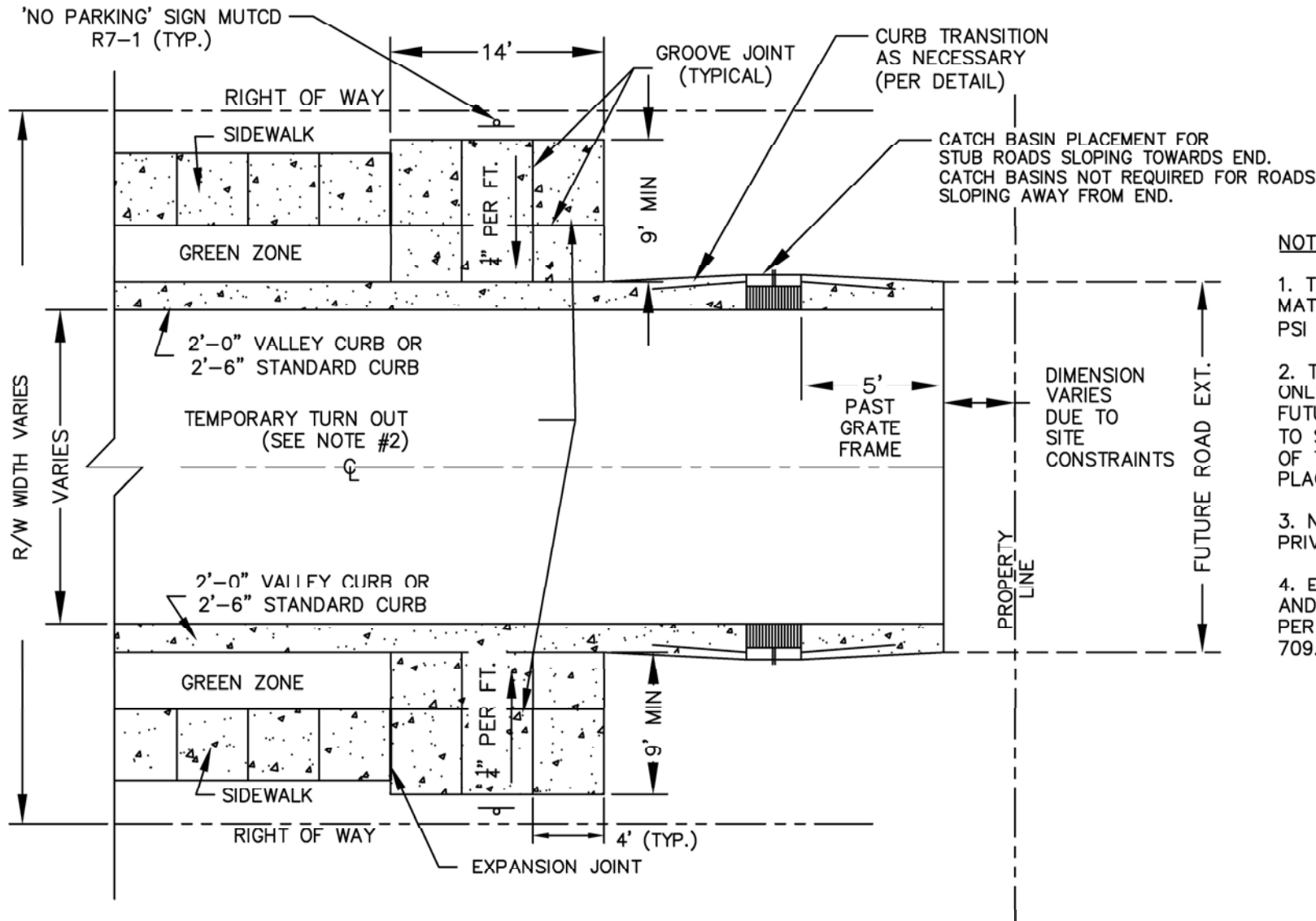
Town of Oakboro  
Development Standards

RESIDENTIAL ALLEY  
TWO-WAY OPERATION  
TYPICAL SECTION

REV. DATE

STD. NO.

280.4



#### NOTES

1. TEMPORARY TURNAROUND MATERIAL SHALL BE MIN. 3600 PSI CONCRETE, 6" THICK.
2. TEMPORARY INSTALLATION ONLY - TO BE REMOVED WHEN FUTURE DEVELOPMENT CONNECTS TO STREET. "SIDEWALK" PORTION OF TURNAROUND MAY BE LEFT IN PLACE IF NOT DAMAGED.
3. NOT TO BE USED AS A PRIVATE DRIVEWAY.
4. END OF ROADWAY BARRICADE AND END OF ROADWAY MARKER PER STANDARDS 706.1 THROUGH 709.1 ARE REQUIRED.

NOT TO SCALE

Town of Oakboro  
Development Standards

## RESIDENTIAL LOCAL STREET TEMPORARY TURNAROUND

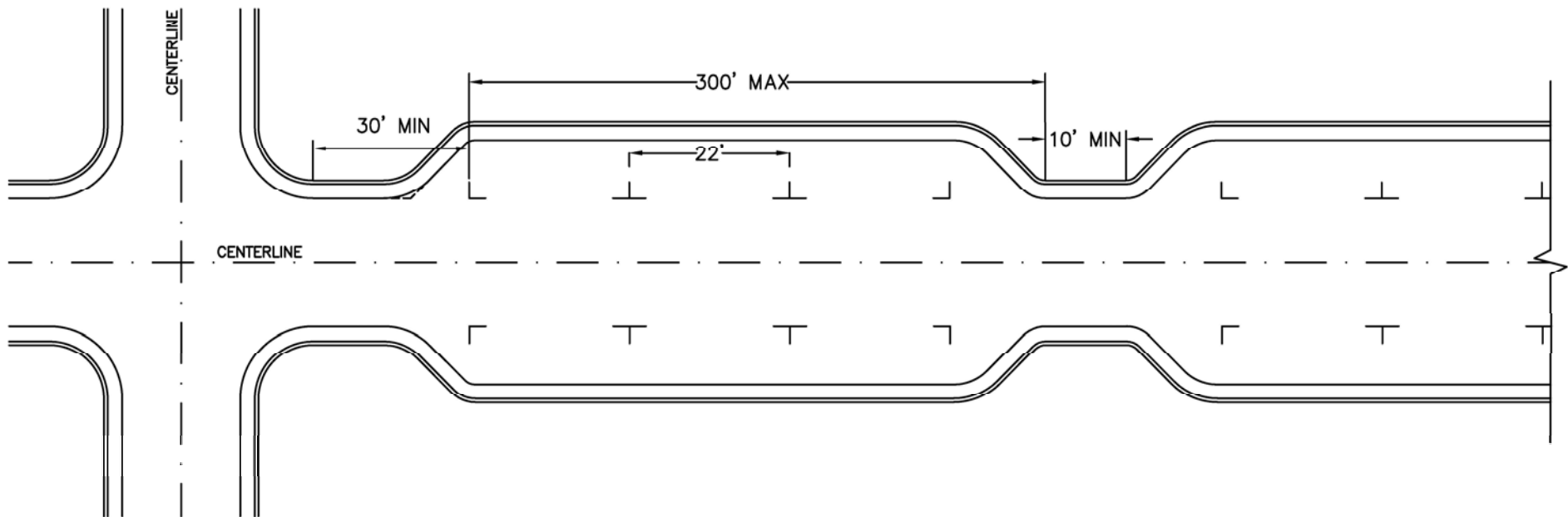
REV. DATE

STD. NO.

280.5

NOTES:

1. REFER TO STANDARD DRAWINGS 285.2, 285.3, AND 285.4 FOR ADDITIONAL INFORMATION.
2. PARKING STALLS MAY BE ON ONE OR BOTH SIDES OF THE STREET.
3. PAVEMENT MARKINGS TO BE THERMOPLASTIC ON RETAIL/OFFICE/MIXED-USE STREETS.
4. 30' MINIMUM DISTANCE TO FIRST PARKING STALL TO BE MEASURED FROM END OF INTERSECTION RADIUS POINT.



NOT TO SCALE

Town of Oakboro  
Development Standards

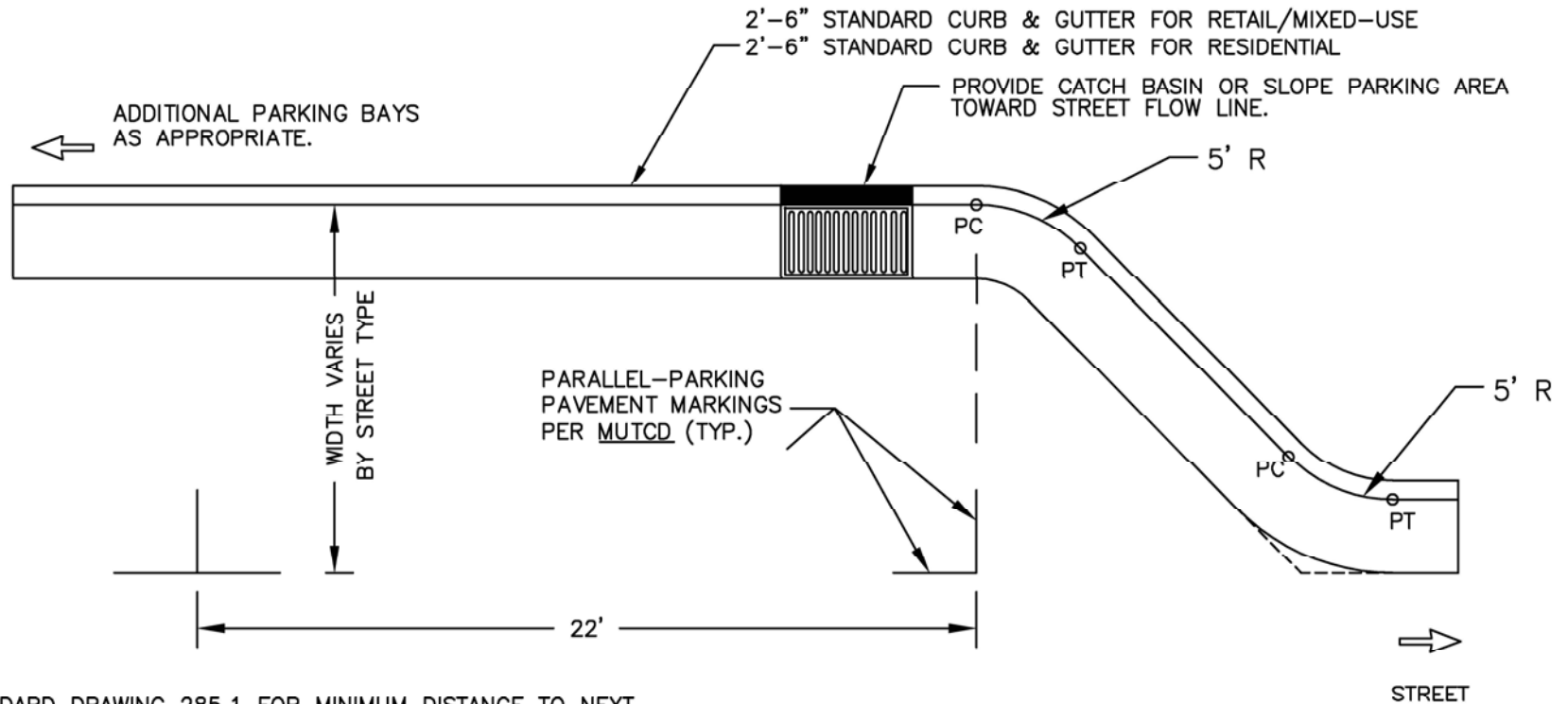
LOCAL STREET  
PARALLEL PARKING LAYOUT

REV. DATE

STD. NO.

285.1





#### NOTES:

1. REFER TO STANDARD DRAWING 285.1 FOR MINIMUM DISTANCE TO NEXT INTERVENING STREET.
2. PARALLEL ACCESSIBLE SPACES AND LOADING ZONES TO BE REVIEWED ON A CASE-BY-CASE BASIS.
3. FOR PARKING BAYS THAT ARE 6 FEET IN WIDTH OR GREATER, THE PAVEMENT MARKINGS SHALL BE SET AT ONE (1) FOOT LESS THAT THE STALL WIDTH.
4. GREATER SEPARATION FROM INTERVENING STREETS THAN 30 FEET MAY BE REQUIRED AT ENGINEER'S DISCRETION.
5. POSITIVE DRAINAGE SHALL BE PROVIDED EITHER BY INSTALLATION OF APPROPRIATE DRAINAGE STRUCTURES OR SLOPE PARKING AREA TO STREET FLOW LINE.

NOT TO SCALE

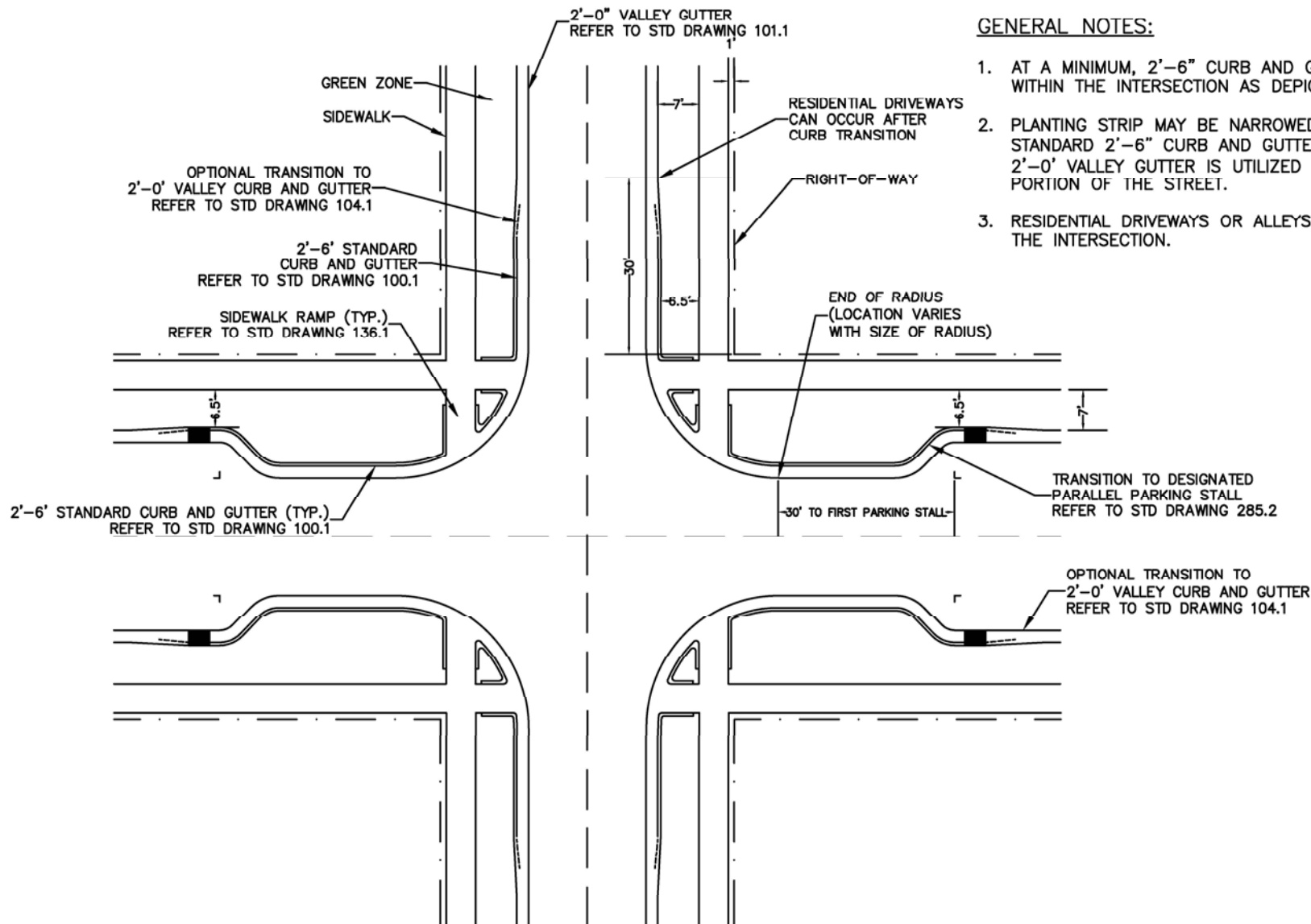
Town of Oakboro  
 Development Standards

## PARALLEL PARKING STANDARDS

REV. DATE

STD. NO.

285.2



#### GENERAL NOTES:

1. AT A MINIMUM, 2'-6" CURB AND GUTTER IS REQUIRED WITHIN THE INTERSECTION AS DEPICTED.
2. PLANTING STRIP MAY BE NARROWED TO 6.5' WITHIN THE STANDARD 2'-6" CURB AND GUTTER SECTION AS SHOWN IF 2'-0' VALLEY GUTTER IS UTILIZED FOR THE REMAINING PORTION OF THE STREET.
3. RESIDENTIAL DRIVEWAYS OR ALLEYS ARE NOT ALLOWED WITHIN THE INTERSECTION.

NOT TO SCALE

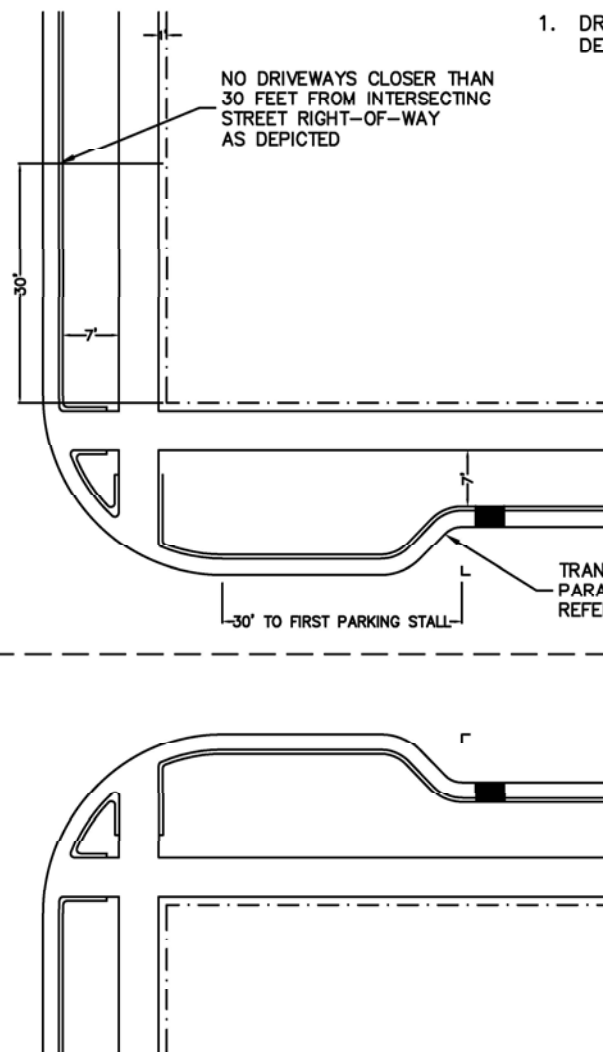
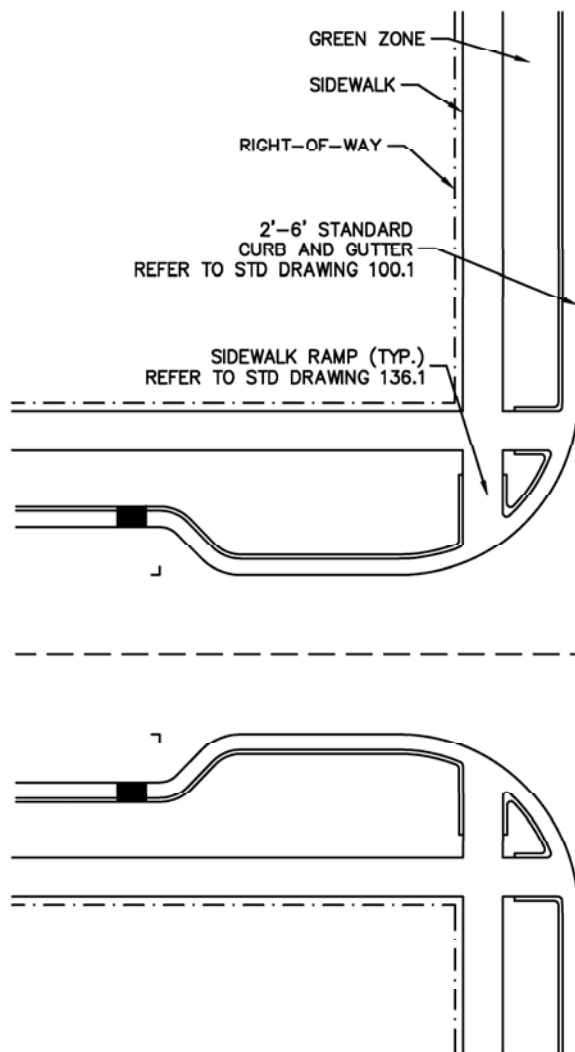
Town of Oakboro  
Development Standards

## PARKING, SIDEWALK, AND CURB AND GUTTER TRANSITIONS AT RESIDENTIAL INTERSECTIONS

REV. DATE

STD. NO.

285.3



# GENERAL NOTES:

1. DRIVEWAYS ARE NOT ALLOWED WITHIN THE INTERSECTION OR DESIGNATED PARALLEL PARKING AREAS.

NOT TO SCALE

Town of Oakboro  
Development Standards

## PARKING, SIDEWALK, AND CURB AND GUTTER TRANSITIONS AT RETAIL/MIXED USE INTERSECTIONS

REV. DATE

STD. NO.

285.4

DWG	SHEET TITLE	SPECIAL REQUIREMENTS AND NOTES
300.01	METHOD OF PIPE INSTALLATION – METHOD A	
310.02	PARALLEL PIPE END SECTION—PRECAST CONCRETE FOR 15" TO 24" PIPE	
310.03	CROSS PIPE END SECTION—PRECAST CONCRETE FOR 18" TO 30" PIPE	
310.10	DRIVEWAY PIPE CONSTRUCTION USING NO SPECIAL END SECTIONS	ONLY AT LOCATIONS APPROVED BY THE VILLAGE ENGINEER
815.03	PIPE UNDERDRAIN AND BLIND DRAIN	
816.03	GEOCOMPOSITE SHOULDER DRAIN	
838.01	CONCRETE ENDWALL FOR SINGLE AND DOUBLE PIPE CULVERTS 15" THRU 48" PIPE 90° SKEW	NOTE 1
838.02	CONCRETE ENDWALL AND SLUICE GATE 15" THRU 36" PIPE—90° SKEW	NOTE 1
838.04	CONCRETE ENDWALL FOR SINGLE AND DOUBLE PIPE CULVERTS 17"x13" THRU 71"x47" PIPE ARCH 90° SKEW	NOTE 1
838.05	CONCRETE "L" ENDWALL FOR SINGLE PIPE CULVERTS 15" THRU 48" PIPE	NOTE 1
838.06	CONCRETE "L" ENDWALL FOR SINGLE PIPE CULVERTS 17"x13" THRU 71"x47" PIPE ARCH	NOTE 1
838.07	CONCRETE ENDWALL FOR SINGLE AND DOUBLE PIPE CULVERTS 40"x31" THRU 66"x51" PIPE ARCH 90° SKEW	NOTE 1
838.08	CONCRETE "L" ENDWALL FOR SINGLE PIPE CULVERTS 40"x31" THRU 66"x51" PIPE ARCH	NOTE 1
838.10	CONCRETE ENDWALL FOR OUTFALL 4", 6" OR 8" PIPE	NOTE 1
838.11	BRICK ENDWALL FOR SINGLE AND DOUBLE PIPE CULVERTS 15" THRU 48" 90° SKEW	
838.14	BRICK ENDWALL FOR SINGLE AND DOUBLE PIPE CULVERTS 17"x13" THRU 71"x47" PIPE ARCH 90° SKEW	
838.15	BRICK "L" ENDWALL FOR SINGLE PIPE CULVERTS 15" THRU 48" PIPE	
838.16	BRICK "L" ENDWALL FOR SINGLE PIPE CULVERTS 17"x13" THRU 71"x47" PIPE ARCH	
838.17	BRICK ENDWALL FOR SINGLE AND DOUBLE PIPE CULVERTS 40"x31" THRU 66"x51" PIPE ARCH 90° SKEW	
838.18	BRICK ENDWALL FOR SINGLE PIPE CULVERTS 40"x31" THRU 66"x51" PIPE ARCH	
838.20	BRICK ENDWALL FOR OUTFALL 4", 6" OR 8" PIPE	
838.21	REINFORCED CONCRETE ENDWALL FOR SINGLE 54" PIPE 90° SKEW	NOTE 1 SEE STANDARD 304.1 & 305.1 FOR SPLASH PAD
838.22	REINFORCED CONCRETE ENDWALL FOR DOUBLE & TRIPLE 54" PIPES 90° SKEW	NOTE 1 SEE STANDARD 304.1 & 305.1 FOR SPLASH PAD
838.27	REINFORCED CONCRETE ENDWALL FOR SINGLE 60" PIPE 90° SKEW	NOTE 1 SEE STANDARD 304.1 & 305.1 FOR SPLASH PAD
838.28	REINFORCED CONCRETE ENDWALL FOR DOUBLE & TRIPLE 60" PIPES 90° SKEW	NOTE 1 SEE STANDARD 304.1 & 305.1 FOR SPLASH PAD
838.33	REINFORCED CONCRETE ENDWALL FOR SINGLE 66" PIPE 90° SKEW	NOTE 1 SEE STANDARD 304.1 & 305.1 FOR SPLASH PAD
838.34	REINFORCED CONCRETE ENDWALL FOR DOUBLE & TRIPLE 66" PIPES 90° SKEW	NOTE 1 SEE STANDARD 304.1 & 305.1 FOR SPLASH PAD
838.39	REINFORCED CONCRETE ENDWALL FOR SINGLE 72" PIPE 90° SKEW	NOTE 1 SEE STANDARD 304.1 & 305.1 FOR SPLASH PAD
838.40	REINFORCED CONCRETE ENDWALL FOR DOUBLE & TRIPLE 72" PIPES 90° SKEW	NOTE 1 SEE STANDARD 304.1 & 305.1 FOR SPLASH PAD

NOTE 1: FOR ALL STRUCTURES – NCDOT REQUIRES CLASS B CONCRETE (2500PSI). THE VILLAGE REQUIRES 3600 PSI CONCRETE STRENGTH @ 28 DAYS. 3600 PSI CONCRETE SHALL BE USED IN ALL PROJECTS.

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NCDOT STANDARDS  
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STD. NO.

300.1

DWG	SHEET TITLE	SPECIAL REQUIREMENTS AND NOTES
838.45	NOTES FOR REINFORCED CONCRETE ENDWALL STANDARD DRAWINGS	NOTE 1 SEE STANDARDS 304.1 AND 305.1 FOR SPLASH PAD
	838.21 THRU 838.40	
838.51	REINFORCED BRICK ENDWALL FOR SINGLE 54" PIPE 90° SKEW	SEE STANDARDS 304.1 AND 305.1 FOR SPLASH PAD
838.52	REINFORCED BRICK ENDWALL FOR DOUBLE & TRIPLE 54" PIPES 90° SKEW	SEE STANDARDS 304.1 AND 305.1 FOR SPLASH PAD
838.57	REINFORCED BRICK ENDWALL FOR SINGLE 60" PIPE 90° SKEW	SEE STANDARDS 304.1 AND 305.1 FOR SPLASH PAD
838.58	REINFORCED BRICK ENDWALL FOR DOUBLE & TRIPLE 60" PIPES 90° SKEW	SEE STANDARDS 304.1 AND 305.1 FOR SPLASH PAD
838.63	REINFORCED BRICK ENDWALL FOR SINGLE 66" PIPE 90° SKEW	SEE STANDARDS 304.1 AND 305.1 FOR SPLASH PAD
838.64	REINFORCED BRICK ENDWALL FOR DOUBLE & TRIPLE 66" PIPES 90° SKEW	SEE STANDARDS 304.1 AND 305.1 FOR SPLASH PAD
838.69	REINFORCED BRICK ENDWALL FOR SINGLE 72" PIPE 90° SKEW	SEE STANDARDS 304.1 AND 305.1 FOR SPLASH PAD
838.70	REINFORCED BRICK ENDWALL FOR DOUBLE & TRIPLE 72" PIPES 90° SKEW	SEE STANDARDS 304.1 AND 305.1 FOR SPLASH PAD
838.75	NOTES FOR REINFORCED BRICK ENDWALL STANDARD DRAWINGS 838.51 THRU 838.70	SEE STANDARDS 304.1 AND 305.1 FOR SPLASH PAD
838.80	PRECAST CONCRETE ENDWALLS FOR SINGLE 12" THRU 72" PIPE 90° SKEW	
840.00	CONCRETE BASE PAD FOR DRAINAGE STRUCTURES	
840.01	BRICK CATCH BASIN 12" THRU 54" PIPE	
840.02	CONCRETE CATCH BASIN 12" THRU 54" PIPE	
840.03	FRAME, GRATES AND HOOD FOR USE ON STANDARD BASIN 12" THRU 54" PIPE	TYPE F AND G GRATES ARE OPTIONAL
840.04	CONCRETE OPEN THROAT CATCH BASIN 12" THRU 48" PIPE	NOTE 1 – OPENINGS PERMITTED IN 4 SIDES OUTSIDE OF STREET R/W MANHOLE RING AND COVER REQUIRED IN TOP SLAB SEE STD. 840.54
840.05	BRICK OPEN THROAT CATCH BASIN 12" THRU 48" PIPE	OPENINGS PERMITTED IN 4 SIDES OUTSIDE OF STREET R/W MANHOLE RING AND COVER REQUIRED IN TOP SLAB SEE STD. 840.54
840.14	CONCRETE DROP INLET 12" THRU 30" PIPE	NOTE 1
840.15	BRICK DROP INLET 12" THRU 30" PIPE	
840.16	DROP INLET FRAME AND GRATES FOR USE WITH STANDARD DWGS. 840.14 & 840.15	
840.17	CONCRETE GRATED DROP INLET TYPE "A" 12" THRU 72" PIPE	NOTE 1
840.18	CONCRETE GRATED DROP INLET TYPE "B" 12" THRU 36" PIPE	NOTE 1
840.19	CONCRETE GRATED DROP INLET TYPE "D" 12" THRU 36" PIPE	NOTE 1
840.20	FRAMES AND WIDE SLOT FLAT GRATES	NOT FOR USE IN PEDESTRIAN AREAS
840.22	FRAMES AND WIDE SLOT SAG GRATES	NOT FOR USE IN PEDESTRIAN AREAS
840.24	FRAMES AND NARROW SLOT SAG GRATES	
840.25	ANCHORAGE FOR FRAMES BRICK OR CONCRETE	
840.26	BRICK GRATED DROP INLET TYPE "A" 12" THRU 72" PIPE	
840.27	BRICK GRATED DROP INLET TYPE "B" 12" THRU 36" PIPE	
840.28	BRICK GRATED DROP INLET TYPE "D" 12" THRU 36" PIPE	
840.29	FRAMES AND NARROW SLOT FLAT GRATES	
840.30	DRIVEWAY DROP INLET	

NOTE 1: FOR ALL STRUCTURES – NCDOT REQUIRES CLASS B CONCRETE (2500PSI). THE VILLAGE REQUIRES 3600 PSI CONCRETE STRENGTH @ 28 DAYS. 3600 PSI CONCRETE SHALL BE USED IN ALL PROJECTS.

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NCDOT STANDARDS  
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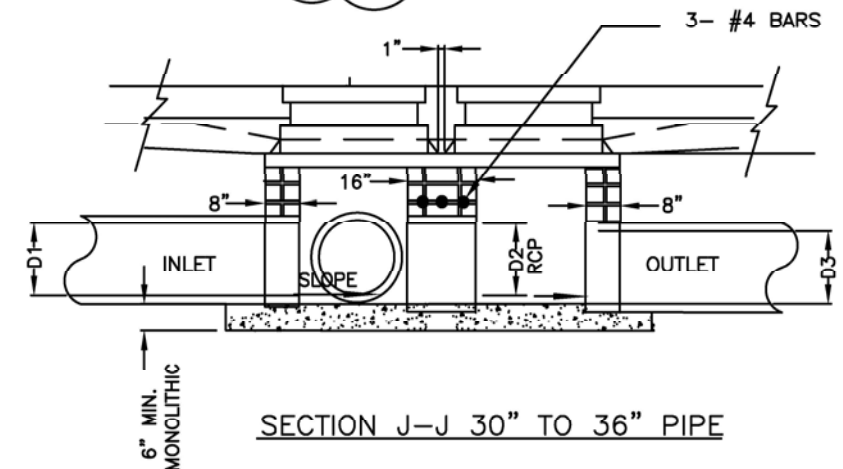
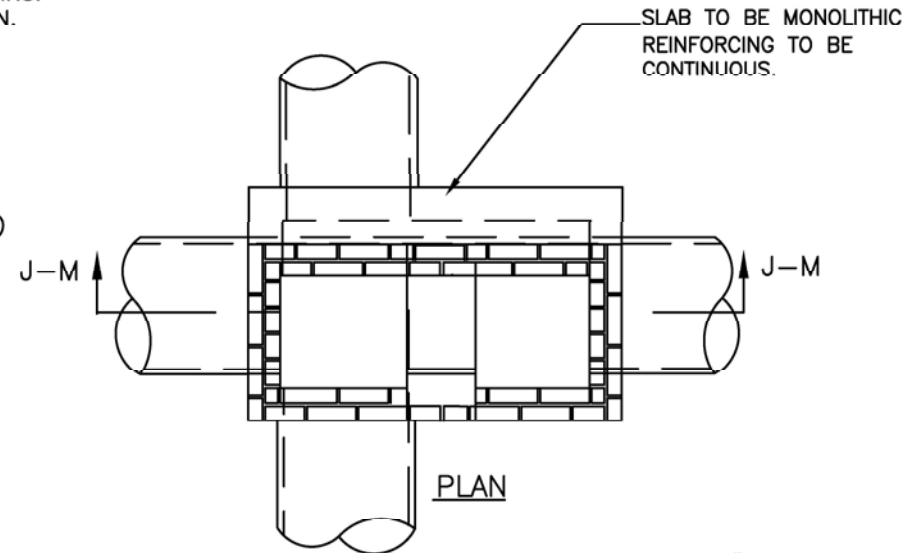
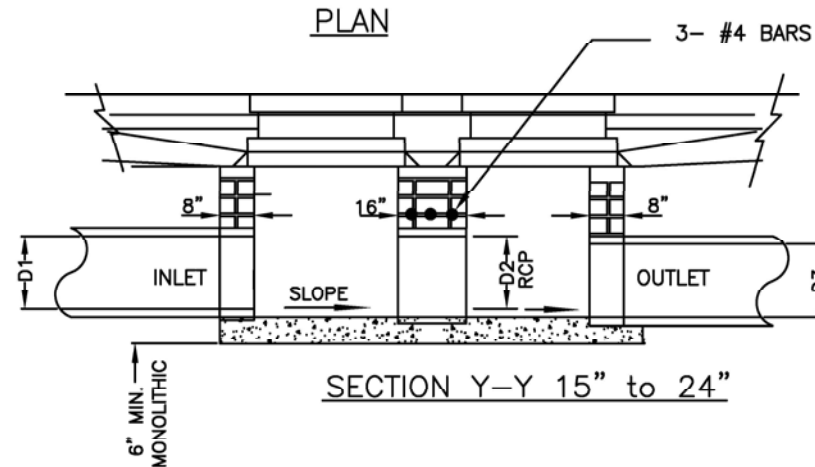
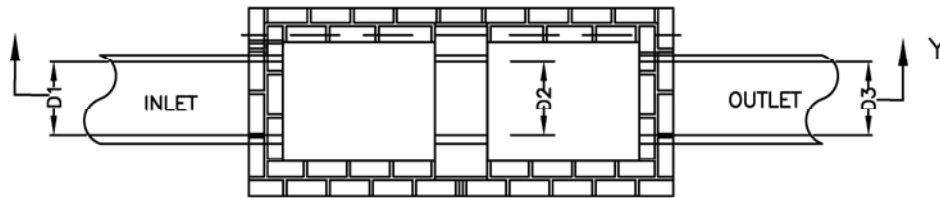
STD. NO.

301.1



# GENERAL NOTES:

1. DOUBLE CATCH BASIN ONLY FOR USE WITHIN VILLAGE MAINTAINED STREETS. INSTALLATION ON STREETS WITHIN EXISTING/FUTURE NCDOT MAINTAINED RIGHT OF WAY REQUIRES A MINIMUM OF ONE 4 FOOT LONG SECTION OF REINFORCED CONCRETE PIPE BETWEEN CATCH BASINS.
2. SEE NCDOT STANDARD 840.01 FOR DETAILS BASED ON PIPE SIZE PER CROSS-SECTION.
3. CONSTRUCT TWO SINGLE BASINS PER NCDOT STANDARD WITH DOUBLE INTERIOR WALL.
4. ALL CONCRETE TO BE 3600 P.S.I COMPRESSIVE STRENGTH.
5. BASE SLAB SHALL BE MONOLITHIC.
6. SEE STANDARD NUMBERS 120.1 AND 121.1 FOR PLACEMENT OF CATCH BASIN.
7. RCP PIPE SECTION D2 CONNECTING CATCH BASINS SHALL HAVE A MINIMUM DIAMETER SAME AS OF OUTLET PIPE D3.
8. ALL REINFORCING STEEL SHOWN ON NCDOT STANDARDS IS TO BE PROVIDED AS CONTINUOUS MEMBERS. (NO LAPS, USED AS A SINGLE CONTINUOUS BAR IN THE SLAB)



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## BRICK DOUBLE CATCH BASIN 15" THRU 36" PIPE

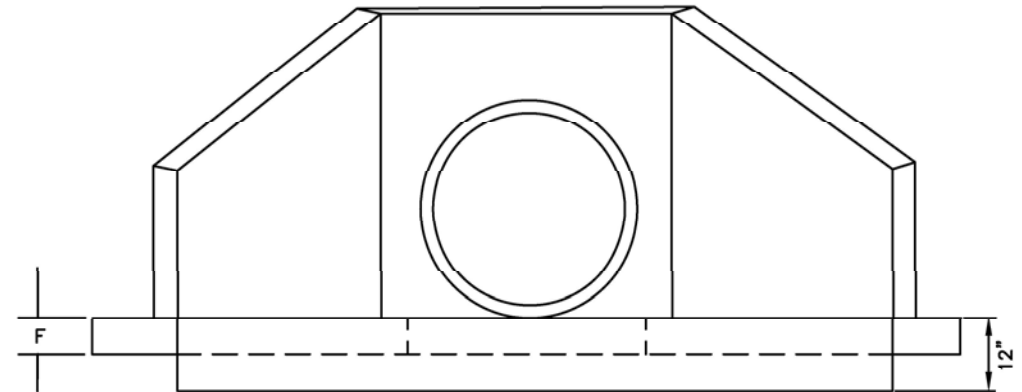
REV. DATE

STD. NO.

303.1

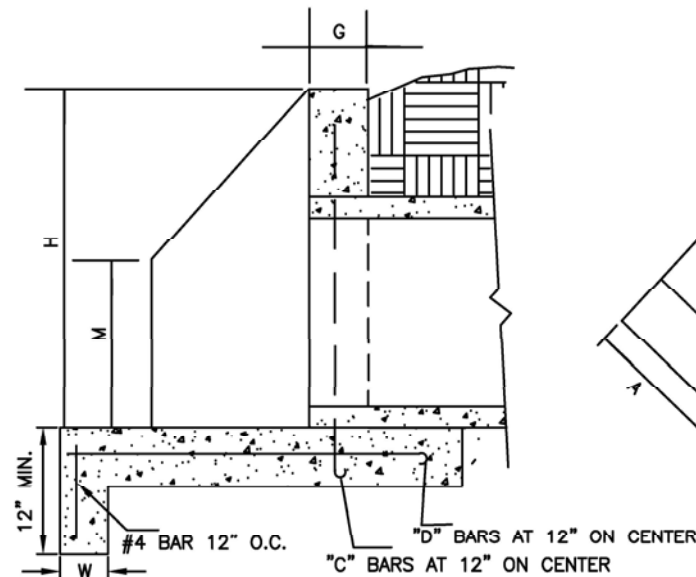


CONCRETE PIPE			DIMENSIONS										
WALL THK.	OUT DIA.	IN DIA.	MIN. H	A	B	C	E	F	G	W	K	M	
2 1/4"	19 1/2"	15"	27 1/2"	20"	24"	8"	7 1/2"	4"	4"	8"	17"	10"	
2 1/2"	23"	18"	31"	20"	24"	8"	9"	4"	4"	8"	17"	12"	
3"	30"	24"	36"	20"	30"	8"	12"	4"	4"	8"	21"	15"	
3 1/2"	37"	30"	45"	20"	44"	12"	15"	6"	8"	8"	31"	18"	
4"	44"	36"	52"	32"	44"	12"	18"	6"	8"	8"	31"	22"	
4 1/2"	51"	42"	59"	32"	48"	12"	21"	6"	8"	8"	34"	26"	
5"	58"	48"	66"	32"	48"	12"	24"	6"	8"	8"	34"	29"	
5 1/2"	65"	54"	73"	32"	54"	12"	27"	6"	8"	8"	38"	33"	
6"	72"	60"	80"	36"	66"	12"	30"	8"	12"	12"	46"	36"	
6 1/2"	79"	66"	87"	36"	72"	12"	33"	8"	12"	12"	51"	40"	
7"	86"	72"	94"	36"	78"	12"	36"	8"	12"	12"	56"	43"	

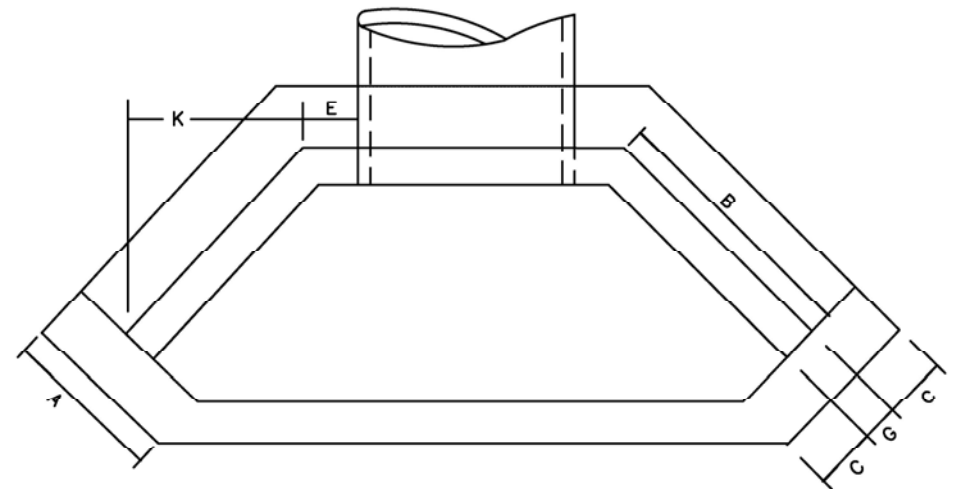


FRONT VIEW

REINFORCING				
DIA.	"C" BAR NO.	"C" BAR LGT.	"D" BAR NO.	"D" BAR LGT.
15"	4	2'-0"	4	1'-11"
18"	4	2'-3"	4	2'-2"
24"	4	2'-9"	4	2'-8"
30"	4	3'-3"	4	3'-2"
36"	4	3'-9"	4	3'-8"
42"	4	4'-3"	4	4'-2"
48"	4	4'-9"	4	4'-8"
54"	4	5'-3"	4	5'-2"
60"	4	5'-9"	4	5'-8"
66"	4	6'-3"	4	6'-2"
72"	4	6'-9"	4	6'-8"



SIDE VIEW



TOP VIEW

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## CONCRETE WINGWALL WITH SPLASH PAD

REV. DATE

STD. NO.

304.1

GENERAL NOTES:

1. ALL CORNERS TO BE CHAMFERED 1" IF CONCRETE.
2. THE CONTRACTOR WILL BE REQUIRED TO PLACE 2-#6 BARS "Y" IN THE TOP OF ALL ENDWALL FOR PIPE CULVERTS 42" AND OVER WITH A MINIMUM 3" COVER AND A LENGTH OF 6" LESS THAN ENDWALL.
3. FORMS ARE TO BE USED FOR THE CONSTRUCTION OF THE BOTTOM SLAB.
4. WALL THICKNESS (T) SHOWN IS NOT TO BE INTERPRETED TO MEAN THE THICKNESS ACCEPTABLE, BUT IS USED ONLY IN COMPUTING ENDWALL QUANTITIES.
5. IF CONTRACTOR ELECTS TO USE CONSTRUCTION JOINT AT BOTTOM OF PIPE, AND POURS BASE SEPARATELY, THE TOP OF BASE SHALL BE LEFT ROUGH.
6. ALL CONCRETE TO BE 3600 P.S.I COMPRESSIVE STRENGTH.

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**CONCRETE WINGWALL  
WITH SPLASH PAD**

REV. DATE

STD. NO.

305.1

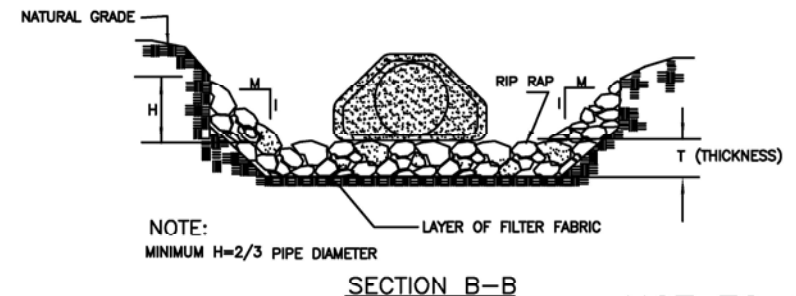
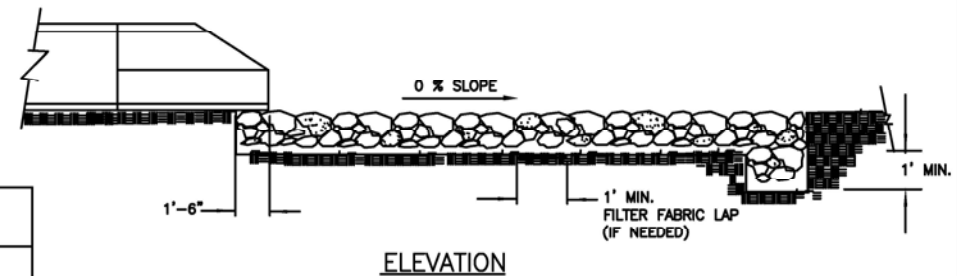
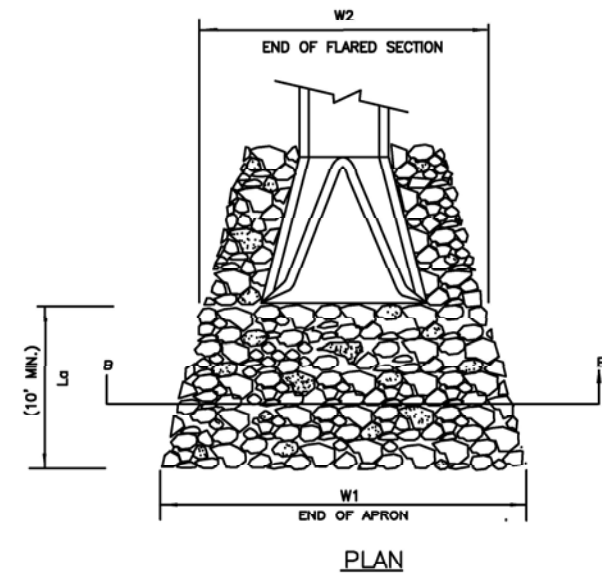
# NOTES:

1. CLASS OR MEDIAN SIZE OF RIPRAP AND LENGTH, WIDTH AND DEPTH OF APRON TO BE DESIGNED BY THE ENGINEER.
2. REFER TO THE CHARLOTTE MECKLENBURG STORM WATER DESIGN MANUAL FOR RIPRAP APRON DESIGN STANDARDS.
3. RIPRAP SHOULD EXTEND UP BOTH SIDES OF THE APRON AND AROUND THE END OF THE PIPE OR CULVERT AT THE DISCHARGE OUTLET AT A MAXIMUM SLOPE OF 2:1 AND A HEIGHT NOT LESS THAN TWO THIRDS THE PIPE DIAMETER OR CULVERT HEIGHT.
4. THERE SHALL BE NO OVERFLOW FROM THE END OF THE APRON TO THE SURFACE OF THE RECEIVING CHANNEL. THE AREA TO BE PAVED OR RIPRAPPED SHALL BE UNDERCUT SO THAT THE INVERT OF THE APRON SHALL BE AT THE SAME GRADE (FLUSH) WITH THE SURFACE OF THE RECEIVING CHANNEL. THE APRON SHALL HAVE A CUTOFF OR TOE WALL AT THE DOWNSTREAM END.
5. THE WIDTH OF THE END OF THE APRON SHALL BE EQUAL TO THE BOTTOM WIDTH OF THE RECEIVING CHANNEL. MAXIMUM TAPER TO RECEIVING CHANNEL 5:1.
6. ALL SUBGRADE FOR STRUCTURE TO BE COMPACTED TO 95% OR GREATER.
7. THE PLACING OF FILL, EITHER LOOSE OR COMPACTED IN THE RECEIVING CHANNEL SHALL NOT BE ALLOWED.
8. NO BENDS OR CURVES IN THE HORIZONTAL ALIGNMENT OF THE APRON WILL BE PERMITTED.
9. FILTER FABRIC SHALL BE INSTALLED ON COMPACTED SUBGRADE PRIOR TO PLACEMENT OF RIP RAP.
10. ANY DISTURBED AREA FROM END OF APRON TO RECEIVING CHANNEL MUST BE STABILIZED.

USE USDA NOMOGRAPH FROM NC SEDIMENT AND EROSION CONTROL MANUAL OR CHARLOTTE MECKLENBURG STORM WATER DESIGN MANUAL FOR DESIGN DATA.

RIPRAP SUMMARY CHART					
OUTLET	L <sub>a</sub>	W <sub>1</sub>	W <sub>2</sub>	*T	H

\* d<sub>50</sub> (see fig 8.06 a&b "NC SEDIMENT AND EROSION CONTROL MANUAL")  
d<sub>max</sub> = 1.5 x d<sub>50</sub>  
T = 1.5 X d<sub>max</sub>.



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RIPRAP APRON AT PIPE OUTFALLS  
OTHER THAN SWIM

REV. DATE

STD. NO.

306.1

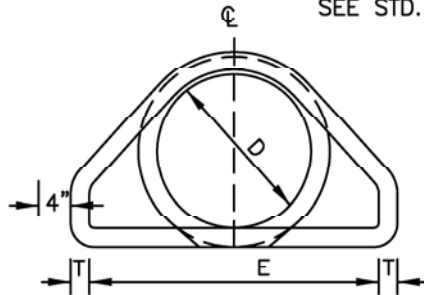
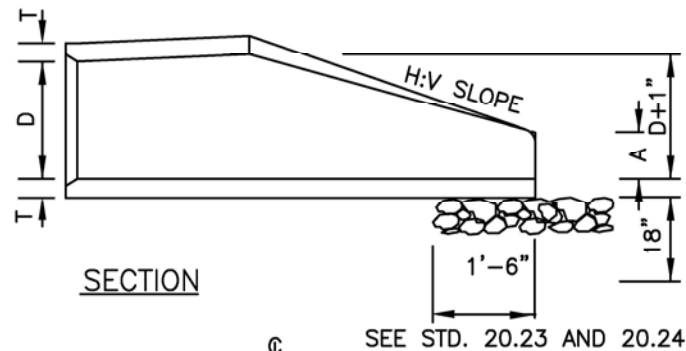
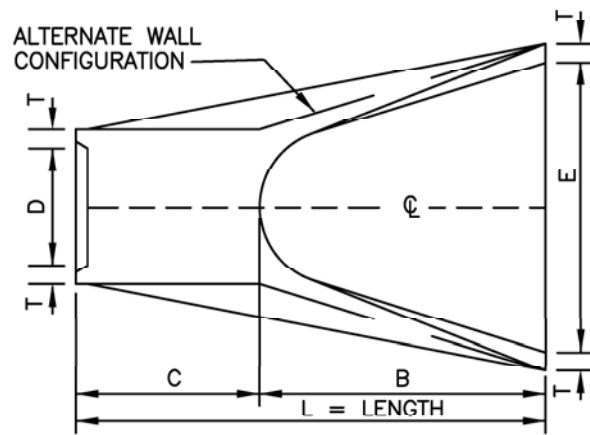


TABLE OF DIMENSIONS								
D	T	A	B	C	E	L	H:V	WT.
12"	2-1/4"	4"	2'-0"	4'-1"	2'-0"	6'-1"	3:1	730
15"	2-1/4"	6"	2'-3"	3'-10"	2'-0"	6'-1"	3:1	730
18"	2-1/2"	9"	2'-3"	3'-10"	3'-0"	6'-1"	3:1	1190
24"	3"	10"	3'-8"	2'-6"	4'-0"	6'-2"	3:1	1770
30"	3-1/2"	1'-0"	4'-6"	1'-8"	5'-0"	6'-2"	3:1	2380
36"	4"	1'-3"	5'-3"	2'-11"	6'-0"	8'-2"	3:1	5320
42"	4-1/2"	1'-9"	5'-3"	2'-11"	6'-6"	8'-2"	3:1	5920
48"	5"	2'-0"	6'-0"	2'-2"	7'-0"	8'-2"	3:1	7470
54"	5-1/2"	2'-3"	5'-6"	2'-10"	7'-6"	8'-4"	3:1	8810
60"	6"	2'-6"	5'-0"	3'-3"	8'-0"	8'-3"	3:1	11180
66"	6-1/2"	3'-0"	6'-0"	2'-3"	8'-6"	8'-3"	3:1	12530
72"	7"	3'-0"	6'-6"	1'-9"	9'-0"	8'-3"	3:1	13980

#### GENERAL NOTES:

1. SEE FORMER NCDOT STANDARD 310.01 FOR DETAILS.
2. REINFORCEMENT SHALL CONFORM TO THE REQUIREMENTS OF REINFORCED CONCRETE PIPE OF LIKE DIAMETER PER AASHTO M170, TABLE 2, WALL B.
3. ALL CONCRETE TO BE 4000 P.S.I COMPRESSIVE STRENGTH.
4. PROVIDE TONGUE OR SPIGOT JOINT AT INLET END SECTION.
5. PROVIDE GROOVE OR BELL JOINT AT OUTLET END SECTION.
6. THE DIMENSIONS FOR END SECTIONS SHALL SUBSTANTIALLY AGREE WITH THE TABLE. MINOR VARIATIONS WILL BE PERMITTED BASED ON THE MANUFACTURER'S STANDARD FORMS AND TEMPLATES.
7. NOT TO BE USED IN NCDOT MAINTAINED RIGHT OF WAY.

NOT TO SCALE

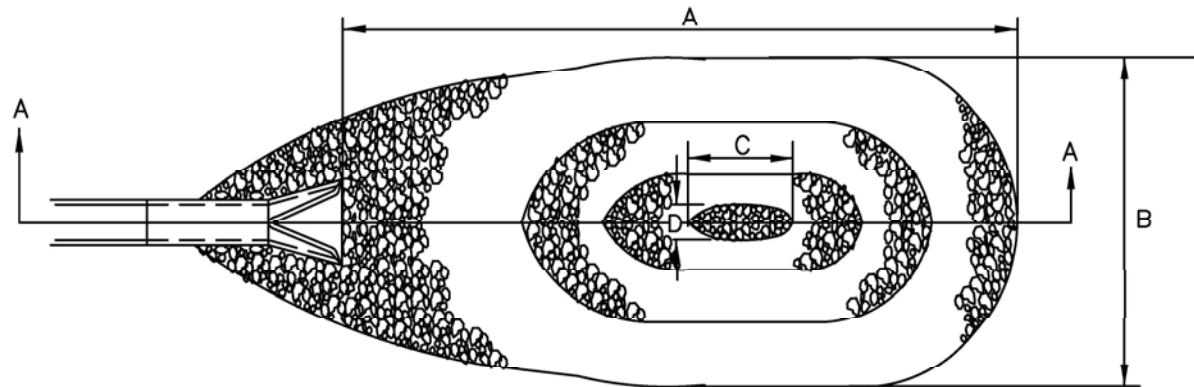
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FLARED END SECTION  
12" THRU 72" PIPE

REV. DATE

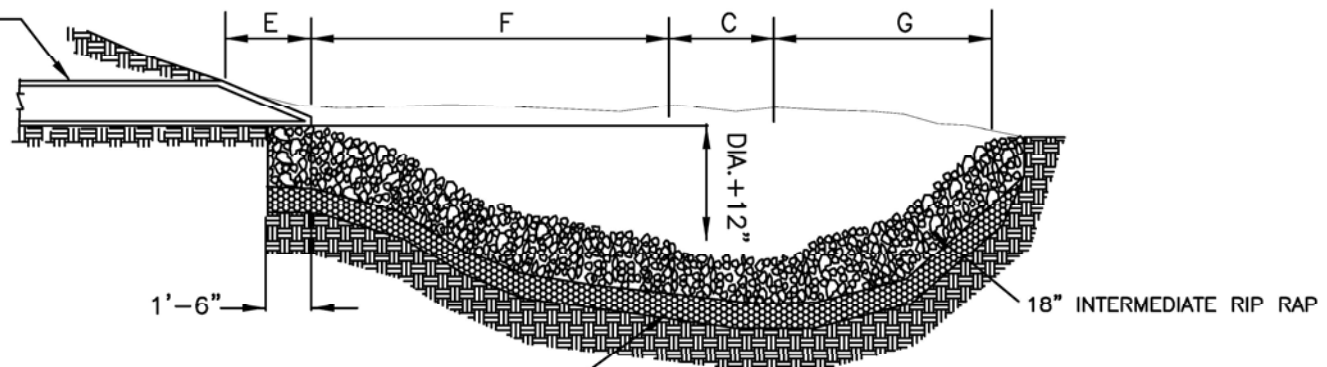
STD. NO.

307.1



PLAN

FLARED END SECTION OR END WALL



SECTION A-A

**NOTE:**

1. THIS DETAIL IS TO ONLY BE USED WHEN OUTFALL HAS A CONTINUOUS FLOW OF WATER AND WITH PRIOR APPROVAL OF THE ENGINEER.

PIPE SIZE	A	B	C	D	E	F	G	WT. RIP RAP IN TONS
15"	10'	7'	1 1/2'	1'	1'	4 1/2'	3'	6
18"	12'	8'	2'	1'	1'	5'	4'	8
21"	15'	9'	2 1/2'	1 1/2'	1'	7'	4 1/2'	12
24"	17'	10'	2 1/2'	1 1/2'	1'	8'	5 1/2'	15
30"	20'	13'	3'	2'	2'	9'	6'	22
36"	24'	16'	3 1/2'	2'	2'	9 1/2'	7'	33

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## RIPRAP PLUNGE POOL

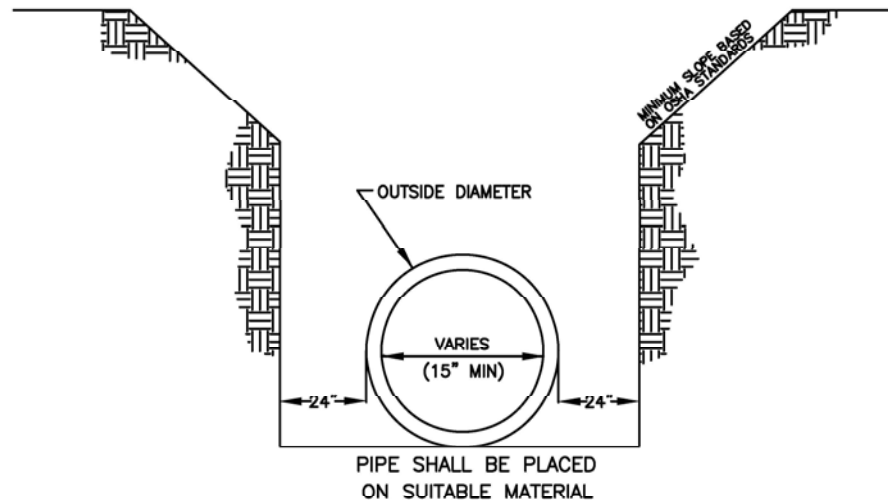
REV. DATE

STD. NO.

308.1

NOTES:

1. A MINIMUM OF 24" FROM OUTSIDE DIAMETER OF PIPE TO SIDE OF TRENCH MUST BE ALLOWED FOR COMPACTION OF FILL MATERIAL. BACKFILLING OF TRENCHES SHALL BE ACCOMPLISHED IMMEDIATELY AFTER THE PIPE IS LAID. THE FILL AROUND THE PIPE SHALL BE PLACED IN LAYERS NOT TO EXCEED 6". UNDER NO CIRCUMSTANCES SHALL WATER BE PERMITTED TO RISE IN UNBACKFILLED TRENCHES AFTER THE PIPE HAS BEEN PLACED. COMPACTION REQUIREMENTS SHALL BE ATTAINED BY THE USE OF MECHANICAL TAMPS ONLY. EACH AND EVERY LAYER OF BACKFILL SHALL BE PLACED LOOSE AND THOROUGHLY COMPACTED INTO PLACE.
2. ALL BACKFILL MATERIAL SHALL HAVE AN IN PLACE COMPACTED DENSITY OF 95%.
3. STANDARD PROCTOR. THE FINAL 2' BELOW FINISHED GRADE SHALL BE 100%.
4. ALL TRENCHING OPERATIONS SHALL MEET OSHA STANDARDS.
5. BACKFILL MATERIAL BENEATH ROADWAY SHALL BE SELECT BACKFILL MATERIAL.



NOT TO SCALE

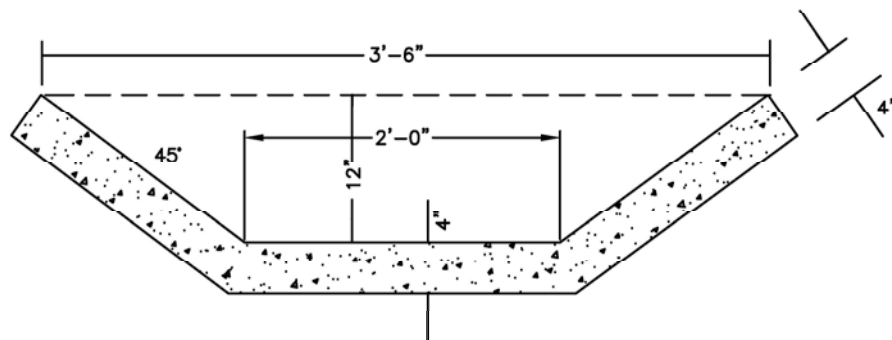
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# TRENCH DETAIL FOR STORM DRAIN

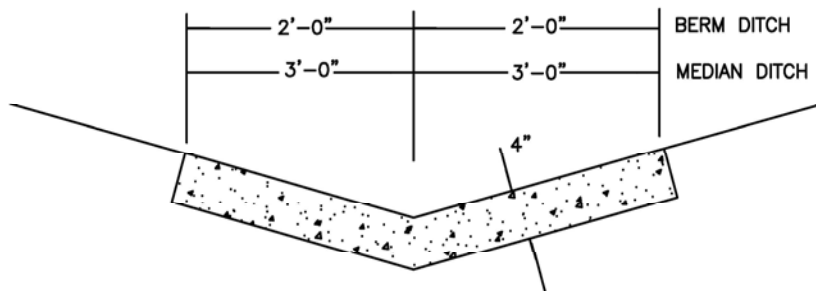
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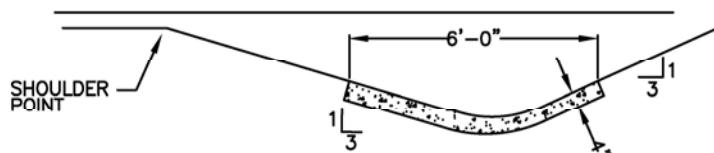
309.1



SLOPE DRAIN, BASE DITCH OR BERM DRAINAGE  
OUTLET DITCH



MEDIAN OR BERM DITCH



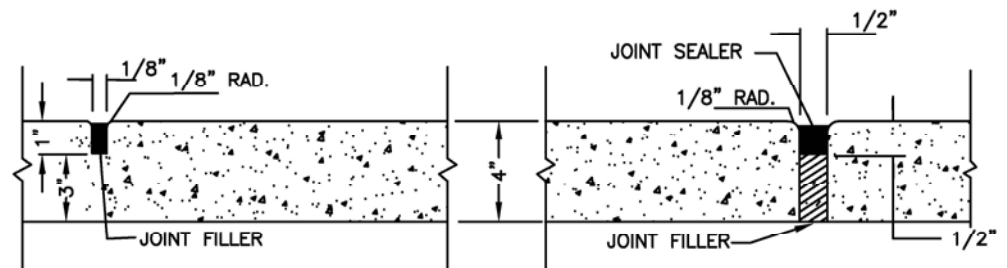
SIDE DITCH

### GENERAL NOTES:

IN THE 4" CONCRETE PAVED DITCHES PLACE 1/2" EXPANSION JOINT AT 30 FT INTERVALS AND AT ALL OTHER POINTS WHERE PROPOSED DITCHES ABUT RIGID OBJECTS. PLACE GROOVED JOINTS 1" DEEP AT 10' INTERVALS BETWEEN EXPANSION JOINTS.

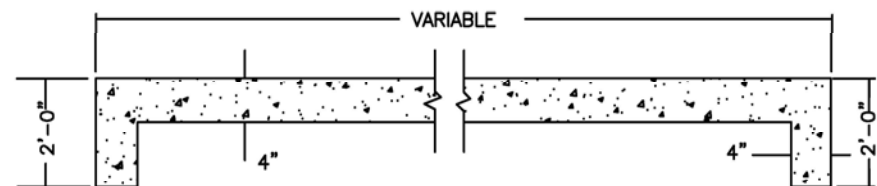
WIDTH AND SHAPE OF PROPOSED 4" CONCRETE PAVED DITCHES SHALL BE AS SHOWN OR AS DIRECTED BY THE ENGINEER.

ALL CONCRETE TO BE 3600 P.S.I. COMPRESSIVE STRENGTH.



SHOWING GROOVED JOINT

SHOWING EXPANSION JOINT



LONGITUDINAL SECTION OF PAVED DITCH

SHOWING 2'-0" CURTAIN WALL REQUIRED AT EACH END

NOT TO SCALE

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Development Standards

## CONCRETE PAVED DITCHES

REV. DATE

STD. NO.

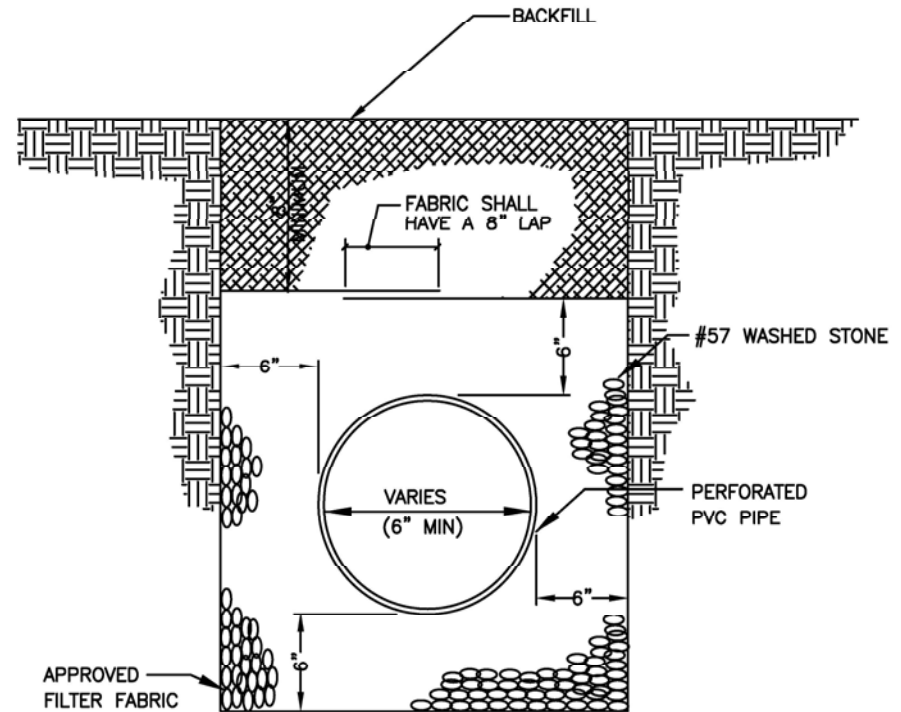
310.1





**NOTES:**

1. A MINIMUM OF 6" FROM OUTSIDE DIAMETER OF PIPE TO SIDE OF TRENCH MUST BE ALLOWED FOR WASHED STONE. THE METHOD OF COMPACTING BACKFILL MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER.  
AN APPROVED FILTER FABRIC SHALL BE PLACED AROUND STONE AND OVERLAPPED 8" AT TOP WITHIN STREET RIGHT OF WAY. PIPE SIZE TO BE SHOWN ON PLAN (MINIMUM 6" PIPE). PIPE TO BE SCHEDULE 20 OR 40 PERFORATED PVC.
2. OUTLET PIPE FROM SUBDRAIN SHALL BE NON-PERFORATED UNDER PAVEMENT (INCLUDING SIDEWALKS AND DRIVEWAYS)
3. THE OUTLET PIPES SHALL BE SCHEDULE 80 UNDER ROADWAYS.
4. SEE SITE PLAN FOR SLOPE OF SUBDRAIN AND TIE IN TO STORM DRAINAGE.
5. FILTER FABRIC SHALL BE AN APPROVED, TYPE 2 WATER PERMEABLE, SYNTHETIC FABRIC.



**SPECIAL NOTE:**

PREFABRICATED DRAINAGE MAY BE USED WITH  
APPROVAL OF VILLAGE ENGINEER.

NOT TO SCALE

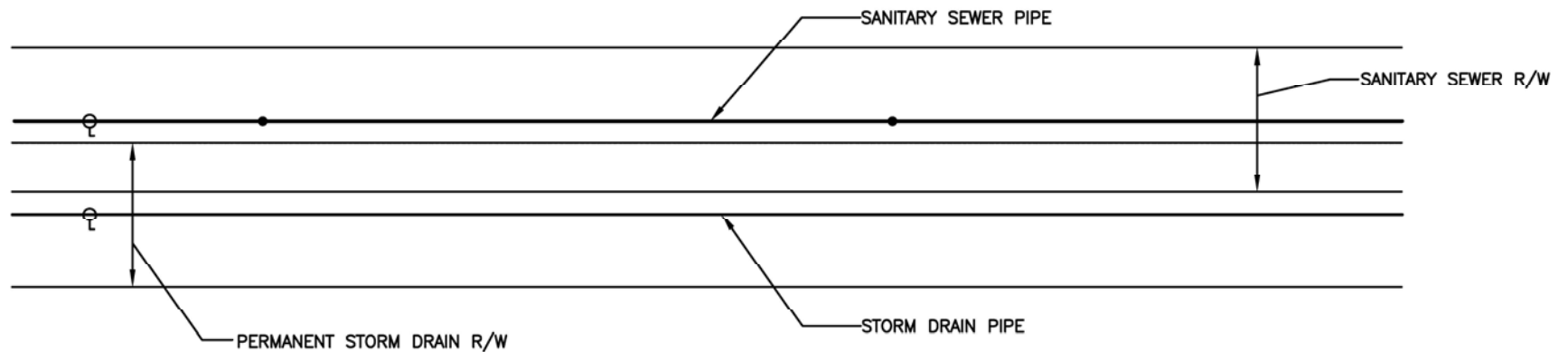
Town of Oakboro  
Development Standards

**SUBDRAIN DETAIL**

REV. DATE

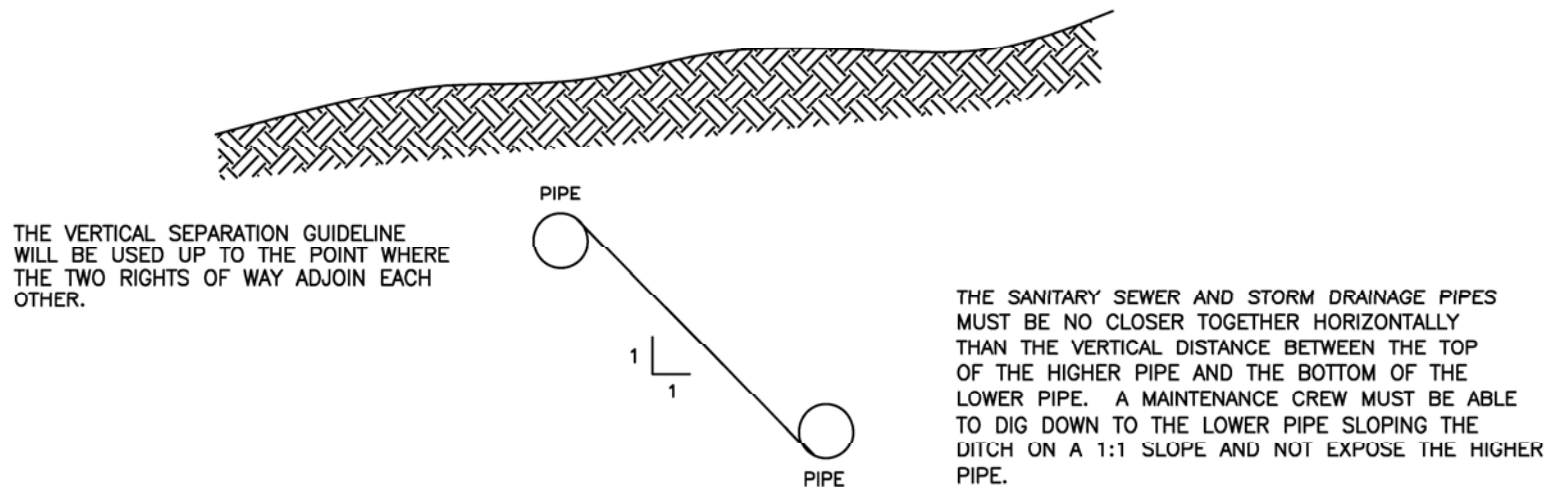
STD. NO.

312.1



THE SANITARY SEWER AND STORM DRAINAGE RIGHTS OF WAY MAY OVERLAP; HOWEVER THE PIPE AND ASSOCIATED STRUCTURES MUST NOT BE IN THE OTHER UTILITY'S RIGHT OF WAY. THE SANITARY SEWER RIGHT OF WAY WIDTHS SHALL BE AS OUTLINED IN C.M.U.D.'S DESIGN MANUAL. THIS DETAIL DOES NOT APPLY TO STORM DRAINAGE UTILIZING OPEN CHANNEL FLOW.

PLAN VIEW



PROFILE VIEW

NOT TO SCALE

Town of Oakboro  
Development Standards

# OVERLAPPING STORM DRAINAGE/ SANITARY SEWER EASEMENTS

REV. DATE

STD. NO.

313.1

### GENERAL NOTES:

1. FOR STREAMS CARRYING 500 ACRES OR MORE OF SURFACE RUNOFF, THE EASEMENT REQUIREMENT IS TO BE THE WIDTH OF THE STREAM FROM TOP OF BANK TO TOP OF BANK, PLUS (+) 10' ON EACH SIDE OF STREAM. ( 40' MINIMUM WIDTH )
2. FOR OPEN CHANNELS THE MINIMUM EASEMENT MUST CONTAIN THE WIDTH OF THE STREAM FROM TOP OF BANK TO TOP BANK.
3. WIDER EASEMENT WIDTHS MAY BE REQUIRED FOR PIPE DEPTHS GREATER THAN TEN FEET.
4. PIPE SYSTEMS AND OPEN CHANNELS ON PRIVATE PROPERTY SHALL BE PLACED IN A STORM DRAINAGE EASEMENT.

### Easement Requirements for Open Storm Drainage Channels

Area in Acreage	Easement Requirement
0-45 ac.	20'
45-120 ac.	30'
120-500 ac.	40'
500 ac.+	see note

### Easement Requirements for Storm Drain Pipe

Pipe Size	Easement Requirement
15"	15'
18"	15'
24"	15'
30"	20'
36"	20'
42"	25'
48"	25'
54"+	30'MIN (VARIES)

NOT TO SCALE

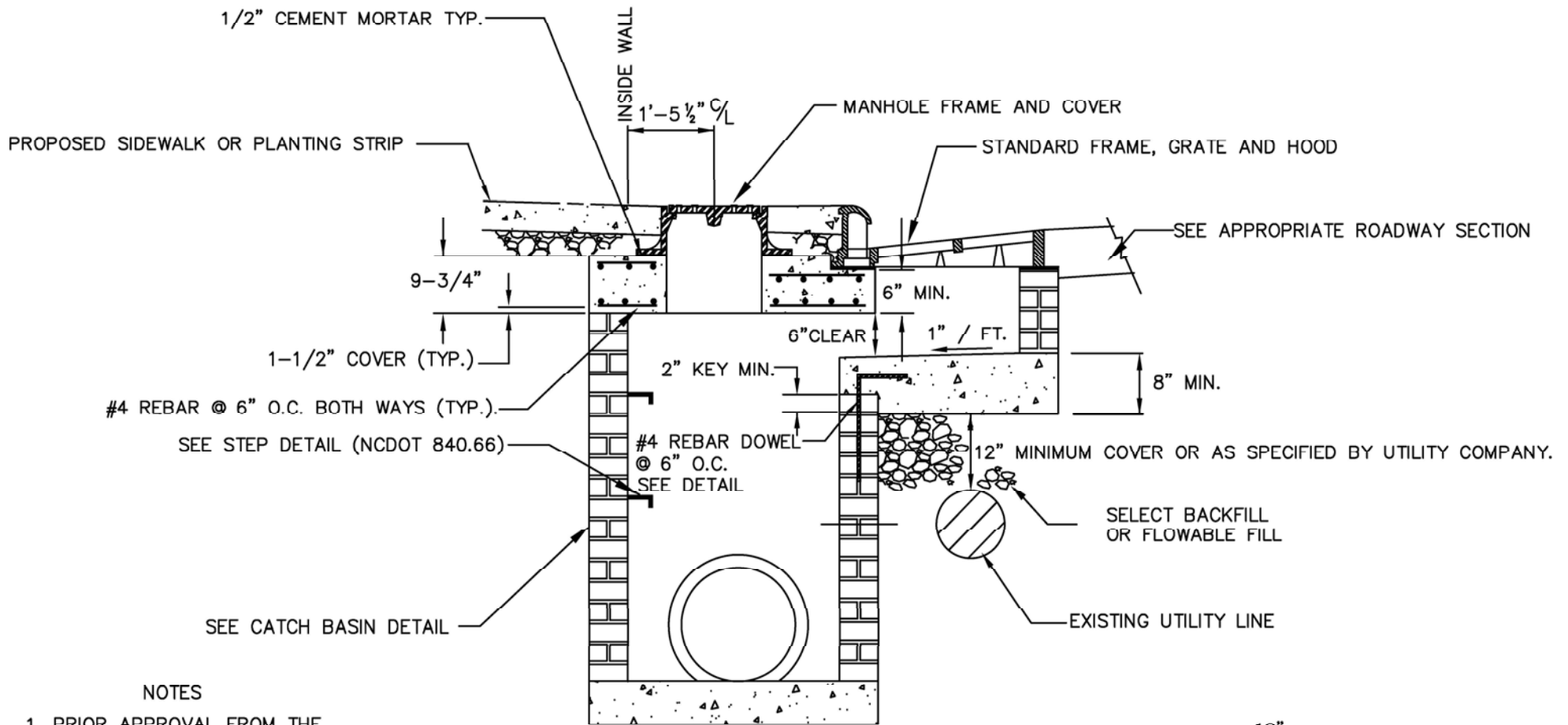
Town of Oakboro  
Development Standards

## MINIMUM DRAINAGE EASEMENT REQUIREMENTS FOR STORM DRAIN PIPES AND OPEN CHANNELS

REV. DATE

STD. NO.

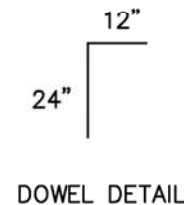
314.1



#### NOTES

1. PRIOR APPROVAL FROM THE ENGINEER IS REQUIRED.
2. THIS STRUCTURE IS TO ONLY BE USED ON VILLAGE MAINTAINED STREETS AND NOT ON NCDOT STREETS WITHOUT THEIR PERMISSION.

OFFSET CATCH BASIN EXISTING  
UTILITY CONFLICT



NOT TO SCALE

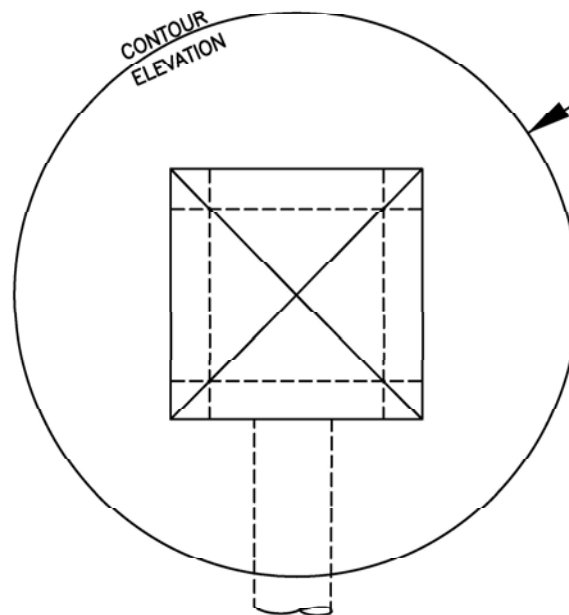
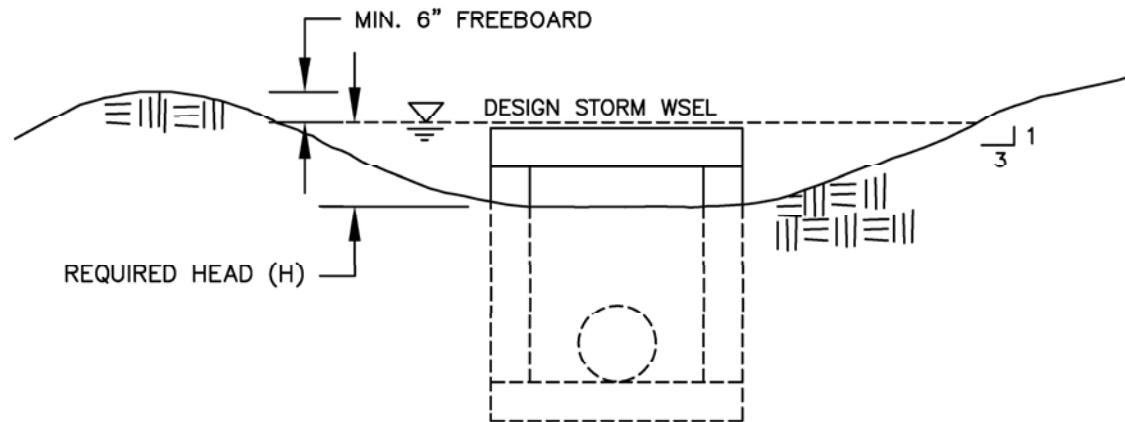
Town of Oakboro  
Development Standards

## OFFSET CATCH BASIN

REV. DATE

STD. NO.

315.1



YARD INLET SUMMARY CHART				
YARD INLET	AREA (AC.)	CFS	HEAD H (FT.)	COMMENT

NOT TO SCALE

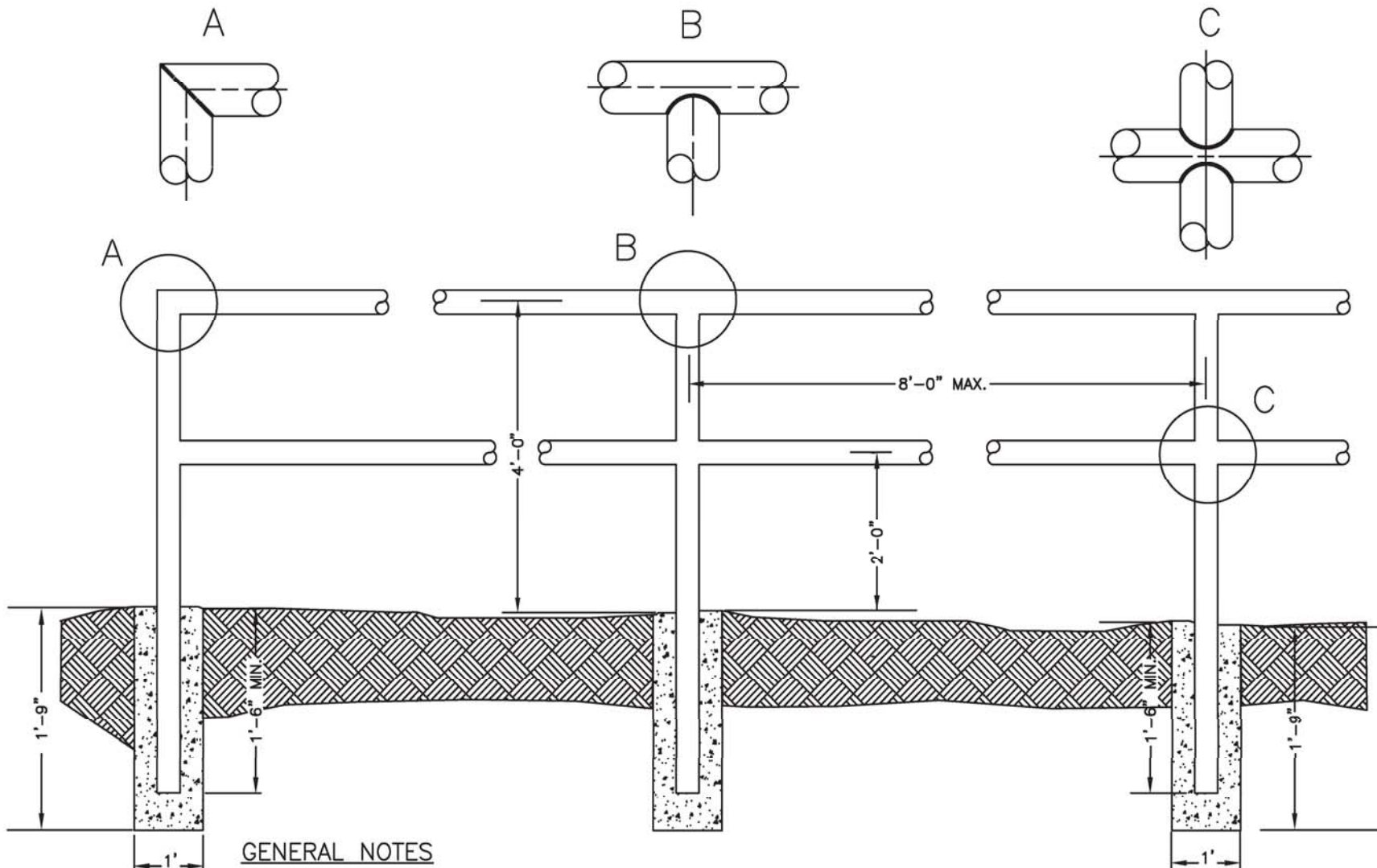
Town of Oakboro  
Development Standards

## GRADING AT DROP INLET

REV. DATE

STD. NO.

316.1



**GENERAL NOTES**

1. ALL CONCRETE TO BE 3600 PSI COMPRESSIVE STRENGTH.
2. TYPE OF PIPE TO BE USED IS 1- $\frac{3}{8}$  INCH MAXIMUM OUTER DIAMETER BLACK IRON, LOW CARBON PIPE OR GALVANIZED.
3. ALL JOINTS TO HAVE A  $\frac{1}{2}$  INCH FILLED WELD AT ALL JOINTS.
4. AFTER INSTALLATION, PAINT ASSEMBLY WITH BLACK ALL WEATHER ENAMEL.
5. ALTERNATIVE HANDRAIL DESIGNS TO BE SUBMITTED TO THE VILLAGE ENGINEER FOR REVIEW.
6. REFER TO DETAIL 701.1 FOR WARRANTIES.

NOT TO SCALE

Town of Oakboro  
Development Standards

**TYPICAL HANDRAIL**

REV. DATE

STD. NO.

700.1

## WARRANTS

HANDRAIL SHALL BE INSTALLED UNDER ANY OF THE FOLLOWING CIRCUMSTANCES IN BOTH NEW CONSTRUCTION AND IN RETROFITTING OR RECONSTRUCTION OF EXISTING ROADWAYS OR SITES:

1. WHEN THE CULVERT-CROSSING DETAIL (STD. 133.1 & 134.1) APPLIES.
2. IN ANY OF THE FOLLOWING COMBINATIONS OF DROPOFF AND OFFSET FROM SIDEWALK:
  - a. 18" OR LARGER DROPOFF WITHIN 2 FEET OF THE EDGE OF THE SIDEWALK
  - b. 36" OR LARGER DROPOFF WITHIN 4 FEET OF THE EDGE OF THE SIDEWALK
  - c. 60" OR LARGER DROPOFF WITHIN 6 FEET OF THE EDGE OF THE SIDEWALK

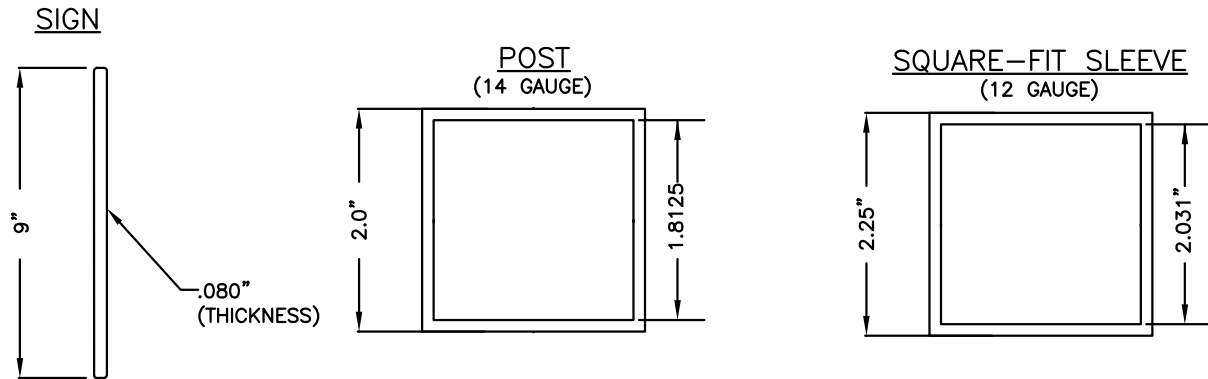
THESE CLEARANCES ASSUME THAT THE CROSS-SLOPE OF THE BERM BETWEEN THE SIDEWALK AND THE DROPOFF IS 6:1 OR FLATTER.

3. AT THE TOP OF ANY DROPOFF WHERE PEDESTRIANS CAN REASONABLY BE EXPECTED IN THE VICINITY.
4. AT THE DIRECTION OF VILLAGE ENGINEER BASED ON FIELD CONDITIONS.

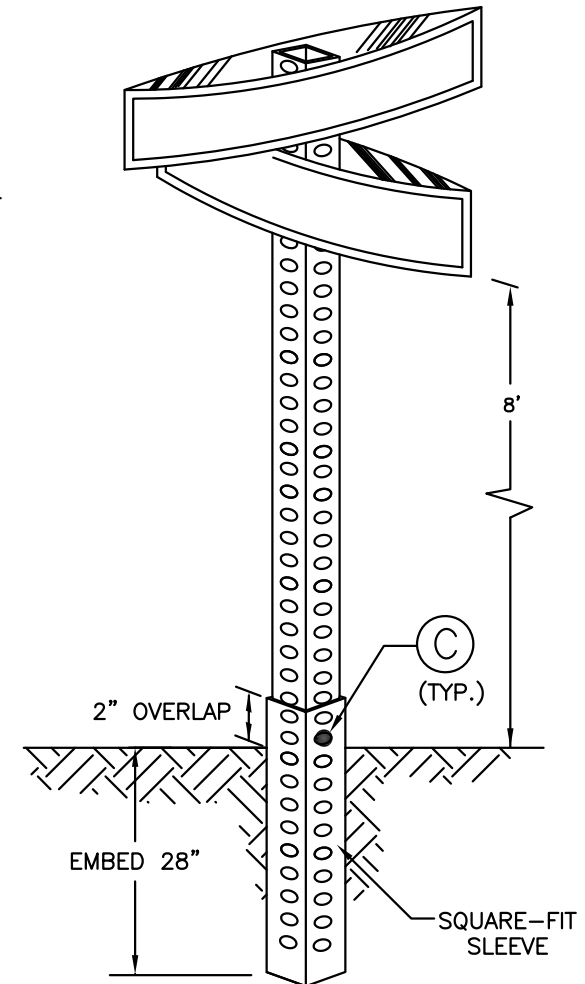
FOR PURPOSES OF THIS STANDARD, THE TERM "SIDEWALK" IS USED GENERICALLY AND SHALL MEAN ANY SEPARATE PATH OR SURFACE TO BE USED FOR BICYCLE AND/OR PEDESTRIAN TRANSPORTATION. EXAMPLES INCLUDE, BUT ARE NOT LIMITED TO, SIDEWALKS, BIKE PATHS, SHARED-USE PATHS, PEDESTRIAN PATHS, AND GREENWAYS.

## DEFINITIONS

— DROPOFF — A SLOPE OF 2:1 OR STEEPER. EXAMPLES INCLUDE HEADWALLS, RETAINING WALLS, AND CULVERTS, ETC.



**STREET NAME SIGN  
POST INSTALLATION**

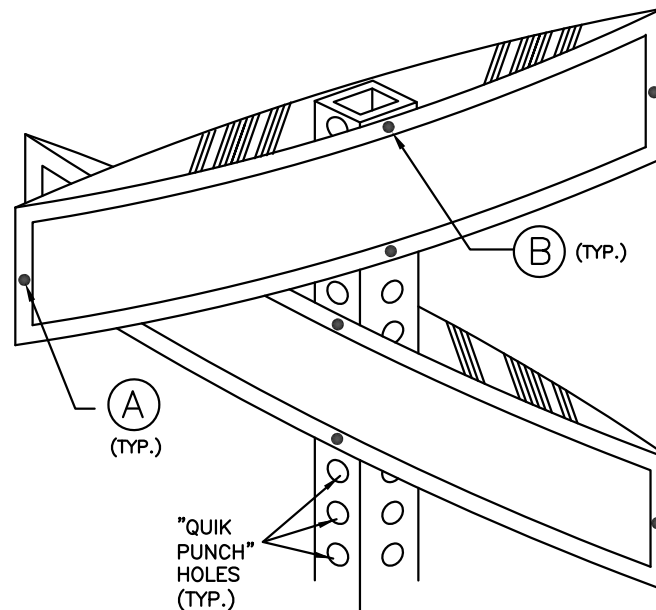


**KEY TO FASTENERS:**

- (A) #10-24 x  $\frac{3}{4}$ " HEX HEAD MACHINE, ZINC- DEAD END  
#10-24 FLANGE NUT, ZINC- DEAD END
- (B)  $\frac{5}{16}$ " #16 X 3" CARRIAGE BOLT, ZINC  
 $\frac{5}{16}$ " #16 HEX NUT, STEEL
- (C)  $\frac{5}{16}$ " #16 X 2- $\frac{3}{4}$ " CORNER BOLT (BREAKAWAY), ZINC  
 $\frac{5}{16}$ " #16 HEX NUT, STEEL

**NOTES:**

1. POST SHALL BE 14-GAUGE GALVANIZED STEEL, QUIK-PUNCH,  $\frac{7}{16}$ " HOLES, 1" ON CENTER, ALIGNED ON ALL SIDES, AND 2" SQUARE, 10 FEET IN LENGTH.
2. THE SLEEVE SHALL BE 12-GAUGE GALVANIZED STEEL,  $\frac{7}{16}$ " HOLES, 1" ON CENTER, ALIGNED ON ALL SIDES, AND 2.25" SQUARE, 30" IN LENGTH.
3. ALL STREET NAME SIGNS ARE SUBJECT TO THE APPROVAL OF THE TOWN MANAGER AND TOWN ENGINEER.



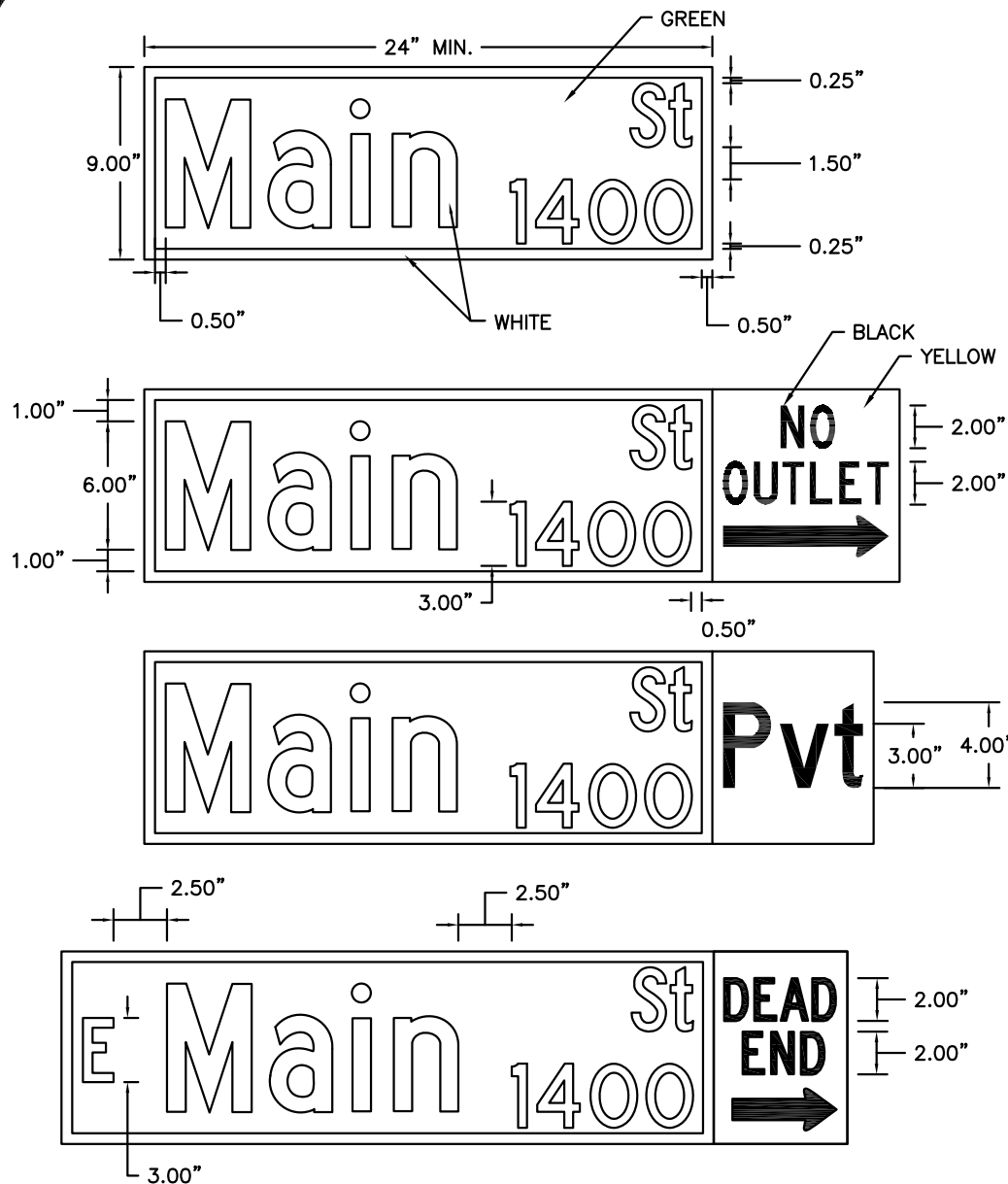
NOT TO SCALE

**Town of Oakboro**  
Development Standards

NON THOROUGHFARE STREET NAME SIGN

STD. NO.	REV.
702.1	



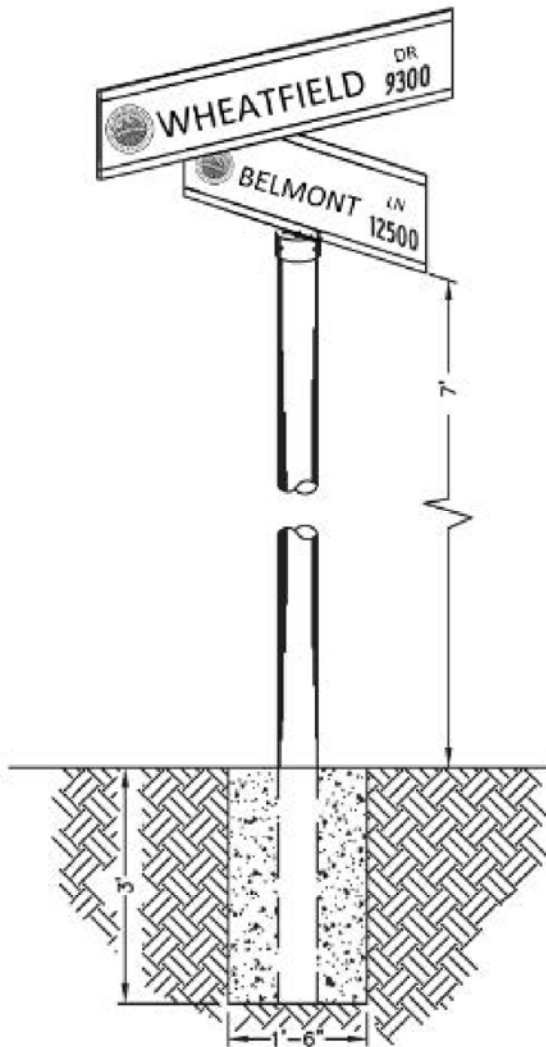


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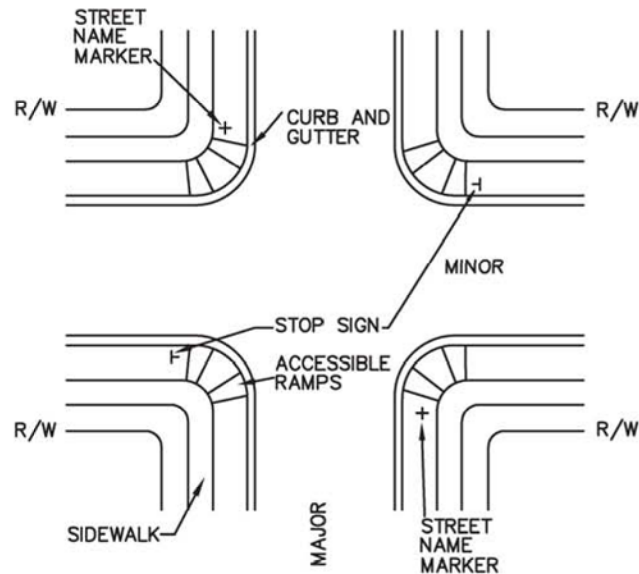
#### NOTES:

1. STREET NAME MARKERS (SNM) SHALL BE ALUMINUM, FLAT, AND HAVE DIMENSIONS AS SHOWN ON THIS DETAIL. MINIMUM LENGTH OF 24"; MAXIMUM LENGTH OF 60". THE SNM'S SHALL BE COVERED WITH WHITE HIGH INTENSITY PRISMATIC (HIP) RETRO-REFLECTIVE SHEETING (3M SERIES 3930 OR EQUIVALENT) WITH PRESSURE SENSITIVE ADHESIVE (OR EQUIVALENT TYPE IV OR HIGHER).
2. THE LETTERS SHALL BE REVERSE CUT FROM TRANSPARENT GREEN OVERLAY FILM (3M #1177 EC FILM OR EQUIVALENT MEETING FEDERAL SPECIFICATION FP-96, SECTION 178.01(A) AND ASTM D4956). THE TRANSPARENT GREEN OVERLAY FILM MUST BE PLACED ON THE SNM TO PROVIDE AN EXPOSED 0.5" BORDER OF THE UNDERLAY WHITE HIP RETRO-REFLECTIVE SHEETING.
3. THE STREET NAME SHALL BE COMPOSED OF INITIAL UPPER CASE LETTERS 6" IN HEIGHT AND CORRESPONDING LOWER CASE LETTERS 4.5" IN HEIGHT, IN FHWA "HIGHWAY B" FONT. THE STREET NAME SHALL BE LEFT-JUSTIFIED AND PLACED 0.5" FROM THE SIGN BORDER. ANY STREET NAME WITH 3 OR FEWER LETTERS SHALL BE CENTERED IN THE SIGN TEXT AREA.
  - PREFIX/SUFFIX NAMES SHALL BE COMPOSED OF INITIAL UPPER CASE LETTERS 3" IN HEIGHT AND CORRESPONDING LOWER CASE LETTERS 2.25" IN HEIGHT, IN FHWA "HIGHWAY C" FONT.
  - BLOCK NUMBERS SHALL BE 3" IN HEIGHT, IN FHWA "HIGHWAY C" FONT.
  - SUFFIX NAMES AND BLOCK NUMBERS SHALL BE RIGHT-JUSTIFIED AND PLACED 0.5" FROM THE RIGHT-SIDE SIGN BORDER AND 0.25" FROM THE TOP AND BOTTOM SIGN BORDERS. PREFIX LETTERS (N, S, E, AND W) SHALL BE CENTERED AND PLACED 0.5" FROM THE LEFT-SIDE SIGN BORDER WITH 2.5" SPACING TO BEGINNING OF STREET NAME.
4. SUPPLEMENTAL SNM WORDING ON YELLOW HIP RETRO-REFLECTIVE SHEETING WITH BLACK VINYL LETTERS SHALL BE PLACED ADJACENT TO THE GREEN OVERLAY FILM/BORDER TO INDICATE STREETS THAT DEAD END, HAVE NO OUTLET, ETC. OR ARE PRIVATE STREETS (PVT). THE YELLOW HIP RETRO-REFLECTIVE SHEETING MUST BE PLACED ON THE SNM TO MAINTAIN AN EXPOSED 0.5" BORDER OF THE UNDERLAY WHITE HIP RETRO-REFLECTIVE SHEETING.
  - NO OUTLET WITH ARROW (RIGHT OR LEFT) – PLACED ON SNM AT ENTRANCE TO A STREET OR STREET NETWORK FROM WHICH THERE IS NO OTHER EXIT. USE UPPER CASE LETTERS 2" IN HEIGHT, IN FHWA "HIGHWAY C" FONT.
  - PVT – PLACED ON SNM AT ENTRANCE TO PRIVATE STREET, USE UPPER CASE LETTER 4" IN HEIGHT AND CORRESPONDING LOWER CASE LETTERS 3" IN HEIGHT, IN FHWA "HIGHWAY C" FONT.
  - DEAD END WITH ARROW (RIGHT OR LEFT) – PLACED ON SNM AT ENTRANCE TO A SINGLE STREET THAT TERMINATES IN A DEAD END OR CUL-DE-SAC. USE UPPER CASE LETTERS 2" IN HEIGHT, IN FHWA "HIGHWAY C" FONT. IF STUB STREET IS LESS THAN OR EQUAL TO 200 FEET, THEN DEAD END IS NOT NECESSARY.
5. ALL SNMs ARE SUBJECT TO THE APPROVAL OF THE TOWN ENGINEER.

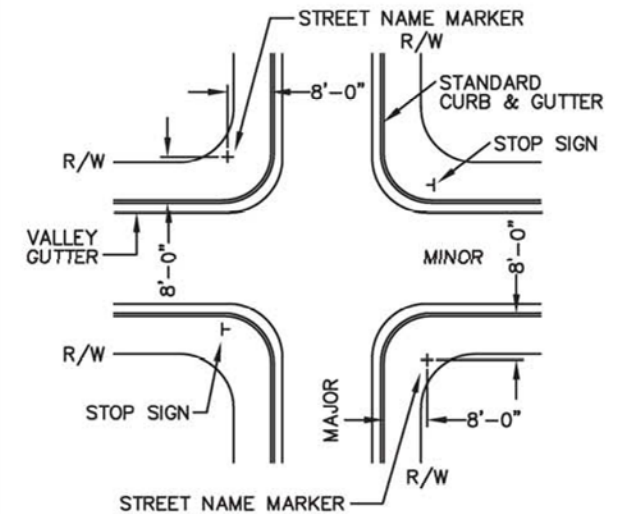
## INSTALLATION OF STREET NAME SIGN



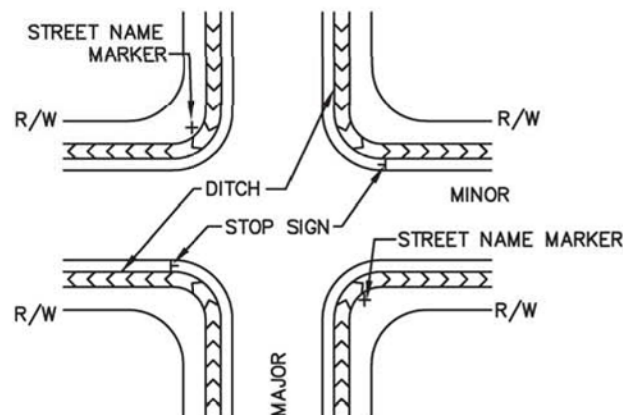
### INTERSECTION with SIDEWALK, CURB, and GUTTER



### INTERSECTION with CURB and GUTTER



### INTERSECTION with DITCHES, and NO CURB and GUTTER



### NOTES

1. TWO STREET NAME MARKERS ARE REQUIRED IF THE MAJOR STREET HAS 3 OR MORE LANES.
2. ANY VARIANCE FROM THIS STANDARD MUST BE APPROVED BY THE VILLAGE ENGINEER.

NOT TO SCALE

Town of Oakboro  
Development Standards

## STREET NAME SIGN INSTALLATION LOCATIONS

REV. DATE

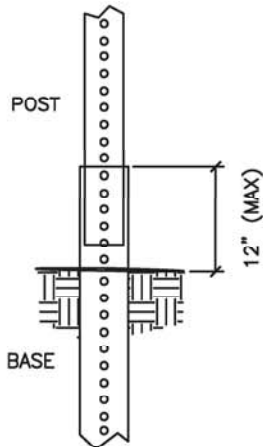
STD. NO.

704.1

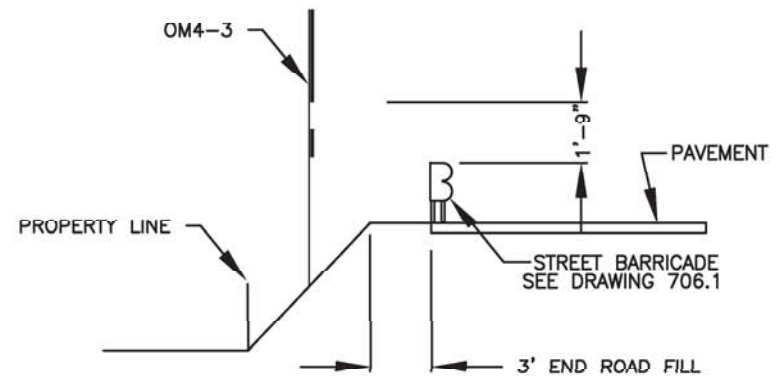
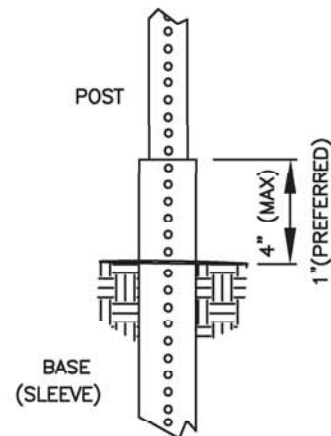
## NOTES:

1. WHEN AN END OF ROADWAY OR STUBBED STREET REQUIRES A GUARDRAIL SECTION, END OF ROADWAY MARKER SIGNS (MUTCD OM4-3, 24"x24", SOLID RED) SHALL BE PROVIDED.
2. SIGNS ARE TO BE PLACED BEHIND THE BARRICADE (SEE DRAWINGS 707.1 & 708.1), EVENLY SPACED WITH ONE SIGN PLACED AT THE CENTERLINE LOCATION AND ADDITIONAL SIGNS AT 6' O.C. (MINIMUM OF 3 SIGNS, MAXIMUM OF 5 SIGNS).
3. WHEN BARRICADE IS USED ON A STREET STUB, THE SIGN AT THE CENTERLINE SHALL BE SUPPLEMENTED WITH A STREET CONNECTIVITY SIGN. SEE DRAWING 708.1.
4. ALL SIGNS/MARKERS SHALL MEET OR EXCEED MUTCD STANDARDS FOR RETROREFLECTIVITY.

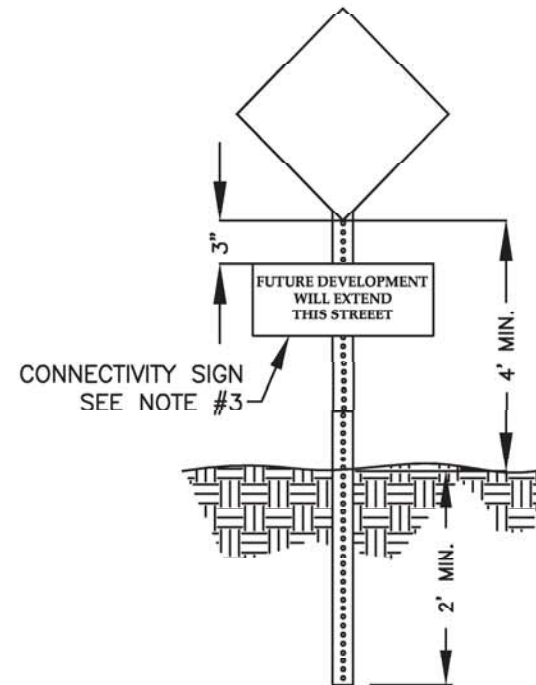
CROSS  
SECTION  
OF POST  
(2 LB./FT.)



CROSS  
SECTION  
OF POST  
(14 GAUGE)



SIGN LOCATION DETAIL



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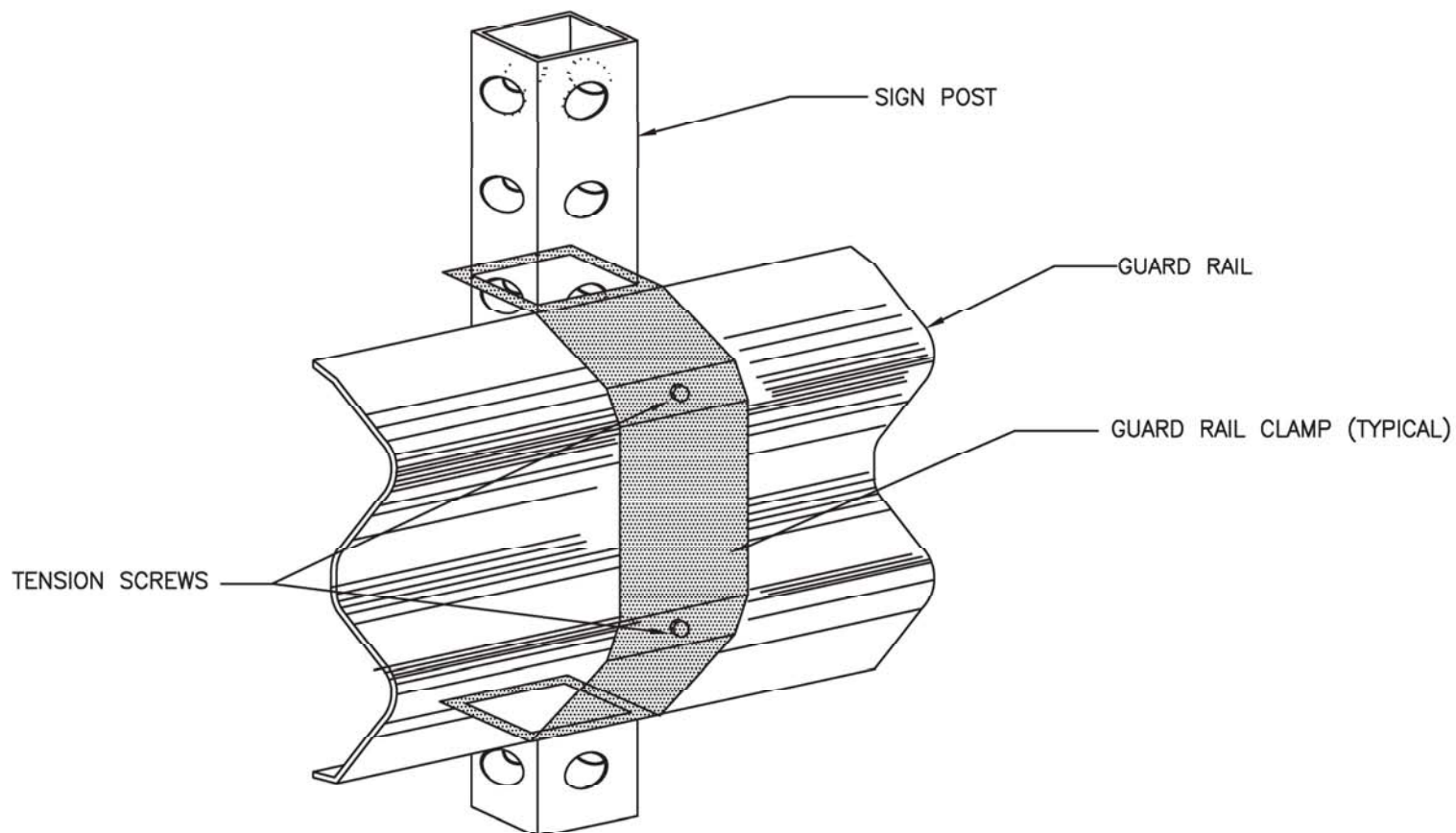
END OF ROADWAY MARKER

REV. DATE

STD. NO.

705.1





NOT TO SCALE

Town of Oakboro  
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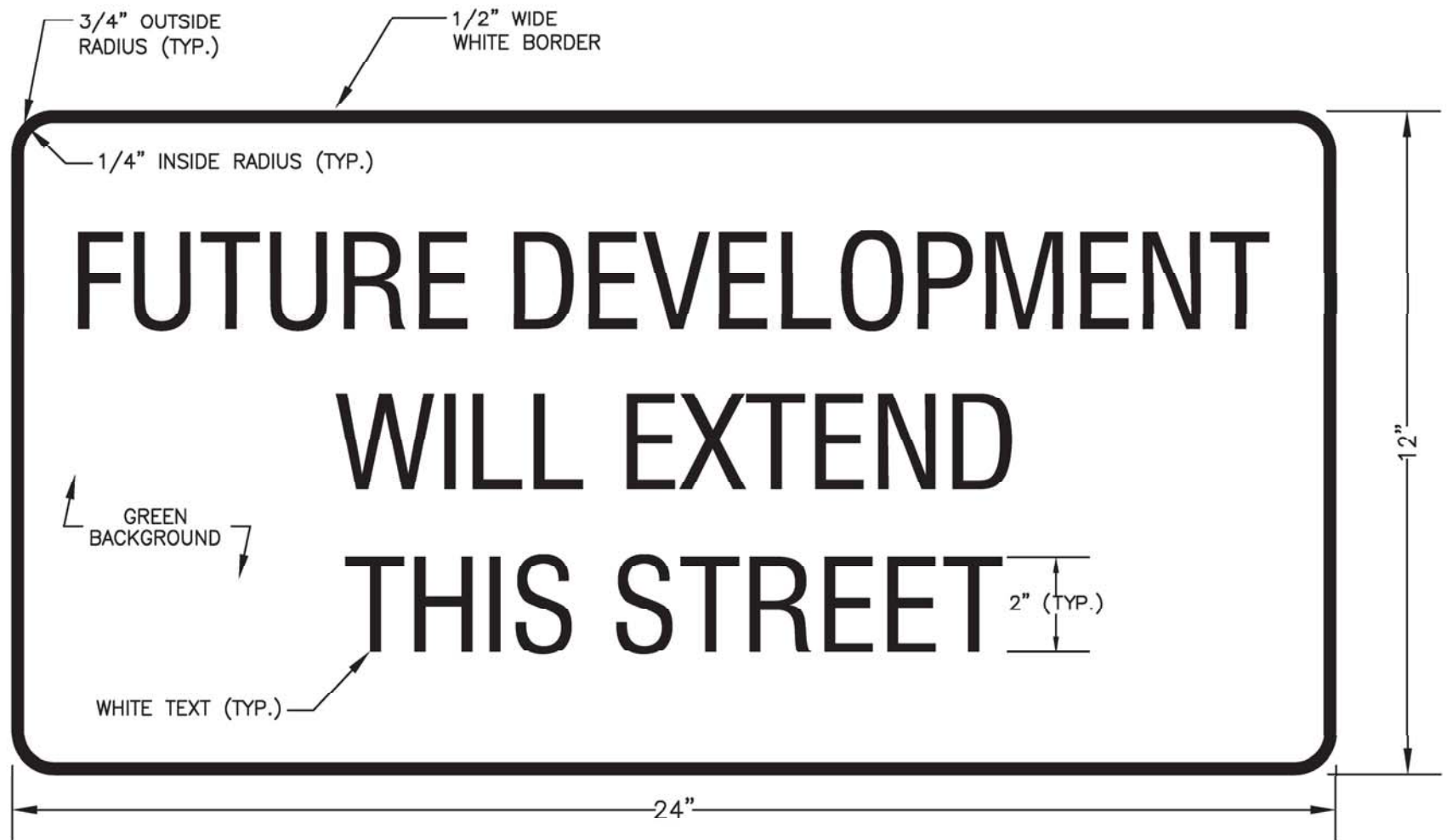
# END OF ROADWAY MARKER GUARD RAIL CLAMP INSTALLATION

REV. DATE

STD. NO.

707.1





**NOTES:**

1. SIGN SHALL MEET OR EXCEED MUTCD STANDARDS FOR RETROREFLECTIVITY
2. SIGN MATERIAL SHALL BE 0.080" THICK ALUMINUM
3. ALL LETTERS SHALL BE SERIES B-2000 FROM THE 2004 STANDARD HIGHWAY SIGNS MANUAL (AND ANY REVISION THERETO) PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION.

NOT TO SCALE

Town of Oakboro  
Development Standards

STREET CONNECTIVITY SIGN  
FOR END OF ROADWAY BARRICADE

REV. DATE

STD. NO.

708.1

## GENERAL NOTES:

1. STEEL BEAM TYPE GUARD RAILS SHALL BE INSTALLED AT THE END OF ALL DEAD-END STREETS, EXCEPT CUL-DE-SAC STREETS WHICH HAVE BEEN APPROVED WITH A PERMANENT TURNAROUND.
2. FOR STREETS 28' IN WIDTH, THE GUARD RAIL SHALL CONSIST OF TWO (2) 12'-8" SECTIONS OR ONE (1) 25' SECTION, THREE (3) STEEL POSTS, AND TWO (2) TERMINAL SECTIONS. FOR STREETS GREATER THAN 25' IN WIDTH, THE GUARD RAIL SHALL SPAN THE ENTIRE WIDTH OF THE STREET.
3. GUARD RAIL SHALL CONSIST OF RAIL ELEMENTS FABRICATED TO DEVELOP CONTINUOUS BEAM STRENGTH AND INSTALLED AS SHOWN.
4. MINIMUM THICKNESS OF GUARD RAIL SHALL BE 12 GAGE U.S. STANDARD. THE RAIL ELEMENT INCLUDING SPLICES SHALL HAVE A MINIMUM ULTIMATE TENSILE STRENGTH OF 80,000 LBS. GUARD RAIL PARTS FURNISHED SHALL BE INTERCHANGEABLE WITH SIMILAR PARTS REGARDLESS OF THE SOURCE OF MANUFACTURER. THE HOLES FOR CONNECTING BOLTS SHALL BE PUNCHED OR DRILLED. BURNING OF THE HOLES FOR CONNECTING BOLTS SHALL NOT BE PERMITTED.
5. THE GUARD RAIL, BOLTS, NUTS, STEEL POSTS, AND ALL OTHER METAL PARTS SHALL BE GALVANIZED TO CONFORM TO THE REQUIREMENTS FOR THE COATING CLASS, (2.5 OUNCES PER SQUARE FOOT) OF THE CURRENT SPECIFICATIONS FOR ZINC-COATED (GALVANIZED) IRON, AND STEEL SHEETS, COILS, AND CUT LENGTHS, IN ACCORDANCE WITH ASTM 123A.
6. IF THE AVERAGE SHELTER COATING AS DETERMINED FROM THE REQUIRED SAMPLES IS LESS THAN TWO (2) OUNCES OF SHELTER PER SQUARE FOOT, OR IF ANY ON SPECIMEN HAS LESS THAN 1.8 OUNCES OF SHELTER PER SQUARE FOOT OF DOUBLE EXPOSED SURFACE, THE LOT SAMPLED SHALL BE REJECTED. THE FINISHED SHEETS SHALL BE OF FIRST CLASS COMMERCIAL QUALITY, FREE FROM INJURIOUS DEFECTS SUCH AS BLISTERS, FLUX, AND UNCOATED SPOTS.
7. THE GUARD RAIL SHALL BE INSPECTED TO DETERMINE THAT THE MATERIAL, DIMENSIONS, AND WORKMANSHIP ARE IN ACCORDANCE WITH THIS PLAN.
8. WHERE AN END OF ROADWAY REQUIRES GUARD RAIL, END OF ROADWAY MARKER SIGNS SHALL ALSO BE REQUIRED. (REFER TO DRAWINGS 705.1 - 708.1)

NOT TO SCALE

Town of Oakboro  
Development Standards

## END OF ROADWAY STREET BARRICADE GENERAL NOTES

REV. DATE

STD. NO.

709.1

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NOTES:

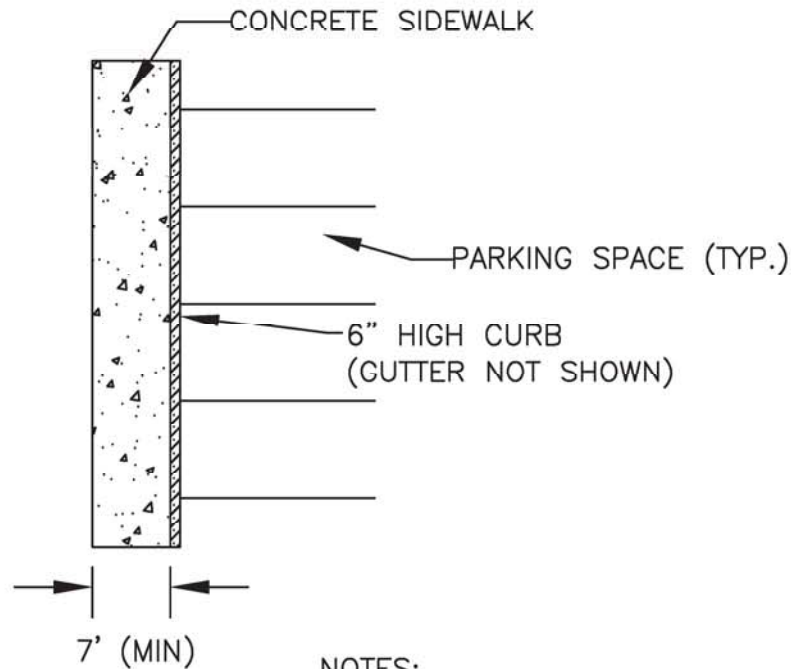
- 1. FOR ACCESSIBLE PARKING STANDARDS/SIGNAGE SEE STDS. 712.1, 713.1, AND 714.1.
- 2. PAVEMENT MARKINGS SHALL BE 4" WHITE PAINT.
- 3. ALTERNATIVE PARKING ANGLES, AISLE WIDTHS, AND OPERATION (TWO-WAY ANGLED PARKING OR REVERSE-ANGLE PARKING) WILL BE CONSIDERED ON A CASE-BY-CASE BASIS.

NOT TO SCALE



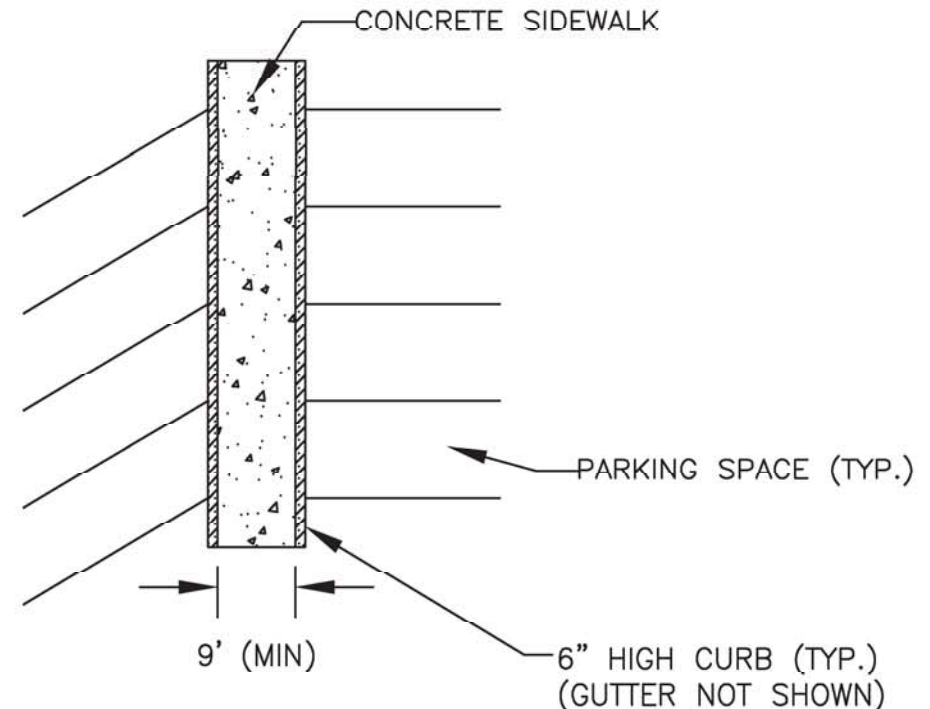
SIDEWALK ADJACENT TO HEAD-IN OR BACK-IN PARKING SHALL BE AT LEAST 7 FEET WIDE.

PARKING ON ONE SIDE OF A SIDEWALK



SIDEWALK BETWEEN TWO ROWS OF HEAD-IN OR BACK-IN PARKING SHALL BE AT LEAST 9 FEET WIDE.

PARKING ON BOTH SIDES OF A SIDEWALK



NOTES:

1. A 2-FOOT-WIDE GRASS PLANTED AREA LOCATED AT THE BACK OF CURB CAN BE USED IN LIEU OF 2 FEET OF SIDEWALK WIDTH.
2. PARKING AT ANY ANGLE OTHER THAN PARALLEL SHALL BE SUBJECT TO THIS STANDARD.
3. IF MONOLITHIC CURB & SIDEWALK IS USED, ADD 6" TO ALL DIMENSIONS (1' IF PARKING ON BOTH SIDES).
4. WHEELSTOPS IN LIEU OF ADDITIONAL SIDEWALK WIDTH SHALL BE CONSIDERED ON A CASE-BY-CASE BASIS.

NOT TO SCALE

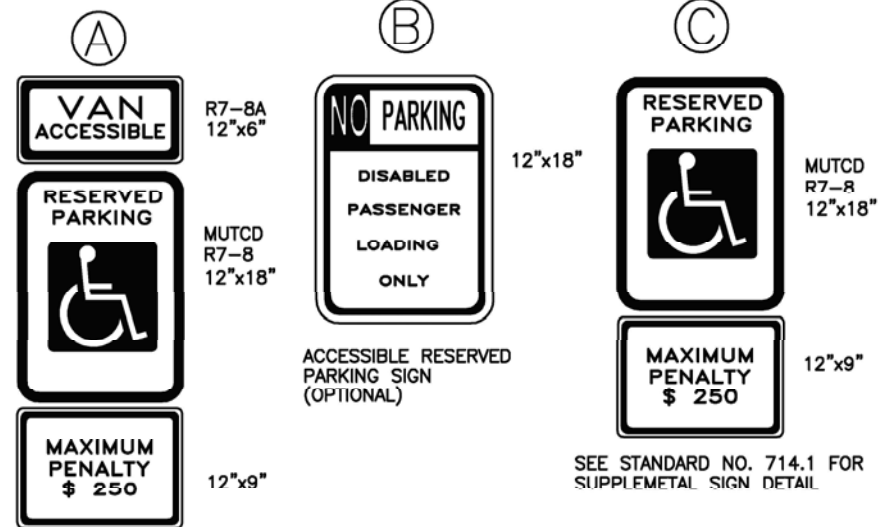
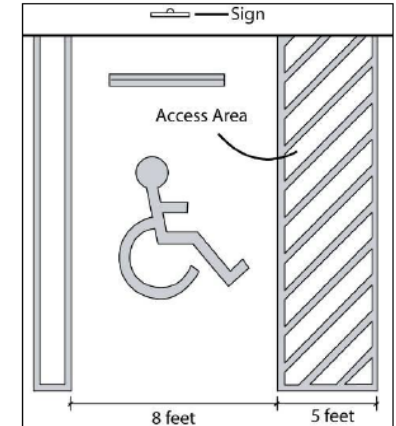
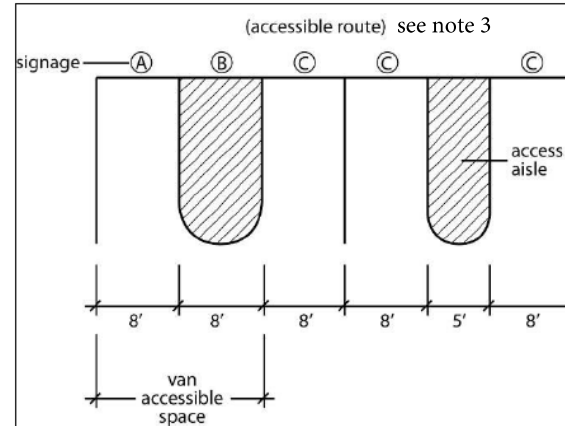
## ACCESSIBLE PARKING REQUIREMENTS

Total Parking Spaces Provided	Min. No. of Accessible Spaces Required	Minimum Number Required By Type		
		Regular (8 ft. + 5 ft.)	Van (8 ft. + 8 ft.)	Side-Loading Van
001 to 025	1	0	1	0
026 to 050	2	1	1	0
051 to 075	3	2	1	0
076 to 100	4	3	1	0
101 to 150	5	3	2	0
151 to 200	6	4	2	0
201 to 300	7	5	2	0
301 to 400	8	6	2	0
401 to 500	9	6	2	1
501 to 1000	2% of total	Required total less van spaces	1 in 4 total accessible spaces	1 for every 3 van spaces
1001 and Over	20 plus 1 for each 100 over 1000	Required total less van spaces	1 in 4 total accessible spaces	1 for every 3 van spaces

Refer to 4.1.2(5) of the Americans with Disabilities Act (ADA) and 4.1.2(5)(d) for medical care facilities

### NOTES:

- ALL 12"x18" ACCESSIBLE SIGNS SHALL BE MOUNTED AT SEVEN FEET FROM GRADE TO BOTTOM EDGE OF SIGN FACE (MUTCD). MOUNTING HEIGHT CAN BE REDUCED TO FIVE FEET IF PLACED IN AN AREA BETWEEN SIDEWALK AND BUILDING FACE IN WHICH PEDESTRIANS ARE NOT EXPECTED TO USE.
- REFER TO MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, (MUTCD) U.S. DEPARTMENT OF TRANSPORTATION AND NORTH CAROLINA DEPARTMENT OF TRANSPORTATION SUPPLEMENT.
- IF ACCESSIBLE ROUTE IS A RAISED SIDEWALK AREA, THEN RAMPS ARE REQUIRED AT LOADING ZONE AREA.



SEE STANDARD NO. 713.1 & 714.1 FOR SUPPLEMENTAL SIGN DETAIL

NOT TO SCALE

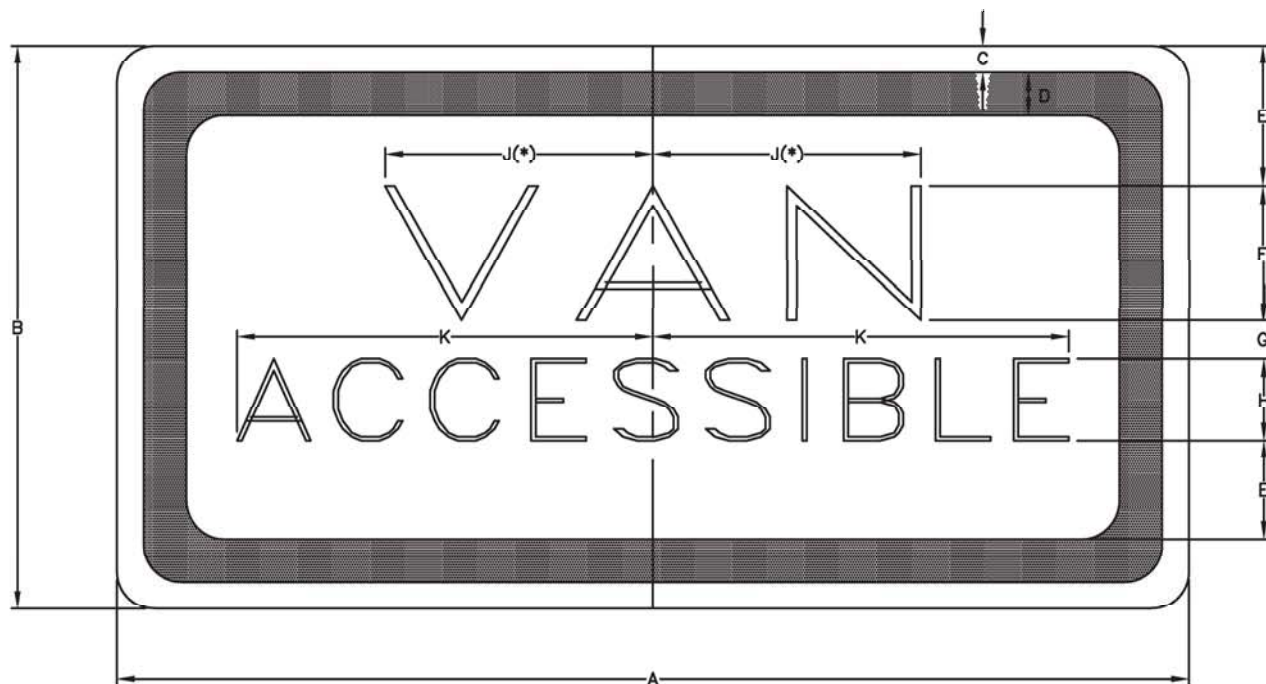
Town of Oakboro  
Development Standards

## ACCESSIBLE PARKING AND SIGNAGE STANDARDS

REV. DATE

STD. NO.

712.1

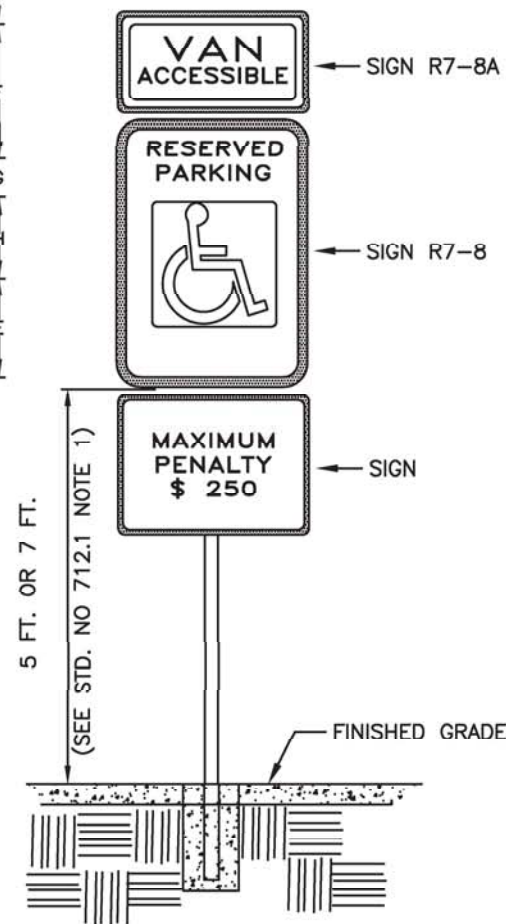


R7-8A

DIMENSIONS (INCHES)										
A	B	C	D	E	F	G	H	J	K	L
12	6	3/8	3/8	1-1/2	1-1/2	1/2	10	2-1/2	4	1-1/2

\* INCREASE SPACING 50%  
D-FHWA (FEDERAL HIGHWAY ADMINISTRATION/USDOT)  
SERIES D LETTERS

LEGEND AND BORDER - GREEN  
BACKGROUND - WHITE  
PRISMATIC SHEETING PREFERRED



NOT TO SCALE

Town of Oakboro  
Development Standards

# SUPPLEMENTAL VAN ACCESSIBLE SIGN

REV. DATE

STD. NO.

713.1



LEGEND AND BORDER - GREEN  
BACKGROUND - WHITE

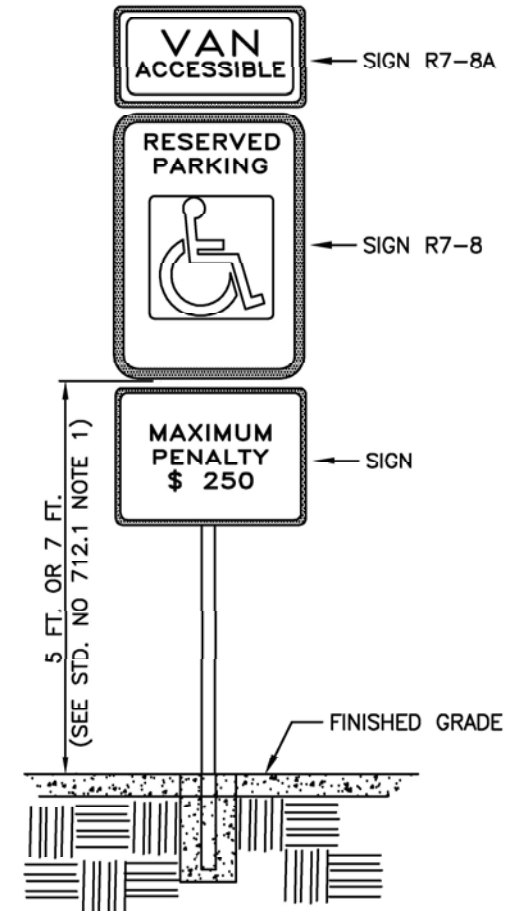
SIGN APPROVED FOR USE  
UNDER GENERAL STATUTE 20-37.6

MAXIMUM PENALTY SIGNS ARE REQUIRED TO  
ACCOMPANY ALL R7-8 PARKING SIGNS

SIGN LETTERING TO BE FHWA D SERIES LETTERS 1.5 INCHES TALL

**NOTE:**

SUPPLEMENTAL ACCESSIBLE SIGN USED IF  
THERE IS ONLY ONE REQUIRED ACCESSIBLE PARKING  
SPACE (MUST BE VAN ACCESSIBLE) AND AT EACH  
ADDITIONAL REQUIRED VAN ACCESSIBLE SPACE. (SEE  
STD. NO. 712.1)



NOT TO SCALE

Town of Oakboro  
Development Standards

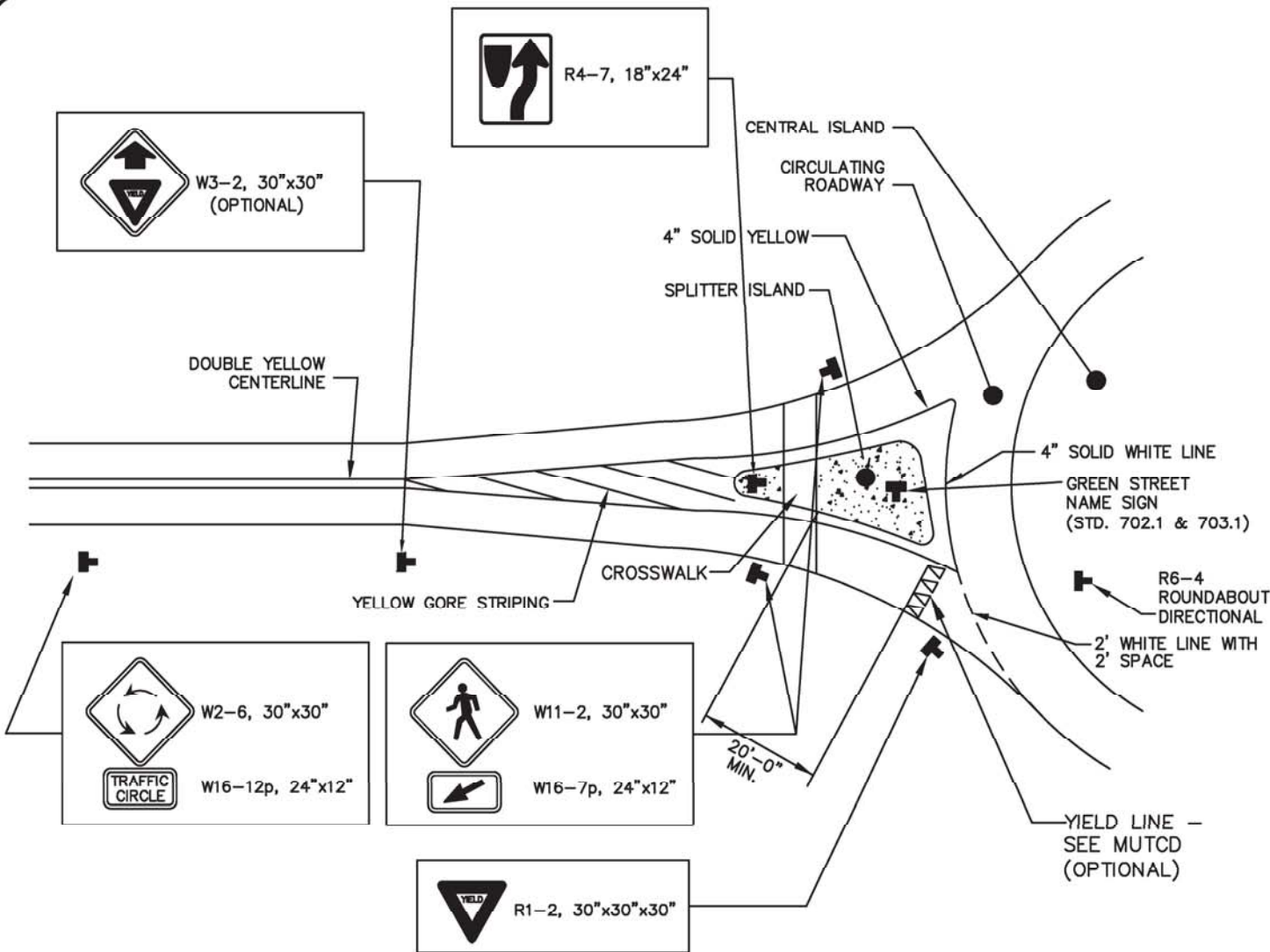
# SUPPLEMENTAL MAXIMUM PENALTY SIGN

REV. DATE

STD. NO.

714.1





## NOTES:

1. PAVEMENT MARKINGS TO BE PER LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
2. SIGNS TO BE LOCATED/SPACED PER MUTCD REQUIREMENTS.
3. "CIRCULAR INTERSECTION" AND "TRAFFIC CIRCLE" SUBPLATE SIGNS, AND KEEP RIGHT SIGN ARE REQUIRED ON THOROUGHFARES. NCDOT AND/OR VILLAGE WILL DETERMINE IF ONE OR MORE OF THESE ARE NECESSARY ON LOCAL OR COLLECTOR STREETS.
4. "PEDESTRIAN CROSSING" AND ARROW SUBPLATE SIGNS ARE REQUIRED WHEREVER THERE IS A MARKED CROSSWALK OR ON A THOROUGHFARE.
5. "YIELD" SIGNS ARE ALWAYS REQUIRED.
6. PAVEMENT MARKINGS, SPLITTER ISLAND DESIGNS, CROSSWALK, ETC., ARE SHOWN FOR CONTEXT ONLY. REFER TO THE MUTCD AND/OR THE FEDERAL HIGHWAY ADMINISTRATION'S MANUAL ROUNDABOUTS: AN INFORMATIONAL GUIDE FOR MORE DETAIL OR DESIGN INFORMATION.
7. ADDITIONAL SIGNS MAY BE NEEDED ON A CASE-BY-CASE BASIS.
8. ALL PAVEMENT MARKINGS SHALL BE THERMOPLASTIC.

NOT TO SCALE

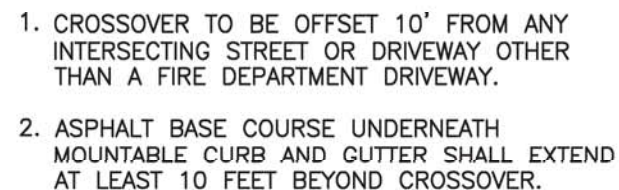
Town of Oakboro  
Development Standards

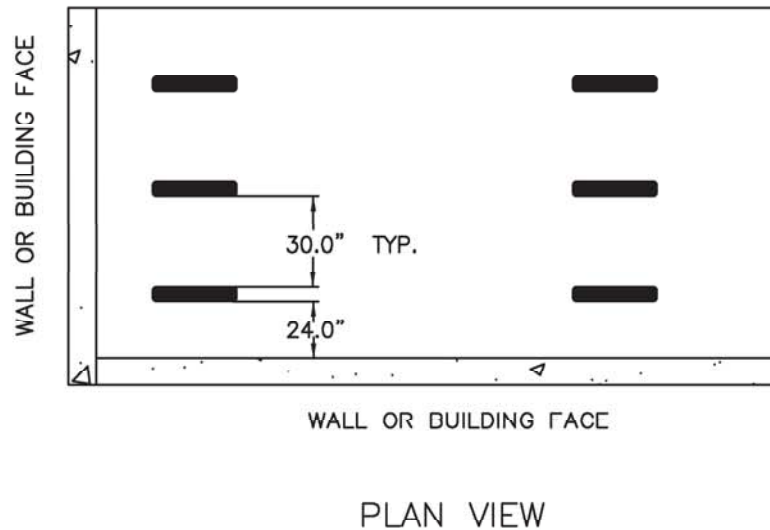
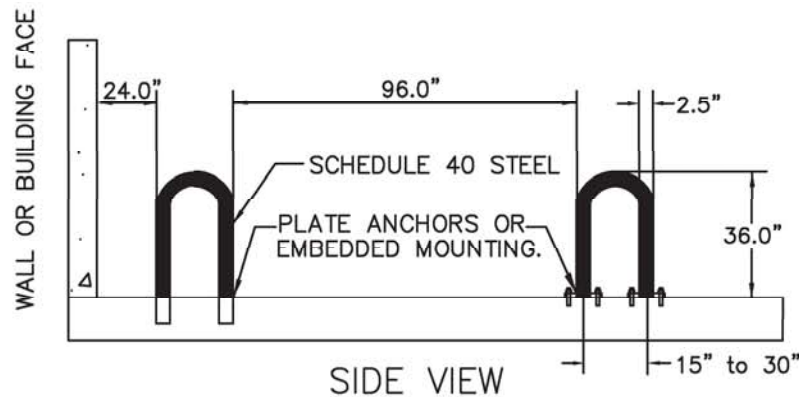
# SIGNAGE AND PAVEMENT MARKINGS AT ROUNDABOUTS

REV. DATE

STD. NO.

715.1





#### NOTES:

1. BIKE RACKS SHOULD BE INSTALLED AS PER MANUFACTURER'S RECOMMENDED INSTALLATION PROCEDURES.
2. ALTERNATIVE BIKE RACKS OR LOCKERS MAY BE USED BUT ARE SUBJECT TO APPROVAL BY THE ENGINEER.
3. ALL DIMENSIONS SHOWN ARE MINIMUM.

NOT TO SCALE

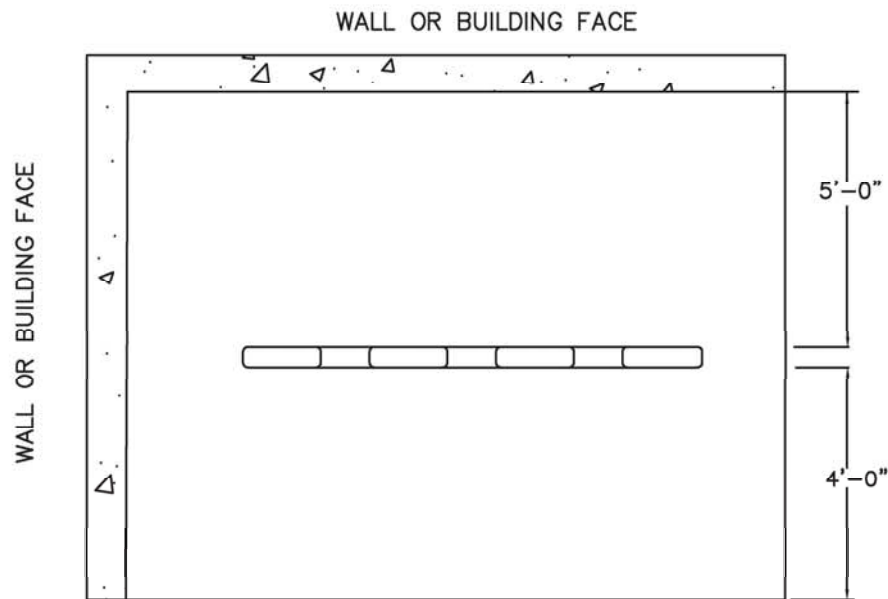
Town of Oakboro  
Development Standards

INVERTED "U" RACK FOR  
BICYCLE PARKING

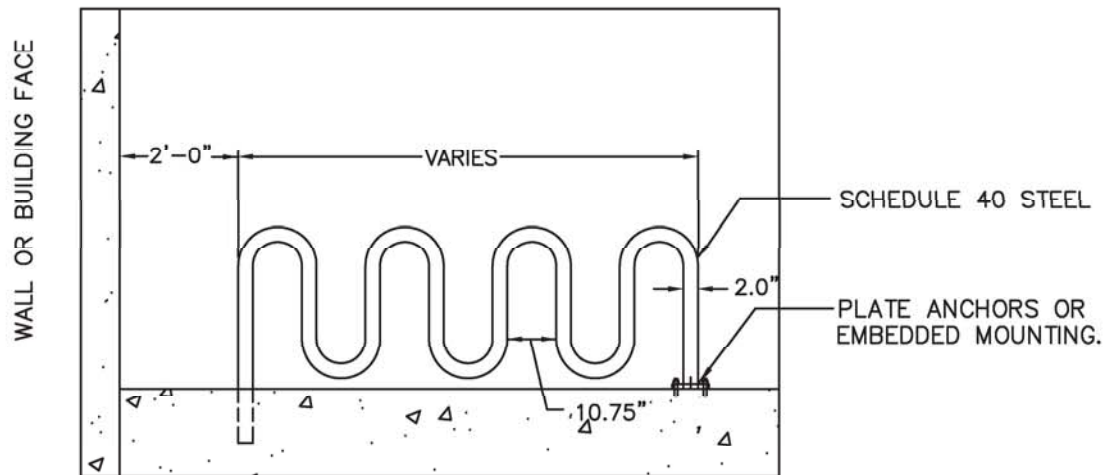
REV. DATE

STD. NO.

717.1



PLAN VIEW



SIDE VIEW

NOTES:

1. BIKE RACKS SHOULD BE INSTALLED AS PER MANUFACTURER'S RECOMMENDED INSTALLATION PROCEDURES.
2. ALTERNATIVE BIKE RACKS OR LOCKERS MAY BE USED BUT ARE SUBJECT TO APPROVAL BY THE ENGINEER.
3. ALL DIMENSIONS SHOWN ARE MINIMUM.

NOT TO SCALE

Town of Oakboro  
Development Standards

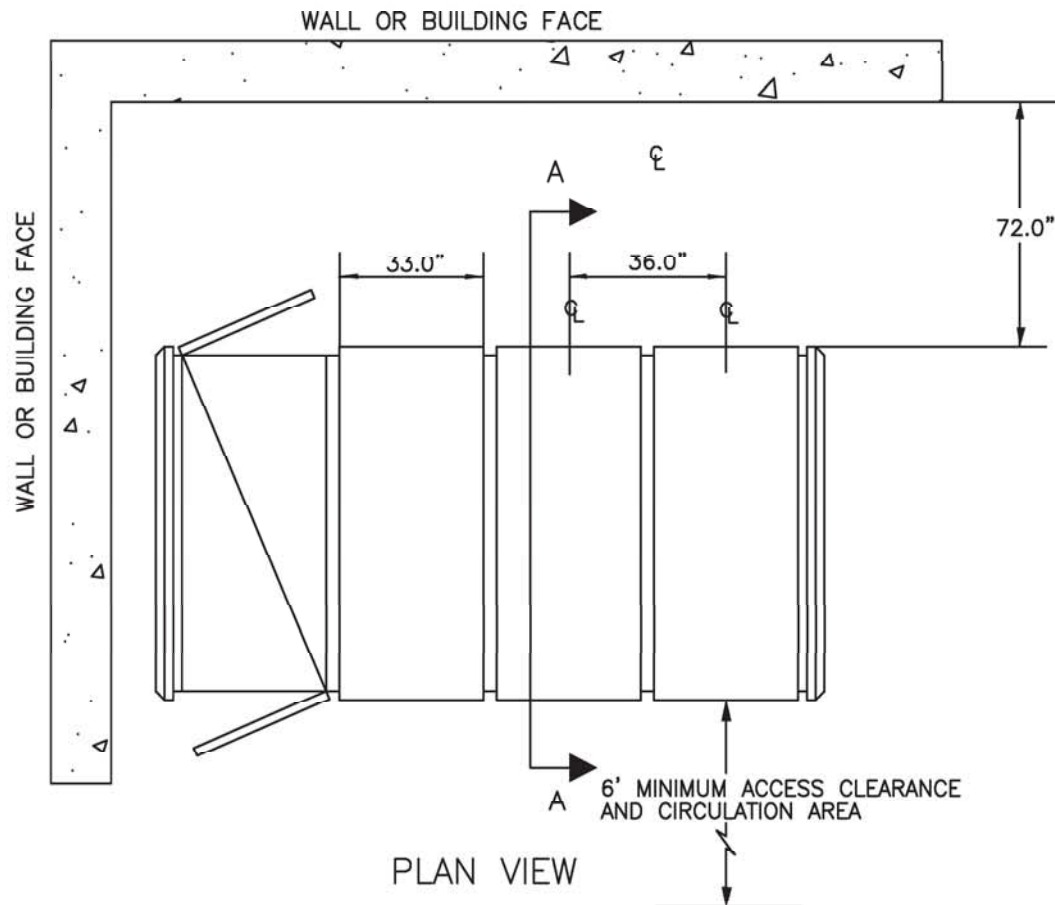
# WAVE RACK FOR BICYCLE PARKING

REV. DATE

STD. NO.

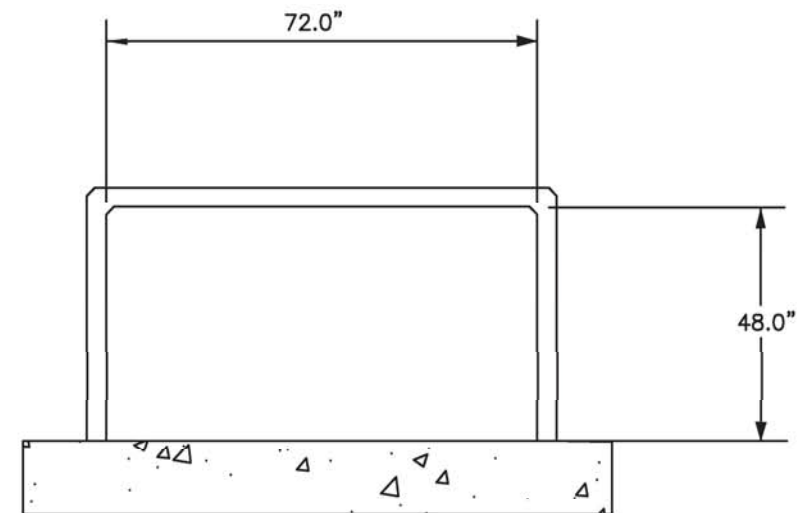
718.1





#### NOTES:

1. BIKE RACKS SHOULD BE INSTALLED AS PER MANUFACTURER'S RECOMMENDED INSTALLATION PROCEDURES.
2. ALTERNATIVE BIKE RACKS OR LOCKERS MAY BE USED BUT ARE SUBJECT TO APPROVAL BY THE ENGINEER.
3. ALL DIMENSIONS SHOWN ARE MINIMUM.
4. ALLOW FOR POSITIVE DRAINAGE AWAY FROM LOCKERS.



NOT TO SCALE

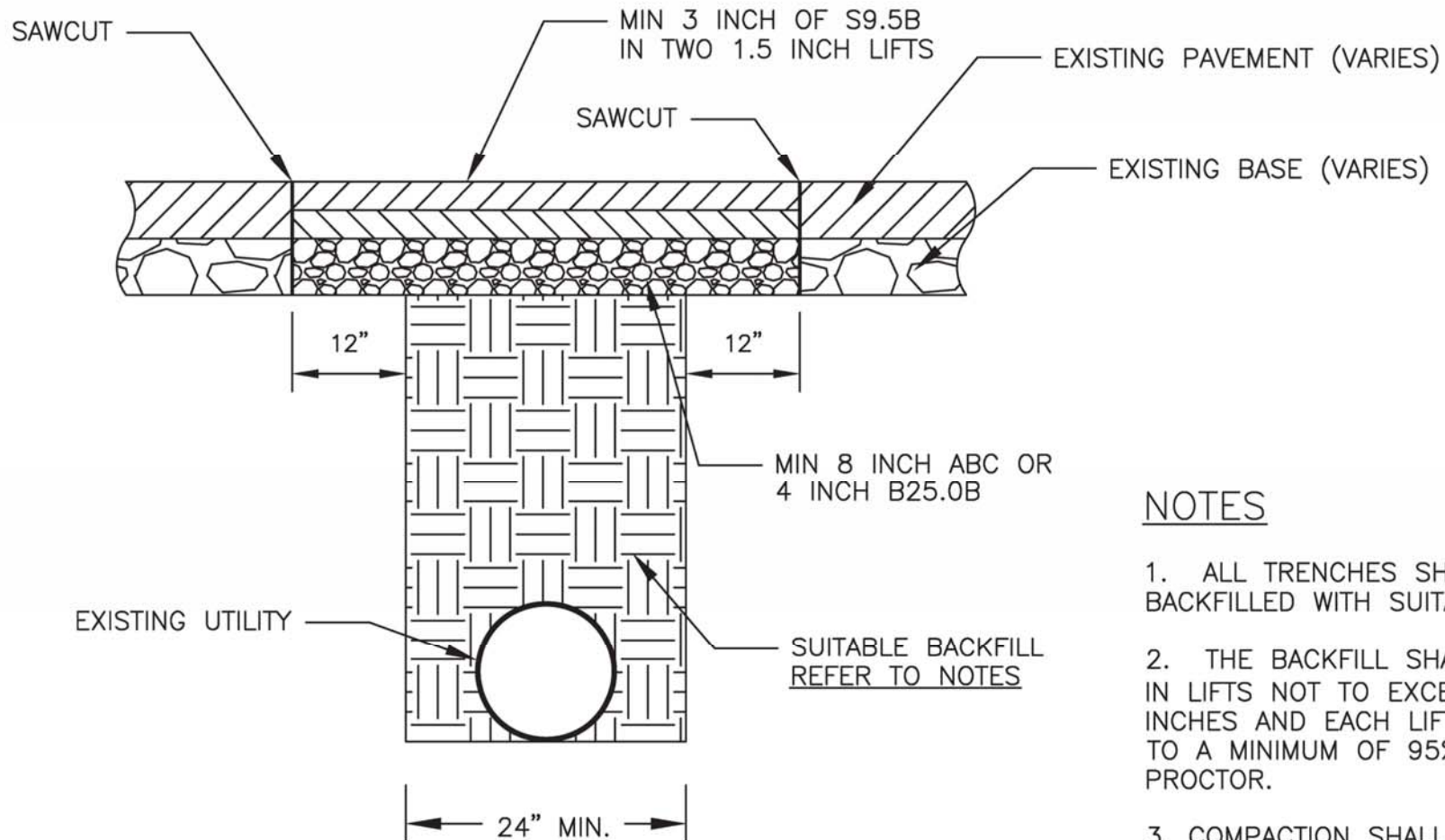
Town of Oakboro  
Development Standards

## BICYCLE LOCKERS

REV. DATE

STD. NO.

719.1



## NOTES

1. ALL TRENCHES SHALL BE BACKFILLED WITH SUITABLE MATERIAL.
2. THE BACKFILL SHALL BE PLACED IN LIFTS NOT TO EXCEED SIX (6) INCHES AND EACH LIFT COMPACTED TO A MINIMUM OF 95% STANDARD PROCTOR.
3. COMPACTION SHALL BE BY MECHANICAL METHODS.
4. WHEN THE EXISTING PAVEMENT DEPTH IS GREATER THAN THREE (3) INCHES, CONTACT THE ENGINEER FOR THE MINIMUM REQUIRED PAVEMENT DESIGN.

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## PAVEMENT PATCHING DETAIL

REV. DATE

STD. NO.

720.1