Town of
KERNERSVILLE
NORTH CAROLINA

DESIGN AND CONSTRUCTION SPECIFICATIONS

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PREFACE

This document is intended to establish design and construction requirements for the preparation and submittal of infrastructure improvement plans for subdivision and other land development projects within the Town of Kernersville and its Extraterritorial Jurisdiction (ETJ). The designing engineer on any project should use judgment and experience to determine any additional information that may be necessary for review.

The Town of Kernersville will use these standards, as well as sound engineering principles, to review the detailed engineering drawings. All engineers are encouraged to use these standards in the preliminary layout of any development to minimize revisions.

The standards set forth herein apply to all development within the Town of Kernersville and all development within the Extraterritorial Jurisdiction (ETJ) of the Town. The standards may also apply to development outside the ETJ in cases where, NCDOT and the Town of Kernersville agree that it would be advantageous for development to be constructed under these standards.

A revisions Summary Sheet is provided to maintain a history of updates.

It is recommended that any individual using this document contact the Community Development Department with suggested revisions.

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Change Number	Date	Summary of Changes

TABLE OF CONTENTS

1 DEFINITIONS AND ABBREVIATIONS

1.1 Definitions

Best Management Practices (BMPs) or Stormwater Control Measures (SCMs) – Are structural or non-structural management-based measures used singularly or in combination to reduce nonpoint source inputs to receiving waters in order to achieve water quality protection goals.

Bond – A type of surety that guarantees payment and/or performance, and insures against a financial lose.

Performance Bond – A bond in which the surety company has an obligation to the Town for any additional cost to complete a given project due to the developer's or owner's failure to properly complete the bonded work. A Letter of Credit from an FDIC insured bank, with a branch in North Carolina, or cash deposit may serve as a performance bond when bonding infrastructure improvements for the Town of Kernersville.

Cash Bond – Performance surety in which cash is deposited with the Town of Kernersville and held in lieu of a performance bond until the bonded work is completed.

Borrow – Fill material (soil), which is required for on-site construction and is obtained from off-site locations.

Certificate of Occupancy – A permit issued by the Community Development Department, setting forth that a building or structure, complies with the Building Code, its use complies with the zoning ordinance, and that the same may be used for the purposes stated therein.

Contractor – Individual or firm under contract with another to perform an agreed upon task.

Cross Drainage – Storm water drainage flow under a roadway though a culvert.

Curb Ramp – Access for pedestrian traffic at intersection of roadway, driveway or other pedestrian way.

NCDEQ – The North Carolina Department of Environmental Quality.

EAL Pavement Schedule – A pavement schedule based on an 18-Kip Equal Axle Load.

Easement – A grant of one or more of the property rights for a specific purpose by the property owner to, or for the use by, the public, a corporation, or other entity.

Access Easement – A permanent easement, which grants the right to the public or specified party to access and/or cross private property.

Drainage Easement – A permanent easement, which grants the right of water drainage to pass in open channels or enclosed structures, the same does not obligate the Town to maintain any storm water devices, pipes, or open channels within the easement.

Drainage Maintenance Easement – A permanent easement, which grants to the Town the right to conduct pipe maintenance repairs, alter the typical drainage channel section and/or profile in order to improve water flow, the same does not obligate the Town to maintain any storm water devices, pipes, or open channels within the easement.

Pedestrian Access Easement – A permanent easement dedicated to the public to facilitate pedestrian access to adjacent streets and properties.

Sidewalk Easement – A permanent easement, which grants the right for a public sidewalk to be placed and maintained thereon.

Sight Easement – A permanent easement, which grants the Town, the right to maintain an unobstructed view across properties primarily located at street intersections, driveways and sharp horizontal curves in the roadway. (The same does not obligate the Town to maintain such).

Slope Easement – A permanent easement, which restricts the degree of slope on property and upon which slope cannot be increased.

Temporary Construction Easement – A temporary easement, which grants the right for the Town, NCDOT or other public utility provider to encroach upon the temporary construction easement while making improvements to public infrastructure and/or public utilities.

Utility Easement – A permanent easement, which grants to the Town and other public utility providers the right to install and thereafter maintain any and all utilities including, but not limited to; water lines, sewer lines, storm sewer lines, electrical power lines, communication lines, natural gas lines, and cable television systems.

Utility Easement (Private) – A permanent easement, which grants the right to install and maintain a private utility across private property. A Private Utility Easement can be granted to an individual, a utility company, a property owners' association or to owners of a specified parcel of land.

Engineer – A person licensed to practice engineering in the State of North Carolina.

Erosion – The wearing away of land surface by the action of wind, water, gravity, or any combination thereof.

Fee "In Lieu of Infrastructure Improvements" – A non-refundable payment to the Town to compensate for needed and/or required infrastructure improvements that may be used in the future by the Town to make such infrastructure improvements adjacent to the subject development.

Formal Street Side Parking – Parallel or angle parking which is adjacent to and contiguous with the travel way of the street and anticipated to occur on a frequent basis.

Grade, Finished – The final elevation of the ground surface after development.

Grading – One of two (2) types of grading, rough or fine.

Groundcover – Any natural vegetative growth, masonry, paving, riprap or other material, which renders the soil surface stable against accelerated erosion.

Informal Street Side Parking – Parallel parking on a street where parking is anticipated to be on an occasional basis.

Inspector – The Chief Construction Inspector, Construction Inspector, or other representative duly authorized by the Town of Kernersville to inspect public and private infrastructure improvements.

Plans – The approved plans, profiles, standard details, supplemental plans, and working drawings, which show the location, dimensions, and details of the work to be performed.

Erosion Control Plan – An erosion and sedimentation control plan.

Final Plat – The final map of all or a portion of a subdivision or site, showing the boundaries and location of lots, streets, easements and all other requirements of subdivision regulations.

Plat – A map of a surveyed parcel of land which is intended to be, or has been, recorded in the office of the Register of Deeds.

Preliminary Plat – A map indicating the proposed layout of a subdivision or site showing lots, streets, easements, and other requirements of subdivision regulations.

Preliminary Site Plan – is a part of the initial design phase in preparing the construction documents. Typically, the preliminary plans are schematics and design development drawings that allow the Town of Kernersville and the architect or engineer to interact before the design is developed, helping to ensure a mutual understanding of the design objectives, limitations and budget.

Site Plan – A development plan required by virtue of the provisions of this manual as a condition for the issuance of a permit for development. The site plan requirements will be more specific based on the development request (or the review request).

Sketch Plan – A rough sketch map of a proposed subdivision or site, showing streets, lots, and any other information of sufficient accuracy to be used for discussion by owner, developer and/or staff, of the street system and the proposed development pattern.

Stabilizing Vegetation – Any vegetation that protects the soil against erosion.

Standard Specifications – A general term referring to all provisions and requirements contained herein entitled "Design and Construction Specifications" and any

subsequent addendums or revision thereto.

Watershed and Stormwater Administrative Manual – A manual that contains guidelines for stormwater management principles, methods, and practices and a compilation of the Watershed/Stormwater permit requirements, submission schedules, fee schedules, ordinances and other information for meeting regulations pertinent to obtaining a Watershed/Stormwater permit in the Town of Kernersville jurisdictional area.

Street – A vehicular travel-way, which provides a means of access and travel. The term street may include road, avenue, place, way, drive, lane, avenue, boulevard, parkway, highway, and any facility principally designed for vehicular traffic.

Private Drive – A vehicular travel way, centered within a public access easement, which serves parking lots for two (2) or more principal buildings in a multi-family housing development or other non-single-family residential development. An individual entity or property owners' association shall maintain private drives. Street side parking spaces, (parallel and angle), is allowed on private drives. Parallel and angle parking spaces shall be designed per the UDO and shall not protrude into the primary travel way.

Private Street – A vehicular travel way, centered within a common area strip, permitted in developments where mandatory property owners' associations exist. Private streets shall undergo the same approval process and meet the same design and construction standards as public streets. Private streets are not encouraged; however, may be permitted for unique situations, such as, gated communities.

Private Street parking and Public Street parking shall be the same standards.

Public Street – A vehicular travel way within a dedicated and recorded public right-of-way.

Stub Street – A street which runs to a property line of adjacent property and is intended to continue into adjacent property at such time as the adjacent property is developed.

Subgrade – That portion of the roadbed prepared as a foundation for the pavement structure.

Substantially Completed – Work has progressed to the point that, in the opinion of the Public Services Director, it is sufficiently completed in accordance with the approved plans and specifications that the improved area can be utilized for its intended purposes.

Surety –A guarantee against loss or damage from one's failure to perform and a physical or financial guarantee for the fulfillment of an obligation. Performance Sureties may be in the form of Standby Letters of Credit, Performance Bonds, and Cash.

Surveyor – A person licensed to practice surveying in the State of North Carolina.

Traditional Neighborhood Development (TND) – A compact mixed use development project that includes a range of housing types, a network of well-connected streets, alleys and blocks, public spaces, and amenities such as stores, schools, and places of worship within walking distance of residences or is within walking distance to those land uses.

TND projects incorporate many different high quality architectural styles and site plan design elements to create an enhanced livable neighborhood(s).

Unified Development Ordinance (UDO) – The compilation of regulations that affect land use, including the Zoning Ordinance, the Environmental Ordinance, and the Subdivision Ordinance/Regulations.

Utilities – Facilities of an agency which provide the general public with electricity, gas, oil, water, sewage, communications, or rail transportation.

Wetlands – Areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support and, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas as delineated by the US Army Corp of Engineers or certified professional in the field of environmental engineering as approved by the US Army Corp of Engineers.

Working Day – Monday through Friday exclusive of Town holidays and Town Hall closing due to weather.

1.2 Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ABC	Aggregate Base Course
ADT	Average Daily Traffic Count
AIA	American Institute of Architects
AICP	American Institute of Certified Planners
ANSI	American National Standards Institute
APWA	American Public Works Association
ASPH	Asphalt
ASTM	American Society of Testing and Materials
AWWA	American Water Works Association
BC	Back of Curb
BC-BC	Back of Curb to Back of Curb
BMP	Best Management Practice
BoA	Board of Aldermen
BST	Bituminous Surface Treatment
CATV	Cable Television
CAP	Corrugated Aluminized Pipe
CB	Catch Basin
CR	Curb Ramp
CFS	Cubic Feet per Second
C&G	Curb and Gutter
CI	Curb Inlet
CIP	Cast Iron Pipe
CL	Centerline

CMP	Corrugated Metal Pipe
co	Sanitary Sewer Cleanout (Drawings)
CO	Certificate of Occupancy
CONC	Concrete
CPP	Corrugated Plastic Pipe
DE	Drainage Easement
DI	Drainage Inlet
DIP	Ductile Iron Pipe
DME	Drainage Maintenance Easement
DMUE	Drainage Maintenance and Utility Easement
EP	Edge of Pavement
ETJ	Extra Territorial Jurisdiction
ex	Existing
FF	Face to Face
FEMA	Federal Emergency Management Agency
FOC	Fiber Optic Cable
G	Gas
GV	Gas Valve
HYD	Hydrant
HDPE	High Density Polyethylene Pipe
ID	Internal Diameter
JB	Junction Box
LP	Light Pole
MSL	Mean Sea Level
MUTCD	Manual on Uniform Traffic Control Devices
NCDEQ	North Carolina Department of Environmental Quality

NCDOT	North Carolina Department of Transportation
NEC	National Electric Code
OD	Outside Diameter
P.C.	Point of Curvature
PDE	Permanent Drainage Easement
PE	Professional Engineer (Licensed in North Carolina)
PED	Pedestal
PH	Phone
PINC	Point of Intersection
P/L	Property Line
PLS	Professional Land Surveyor (Licensed in North Carolina)
PP	Power Pole
ppm	parts per million
PROP	Proposed
psi	pounds per square inch
P.T.	Point of Tangency
P.V.C.	Point of Curvature on Vertical Curve
P.V.T.	Point of Tangency on Vertical Curve
PVMT	Pavement
Qmax	maximum discharge
Qmin	minimum discharge
QMS	Quality Management System
R/W	Right of Way
RCP	Reinforced Concrete Pipe
SD	Storm Drain
SS	Sanitary Sewer

STD	Standard
TBC	Top Back of Curb
TC	Top of Curb
TCE	Temporary Construction Easement
TOK	Town of Kernersville
TST	Temporary Sediment Trap
UDO	Unified Development Ordinance
UE	Utility Easement
USACE	United States Army Corps of Engineers
VCP	Vitrified Clay Pipe
WL	Water Line
WM	Water Meter

2 GENERAL PROVISIONS

2.1 General

For approval of street design, a North Carolina Registered Professional Engineer must seal all construction plans and revisions submitted to the Community Development Department, with the exception that the Town will accept for approval, street designs sealed by a North Carolina Registered Professional Land Surveyor in those circumstances allowed by North Carolina General Statutes. A digital copy in drawing file (*.dwg) format of the "Record Drawing" of the development must be submitted before final acceptance and maintenance of any streets and storm drainage systems. The digital files must be tied to the State Plane Coordinate System using two Town of Kernersville or NCGS Monuments.

All proposed public streets shall be designed to become part of the overall street system and be identified as such on all adopted plans. All streets and roads shall align with other designated roadways for continuity in the Town's street system.

All single family residential subdivisions shall be accessed by public streets except those wherein private streets have been approved in accordance with the provision of the Unified Development Ordinance (UDO).

Dedication of additional rights-of-way, easements, construction of turn-lanes, roadway widening, or other improvements to existing public streets upon which the property fronts or which provide access to new developments may be required as provided for in the UDO. In some cases, the proposed development may be adjacent to roadways, utilities, drainage systems, etc. in which, a large scale infrastructure improvement project may be needed. In such cases, the Town may elect to collect a fee "In-lieu-of Infrastructure Improvements" to be used on a larger scale improvement project adjacent to the development. This process is encouraged on high volume roads where small piecemeal improvements may result in poor construction methods, ride quality, and excessive inconvenience to the motoring public.

2.2 Correlation, Interpretation and Order of Precedence

If there be any conflicting term or requirements between this manual and the UDO, the UDO shall govern.

The latest revision of the *NCDOT Standard Specifications for Roads and Structures*, *NCDOT Design Manual*, *NCDENR DEQ Stormwater Best Management Practices Manual*, *The NCDEQ Erosion and Sediment Control Planning and Design Manual*, *The AASHTO Policy on Geometric Design of Highways and Streets*, and *the Manual on Uniform Traffic Control Devices* shall apply to all roadway and storm drainage construction unless otherwise specified herein this manual.

2.3 Sureties or Improvement Guarantees

Prior to the recording of any plat, all improvements required by this Manual and the UDO shall be completed or the remaining improvements secured by a surety approved and accepted by the Town Manager; the surety shall be a performance bond provided by a certified surety company authorized to issue bonds in North Carolina; an Irrevocable Standby Letter of Credit provided from a bank insured by the FDIC; or cash. If the surety is a guarantee other than cash, the Letter of Credit or bonding instrument must be readily convertible into cash, payable to the Town of Kernersville at face value upon the Town's request. Prior to recording the Plat, the developer shall contact the Community Development Department and request an estimate for bonding purposes. If any work has been completed and paid for prior to recording the plat, the developer shall provide documentation that work-to-date has been paid in full.

Refer to Appendix B for the administrative procedures regarding the submittal of sureties.

In no case shall the duration of the financial guarantee exceed two (2) years, unless said guarantee is extended with the consent of the Town Manager.

All developments whose public improvements are not completed and accepted thirty (30) days prior to the expiration of the financial guarantee shall be considered in default. Upon default, the surety company or financial institution holding the escrow account shall pay to the Town, all or any portion of the bond or escrow amount deemed necessary by the Town to complete all or any portion of the required improvements, including administrative cost incurred by the Town. The Town shall complete the project, or a portion thereof, using the guaranteed funds. The Town shall return any funds not spent in completing the improvements.

Default on a project does not release the developer from the liability he has or may have incurred during the performance of work prior to the default or the responsibility for payment of items that may exceed the current surety being held by the Town.

See section 3.2, *Horizontal Street Design* for bonding of improvements to property lines where existing topography prevents construction without encroachment on others.

2.4 Dedication and Acceptance

2.4.1 Rights-of-Way and Easements

The recordation of a properly executed final plat constitutes dedication to the Town the right-of-ways of each public street and all easements as proposed on the final plat. The approval and recordation of a final plat does not constitute acceptance of maintenance responsibility within such right-of-way or easement. Improvements within such right-of-way or easements, such as street paving, drainage facilities or sidewalks must be accepted for maintenance by the Public Services Director, or appointed official after a final inspection has been conducted and approved by the Public Services Department, and all items of construction have been satisfactorily completed.

2.4.2 Half/Partial-Streets

Half/Partial Streets, i.e. right-of-way of one-half of the standard or required width of a street or a portion thereof, shall not be designed except where essential to the reasonable development of the subdivision and adjacent land. The right-of-way for Half/Partial Street shall be dedicated to facilitate a future street and so noted on the final plat. The Developer shall post a cash bond with the Town, sufficient to construct one-half the cost of the street for that portion which is situated within the subject development.

2.5 Structures

2.5.1 Retaining Walls

All retaining walls shall be constructed in accordance with the Town's UDO and Section 7, Erosion Control. The design of a retaining wall must be signed and sealed by a Professional Engineer (PE) licensed in the State of North Carolina. A PE must also certify the final construction. A building permit shall be required for any retaining wall over five (5) feet in height on private property, and not covered by another building permit or engineered submitted construction drawings.

2.5.2 Other Structures

Any structure submitted as part of an infrastructure improvement plan such as pump houses, well houses, etc. must also be submitted to the Community Development Department for the appropriate building permits.

2.6 Trees and Landscape Plans

2.6.1 Trees

On December 7, 2010, The Town of Kernersville adopted the "Kernersville Public Tree Ordinance" which regulates and controls the planting, maintenance and removal of trees and shrubs on Town owned or controlled property, which is property owned or leased by the Town of Kernersville or is property that the Town controls through rights-of-ways and easements for public purposes, such as streets, the construction and maintenance of public utilities, the provision of pedestrian access across private land, the development and maintenance of greenways and open space, or the protection of water quality.

This ordinance requires that an "Encroachment Permit" be issued by the Town of Kernersville Public Service Department to public utilities, other government agencies, developers, contractors, civic groups, and individuals to perform work on trees, plants or shrubs on Town-controlled Public Rights-of-way in accordance with the terms and conditions indicated in the ordinance.

Therefore, any project that involves work on trees and shrubs as conditioned in the preceding paragraph must submit a copy of the approved encroachment permit prior to obtaining project approval by the Community Development Department, and comply

with the Kernersville Public Tree Ordinance. For more information about the Encroachment Permit and the Kernersville Public Tree Ordinance, please contact the Town of Kernersville Parks and Recreation Department at 336-996-3062.

2.6.2 Landscape Plans

All landscape plans for new construction or up-fits to changes in landscape to existing sites will be reviewed and approved by the Community Development Department as a part of the building permit process. Developers will be required to meet the Town of Kernersville Unified Development Ordinance Landscape Requirements Chapter B Article III Section 3-4.

3 STREETS

At a minimum, all streets shall be designed and constructed to Town of Kernersville Standard Specifications and Detailed Drawings contained in this manual. NCDOT standards shall be used on all existing state roads, extensions of existing state roads, roads to be maintained by NCDOT, or any item of construction that is not covered in this manual. See ***Table 3.1 Roadway Design Criteria*** and ***Table 3.2 Pavement Application Rate Summary***.

3.1 Street Classifications and Roadway Design Criteria

Street classifications follow the NCDOT Complete Streets Planning and Design Guidelines. The Community Development Director shall make final determination of the classification of streets in a proposed development.

Within a Traditional Neighborhood Development (TND) utilities may be permitted under the alleys pavement upon submittal of a utility plan reviewed and approved by the Public Services Director and Community Development Director. All utility installations within rights-of-way shall be consistent with the Town of Kernersville and the City/County Utilities Commissions' current Utility Policy.

Table 3.1 Roadway Design Criteria

Design Criteria	Residential Street	Residential Cul-De-Sac Street	Collector/ Sub-Col. Street[1]	Marginal Access Street[2]	Industrial Street	Industrial Cul-De-Sac Street	Commercial Street[3]
ROW width (ft)	50	50	60/50	30-60	60	50	45/50
Min. Cul-De-Sac ROW Radius (ft)	N/A	55	N/A	N/A	N/A	60	N/A
Min. Cul-De-Sac Radius F-F or V-V (ft)	N/A	45	N/A	N/A	N/A	50	N/A
Utility Easement – Each Side (ft)	10	5	5/10	5-10	5	10	5
Street Width F-F or V-V (ft)	28	26[4]	37-40/30-37	26-40	40	37	37
Min. Design Speed (mph)	30	25	35/30	25-40	40	30	35
Min. Centerline Radius with normal crown => normal crown (2%)	200	150	400/250	225-400	400	300	250
Max. Grade (%)[6]	10	10	7	7	7	7	7
Min. Grade (%)	1	1	1	1	1	1	1
Tangent Length in Reverse Curves (ft)	30	10	50/40	50	100	100	30
Min. Tangent Length at Intersection	30[7]	20[7]	60/40	40	100	60	30
Allowable Storm Water Spread to Centerline of Street	1/3	1/3	1/3	1/3	1/3	1/3	1/3

1. The Town shall determine collector classification.
2. The Community Development Director shall determine the required street section and ROW width (see detailed drawings) based on the maintenance and utility requirements to serve the adjacent development(s).
3. Commercial cul-de-sacs shall use the same design as Commercial Streets w/ 175' radius.
4. Cul-de-sac streets longer than 600 feet shall be 28 feet.

5. Grades for 60 feet each way from an intersection should not exceed 4%; however, steeper grades for the first 60 feet may be considered in extenuating circumstances for residential streets intersection other residential streets.
6. For streets in heavy industrial areas and other area where the estimated ADT and estimated percentage of truck is high, the Public Services Director shall determine the required amount of I-19B based on an 18-kip EAL design.
7. Tangent length shall be a minimum of 40 feet when approaching a collector or greater street classification.

Table 3.2 Pavement Application Rate Summary

General Use	Mix	Single Lift Depth	Max. Total Depth
Surface	SF 9.5A	1.0" - 1.5"	3.0"
Surface	S 9.5B	1.5" - 2.0"	3.0"
Intermediate	I 19.0B	2.5" - 4.0"	4.0"
Base	ABC	8.0" - 10.0"	

Paving Schedule Options

Residential Street/Residential Cul-De-Sac Street:

		Depth
Surface	S 9.5B	3.0"
Base	ABC	8.0"
	OR	
Surface	SF 9.5A	1.0"
Intermediate	I 19.0B	2.5"
Base	ABC	8.0"

Collector Street:

		Depth
Surface	SF 9.5A *or* S 9.5B	1.5"
Intermediate	I 19.0B	3.0"
Base	ABC	8.0"

Marginal Access Street:

		Depth
Surface	SF 9.5A *or* S 9.5B	1.5"
Intermediate	I 19.0B	2.5" - 4.0"
Base	ABC	8.0" - 10.0"

Industrial Street/Industrial Cul-De-Sac Street/Commercial Street:

		Depth
Surface	SF 9.5A *or* S 9.5B	2.0"
Intermediate	I 19.0B	4.0"
Base	ABC	10.0"

3.1.1 Private Streets

Although not encouraged by the Town, private streets may be permitted in certain developments, including gated communities.

Establishment of a Property Owners' Association is required in order to maintain any private streets permitted in a development. A document setting forth declaration of covenants, conditions, and restrictions governing the Property Owners' Association and the property within a development shall adequately address planning, management and funding of both routine maintenance and non-routine maintenance of private streets. At the time of preliminary plan submittal, the developer shall submit the proposed declarations for review and approval by the Town, and ultimate recordation.

Any and all proposed private streets shall be clearly shown as such on all preliminary subdivision plans submitted to the Town and all permitted private streets shall be clearly shown as such on final plats. All approved private streets shall be centered within a common area strip having a minimum width of fifty (50) feet. An approved driveway permit from the Town or NCDOT (whichever is applicable) is required for all approved private streets connecting with public streets.

All private streets shall proceed through the same submittal, approval and inspection process that public streets undergo; however, inspection of construction shall be performed by a private engineering/consulting firm (at the developer's expense) with all inspection reports, testing and survey data submitted to the Town at the completion of the project. Documentation shall include verification that all improvements have been installed in accordance with the Construction Drawings and Specifications. The Town shall retain any and all Bonds previously placed with/submitted to the Town until all required documents are submitted, reviewed and approved.

The minimum street design standards for all private streets shall be the same as those approved as minimum design for public streets as referenced in ***Table 3.1 Roadway Design Criteria*** and ***Table 3.2 Pavement Application Rate Summary***.

For any private street determined by the Community Development Department as serving significant truck traffic within the foreseeable future, the developer shall submit a pavement design based on an 18-Kip EAL design criteria to the Community Development Department for review and approval.

All private streets will have a thirty (30) inch curb and gutter section, either a standard curb and gutter or valley type curb and gutter as detailed in this document.

Unless otherwise approved by the Community Development Department and Public Service Department, utility structures shall not encroach or penetrate the asphalt surface course.

3.1.2 Private Drives

Private drives may be allowed in certain developments in accordance with the UDO. Private drives may be used in developments to provide access to parking lot(s) for two (2)

or more principal buildings in a group housing (apartments, townhouses, condominiums, etc.) or other non-single-family residential development.

Private drives shall be centered within a public access easement or common area strip and shall be shown as such on all preliminary plans and final plats. The minimum design standards are as follows:

Public Access Easement/Common Area	30’
Minimum Pavement Width EP-EP	22’
Minimum Aggregate Base Course	8”
Minimum Asphalt Surface Course	2”

Ribbon Pavement is acceptable for private drives.

Note: Prior to recordation of a final plat, the developer shall furnish a certification sealed by an engineer that the sub-grade and base course passed a proof roll in accordance with the construction standards of this manual.

All private drives, connecting to public or private streets, require an approved driveway permit from the Town or NCDOT, whichever is applicable.

3.1.3 T-Shaped Turnarounds

A T-Shaped Turnaround is required for any street exceeding one hundred and fifty (150) feet in length. A permanent T-shaped turnaround shall be constructed in accordance with the Construction Standards of this manual, and utilized only when topography prohibits the construction of a circular turnaround.

In cases where a street is to be built to the adjoining property lines, and said street is to be extended in the near future, or said street is less than 300’ from the nearest adjoining street, a temporary T-shaped turnaround may be used in accordance with the Construction Standards of this manual.

3.2 Horizontal Street Design

3.2.1 Alignment

All streets shall conform to the Town's adopted Thoroughfare and Street Plan when applicable or shall be designed and located in proper relation to existing and proposed streets, topography, natural features such as streams and trees; public convenience and safety; and to the Town’s Development Plan. Collector streets and thoroughfares shall be as directional as possible but consistent with topography and preserving developed properties and community values.

The arrangements of streets shall make provisions for the continuation of existing streets and utilities in adjoining subdivisions. When a new subdivision adjoins undeveloped land, or the subdivision is to be built in sections, streets, including stubs, and accompanying utilities shall be constructed to the property lines of the undeveloped land. The street and utility extensions must be designed and constructed in a manner that

will not cause hardship to owners of adjoining property when they attempt to develop their land and provide convenient access and utility services to it.

If a street cannot be constructed to the property line due to minor cuts and fills which would be necessary on the adjacent property, the Community Development Director may determine that the last fifteen (15) feet of roadway need not be constructed. However, in cases where the accessing street cannot be constructed to the property line due to major cuts and fill; the Developer shall post a cash bond to the Town for construction of the roadway and utilities to the property line.

The design of streets shall conform to the curve controls as outlined in this manual and design table. Streets that are multi-lane and/or divided will require special design review.

Compound horizontal curves with the same direction of curvature shall have the radius of the flatter circular arc no more than one and one half (1-1/2) times the radius of the sharper circular arc.

3.2.2 Intersections

Streets shall intersect each other at right angles whenever possible. The minimum desirable intersection angle is eighty (80) degrees. Streets classified as collectors or higher shall not intersect any other street at less than eighty (80) degrees. In unusual situations, streets classified in the residential category may intersect streets classified as collectors or lower at a minimum angle of seventy (70) degrees.

3.2.3 Superelevation

Superelevation is to be used on all thoroughfares and in some cases superelevation may be required for certain collector streets. Superelevation shall conform to NCDOT and AASHTO standards for superelevation design.

3.2.4 Tapers

Tapers shall be used as necessary in street design. The following equations shall be used as applicable. Where:

L= Taper length in feet
S = Speed in miles per hour
W = Lateral offsets in feet

For posted speeds of 45 mph or greater: $L=WS$
For posted speeds of 40 mph or less: $L=WS^2 / 60$

Turn lane tapers shall be at least 15:1 for posted speeds of 45 mph and more. The minimum turn lane taper allowed for streets posted less than 45 mph is 8:1. Symmetrical reverse curve tapers are recommended for non-thoroughfare streets. Storage lengths for the turn lanes shall conform to NCDOT and AASHTO standards.

3.2.5 Guardrail

Guardrail shall be installed when determined necessary in accordance with NCDOT standards or when directed by the Town Engineer.

3.2.6 Islands and Medians

Concrete traffic islands designed to direct turning movements are acceptable and shall be constructed and placed as per NCDOT standard specifications. Landscaped medians shall be designed in accordance with the standard detail drawings.

3.3 Vertical Design

Street grades shall be established with respect to existing topography to avoid excessive grading and the removal of existing trees and vegetation whenever practical. The vertical curve controls found in ***Table 3.1 Roadway Design Criteria*** shall be followed at all times.

3.4 Geometric Design

3.4.1 Radii

A minimum radius of thirty (30) feet to the face of curb shall be required where residential streets intersect.

A minimum radius of forty-five (45) feet to the face of curb with four (4) foot offsets and 15:1 tapers are required where residential or industrial streets and thoroughfares intersect.

3.4.2 Driveway Design Criteria and Permits

A driveway permit is required for all driveways, streets or turnouts accessing Public

Streets within the Town of Kernersville's jurisdiction. See permit application procedures in Appendix E.

A driveway inspection is required prior to pouring concrete or placing asphalt. Once the driveway location has been approved by the Community Development Department, and concrete forms set, the Street Division must be notified for an inspection. Failure to request a driveway inspection and failure to comply with the specifications may necessitate removal and replacement of the driveway apron by the property owner and/or responsible party. See Detail Drawings for driveway apron specifications.

The number of street and driveway connections permitted serving a single property frontage or commercial development shall be the minimum deemed necessary by the Town for reasonable service to the property without undue impairment of safety, convenience, and utility of the roadway. Normally, not more than one driveway shall be

permitted for any single property frontage. The arrangement of driveways should be related to adjacent driveways and nearby street intersections to avoid conflicting turning movements.

3.4.2.1 Residential Driveways

Residential driveways shall be ten (10) to eighteen (18) feet wide and shall conform to the detail drawings in this manual for concrete driveway aprons. A wider driveway may be considered in cases where a wide driveway is needed to access a double car garage or similar facility; maximum width allowable is twenty-four (24) feet.

Residential driveways located on corner lots were sub-collector and lower classification streets intersect shall be located a minimum distance of fifteen (15) feet from the point of tangency of the curb radii of the intersecting street.

3.4.2.2 Commercial Driveways

For location, design and construction of **commercial** driveways, refer to the current edition of the NCDOT *"Policy on Street and Driveway Access to North Carolina Highways,"* and the current edition of the NCDOT *"Roadway Standard Drawings."*

Changes in grade within the driveway/access drive may require a vertical curve. Individual site conditions will be evaluated by the Town of Kernersville Fire/Rescue Department for suitable access by fire apparatus; grades shall not exceed eight percent (8%) without Fire Department approval. The maximum width for a commercial driveway shall be thirty-six (36) feet; the minimum width shall be twenty-six (26) feet.

Radius type turnouts may be considered when the anticipated driveway ADT is greater than 500 vehicles or when access by larger trucks must be accommodated.

Driveways that are unpaved shall have a minimum eight (8) foot concrete apron measured from the back of the curb and gutter, or ten and one half (10.5) feet from the edge of pavement on a ribbon paved street.

3.4.3 Curb and Gutter

Thirty (30) inch concrete curb and gutter shall be required as standard on all public maintained streets which have public water & sewer available to the site. Thirty (30) inch concrete valley curb may be installed as an alternative to the standard when requested by the developer and approved by the Town. See the standard detail drawings in Appendix A.

3.4.4 Ribbon Paved Streets

In developments where the Town determines that public sewer is not available and cannot be made available within a reasonable time frame, ribbon paved streets may be considered.

3.4.5 Sidewalks

Sidewalks shall be installed throughout each phase of construction in their entirety at the time of roadway construction. No segmental installations shall be permitted, unless approved by the Public Services Director.

Sidewalks shall be an approved NCDOT Class B concrete mix, and shall be placed a minimum thickness of four (4) inches. At locations where a driveway crosses a sidewalk, a six (6) inch depth is required.

Where required, sidewalks shall be three (3) feet behind the back of curb with a minimum width of five (5) feet. The Town may require a wider sidewalk and/or grass strip in developments were a substantial amount of pedestrian or vehicular traffic is anticipated as established in the North Carolina Complete Streets Planning and Design Guidelines.

Where sidewalks and/or greenways intersect any section of curb and gutter, curb ramps are required.

3.4.6 Pavement Design

Except as provided in Section 3.4.7 Pre-approved Pavement Schedules, pavement section for all streets shall be designed by a Registered North Carolina Professional Engineer. The pavement design shall be signed and sealed by a Registered North Carolina Professional Engineer. Pavement design shall be in accordance with NCDOT Design Standards.

3.4.7 Roadway Design Criteria

All approved pavement schedules are included on the standard drawings for typical roadway sections, which are included in Appendix A. For typical roadway sections that do not have pavement schedules listed, specific pavement designs, which shall be developed in accordance with Section 3.4.6 Pavement Design, must be submitted to the Public Services Department for review and approval. Details of the approved pavement schedule(s) shall be included on the construction drawings for all projects.

3.4.8 Limits on Production and Placing Asphalt Mixtures

Production and placing of asphalt mixtures on roadways intended to be accepted by and dedicated to the Town of Kernersville shall be in accordance with applicable sections of the “Standard Specifications for Roads and Structures” published by NCDOT, as may be amended.

3.5 Traffic Impact Study

A Traffic Impact Study (TIS) may be required for developments with an estimated trip generation of 3,000 vehicles per day or greater during an average weekday based on a five-day national average as defined in the Institute of Transportation Engineers (ITE) Trip Generation Manual.

A TIS may also be required for proposed accesses within 1,000 feet of an interchange, in the vicinity of a high accident location, on a major roadway, involvement with an existing or proposed median crossover, involvement with an active roadway construction project, or at the discretion of the Community Development Director.

The TIS will be completed in accordance with NCDOT's Policy on Street and Driveway Access to North Carolina Highways.

3.6 Street Lights

Street lights shall be shown on plans for all new public streets.

Street lights shall be in accordance with the AASHTO Roadway Lighting Design Guide, latest edition. All lighting in new developments must be LED. If lights are to be installed in a new phase of an existing development, and the streets have decorative lighting, then fixtures that are identical or similar to those used in the previous phase may be used.

3.7 Bridges

Structures, which are to span streams, shall be designed in accordance with NCDOT design standards and specifications. Plans shall be submitted to the Community Development Department for review and approval. Additional fees for the review of bridge plans will be established at the time of the review and are the responsibility of the developer.

3.8 Roadway Dams

It is the policy of the Town of Kernersville to discourage the location of roadways on dams. In those cases, where a definite advantage may be gained or a substantial savings in funds may be realized, the utilization of a dam for a roadway may be considered.

Where it is determined that a dam will be utilized as a roadway, the following criteria must be met:

- When applicable, the dam must have certification from the NCDEQ pursuant to the "Dam Safety Law of 1967" (as amended by the General Assembly of 1977).
- All pertinent data regarding the design of the embankment as an impoundment structure must be presented to the Engineering Division for review.
- The top cross-section dimension must be the roadway section width required (from right of way line to right of way line) for the facility plus a minimum of four (4) feet on each side.
- Guardrail will be provided on both sides of the roadway.
- Spillway will be designed to provide two (2) feet of freeboard for an estimated 100-year design frequency outflow as a minimum.
- A means of draining the lake completely will be provided.

Design acceptance or approval by the Town is limited to the use of the dam as a roadway and is in no way intended as approval of the embankment as an impoundment structure.

Responsibility incurred by the Town of Kernersville when a section of roadway crossing a dam is accepted as a part of the Town's maintenance system is limited to maintenance of the roadway proper for vehicular traffic only. Responsibility for the impoundment, any damage that may result there from, and maintenance of the dam or appurtenances as may be required to preserve its integrity as a water impoundment structure, shall remain with the owner of the impoundment. Structures should be designed and plans sealed by a Professional Engineer.

3.9 Street Names

Proposed streets, which are obviously in alignment with other streets, shall bear the assigned name of the existing streets. In no case shall the name for a proposed street duplicate or be phonetically similar to an existing street name in Forsyth County, irrespective of the use of the suffix, street, avenue, boulevard, drive, place, court, etc. Street names for all new subdivisions shall be approved by the address administrator prior to platting.

3.10 Traffic Control

All traffic control devices shall be designed and installed in accordance with the Manual on Uniform Traffic Control Devices, or otherwise approved by the Town of Kernersville.

The Town will not allow the obstruction of any public street, private street or fire lane unless otherwise stipulated by the Board of Aldermen. This requirement is in accordance with the North Carolina State Fire Prevention Code. The reference to an “obstruction” shall include parking, speed bumps or any other devices that may obstruct the free passage of emergency vehicles.

All traffic control devices must be shown and approved as a part of a traffic control plan prior to installation and must be in conformance with this manual. The traffic control devices and all related signs and pavement markings shall be maintained by the owner as a part of the approval of the plan. Traffic control devices shall include rumble strips, raised pavement markers, pavement undulations (speed bumps).

3.10.1 Pedestrian Crossings

All locations, which are designated for pedestrian traffic crossings, shall be designated as a crosswalk with pavement marking and signage in accordance with MUTCD.

All pedestrian crossings must be approved by the Community Development Department prior to installation.

3.10.2 Street Traffic Control Signs

The owner/developer is responsible for the installation, at his/her expense, of all required signage, such as street name signs, stop signs, speed limit signs, etc. and all pavement markings. The developer will also be responsible for the installation of any optional signage and markings, as may be determined during the review and approval process.

All signage must be installed after the placement of the intermediate course of asphalt. All markings shall be placed at the completion of the final course, unless temporary markings are warranted during construction.

3.11 Sight Distance

Sight distance shall mean the length of roadway visible to the driver traveling along the roadway or waiting to enter or cross the roadway. The sight triangle shall include both the horizontal and vertical plane. A ten (10) foot x seventy (70) foot horizontal sight triangle shall be located at all street intersections and multi-family and non-residential driveway intersections.

The Town shall review all proposed development plans, including site, subdivision, landscape plans, infrastructure plans and sign plans for compliance with these requirements. All new development within the Town's ETJ shall meet these requirements as a part of the plan approval process.

Some objects located within sight distance or sight triangle areas may not significantly obstruct the required visibility of the driver. The driver may be able to see over, under or around some objects within sight distance areas. Objects that may be allowed within sight distance areas include fire hydrants, utility poles, and utility cabinets less than two (2) feet high, and traffic control devices that are located to minimize visual obstruction. Other objects twelve (12) inches in diameter and smaller, such as utility poles, light poles and sign posts, may be allowed within sight distance areas if located individually or in combination so as to not substantially restrict the driver's view. The determination of what objects, if any, may be located within sight distance areas shall be made by the Community Development Department.

3.11.1 Intersection Sight Distance

In order for vehicles to safely maneuver into or through an intersection, sufficient sight distance must be provided so as to avoid collisions. Intersection sight distance is to be designed in accordance with AASHTO’s Policy on Geometric Design of Highways and Streets, latest edition.

3.11.2 Stopping Sight Distance

At a minimum, stopping sight distance must be available to the driver at all locations along roadways. Stopping sight distance applies to horizontal as well as vertical alignments. Stopping sight distance on horizontal curves is measured along the centerline of the inside lane around the curve and the line of sight is a straight line between two points on the centerline of the lane. On vertical curves, stopping sight distance is measured on a straight line between the driver's eye and an object on the roadway surface. All stopping sight distance shall be designed in accordance with AASHTO’s Policy on Geometric Design of Highways and Streets, latest edition.

3.12 Roadway Construction

3.12.1 Grading

All organic material must be removed a minimum of three (3) feet below the stone base course. Clearing debris and top soil shall not be used as roadbed fill material. Unsuitable soils such as, alluvial materials, and old fill material such as stumps; trees, topsoil, trash, etc. shall not be used as structural fill regardless of depth below finished grade. Base material shall not be placed on a roadway until the storm sewer, subgrade, utilities, and all appurtenances have been inspected, approved and meet Town of Kernersville and NCDOT Standard Specifications.

Fill material shall be compacted to 95% of standard proctor. The last two (2) feet of material must be compacted to 98% of standard proctor. The Inspector may require the developer/owner to provide field density testing of the subgrade soils from a certified testing laboratory. The soils laboratory shall perform sufficient proctors to evaluate the compaction characteristics of various soils used in the roadbed.

3.12.2 Base Material & Placement

Compacted ABC stone or B25.0 Asphalt Base shall be used as base material. See roadway cross section drawings in Appendix A. Compaction shall be 98% standard proctor. The Inspector may require the developer/owner to provide field density testing of the base material from a certified testing laboratory.

3.12.3 Curb & Gutter

Curb and gutter shall be constructed using approved NCDOT Class B concrete placed on a minimum of four (4) inches of compacted ABC stone. Concrete shall be tested in accordance with NCDOT Standard Specifications. Curing compound shall be used on all curb and gutter. An expansion joint shall be placed every (90) feet and control joints shall be every ten (10) feet or fifteen (15) feet when placed with a power curb machine. Expansion joints shall also be placed five (5) feet on both sides of curb inlets and any other rigid structure which might be cast in the curb and gutter. All joints shall be sealed with an NCDOT approved material. No concrete will be placed until the forms and subgrade have been approved by the Inspector.

3.12.4 Plant Mix Asphalt

Asphalt shall meet the requirements on NCDOT Specifications Section 610. A job mix formula will be required prior to any paving. A breakdown, intermediate and pneumatic wheel finish roller shall be used for the surface course. The Street Division may require a Density Test and field test every 500 feet.

Asphalt placement, temperature and material properties shall meet the NCDOT Specifications.

3.12.5 Sidewalks

Sidewalks shall be a minimum of five (5) feet wide, placed a minimum of three (3) feet behind the curb, unless otherwise approved or established in the North Carolina Complete Streets Planning and Design Guidelines.

The surface of sidewalks shall be finished to grade and cross section with a float, hand-toweled smooth and finished with a medium broom finish. Concrete shall be tested in accordance with NCDOT Standard Specifications. Sidewalks shall be constructed using an approved NCDOT Class B concrete mix with control joints every five (5) feet. Expansion joints shall be every fifty (50) feet. See detail drawings in Appendix A. No concrete will be placed until the forms and subgrade have been approved by the Inspector.

3.13 On-Street Parking

For commercial, industrial and high density residential developments the U.S. Department of Transportation, Federal Highway Administration, Manual on Uniform Traffic Control Devices (MUTCD) and American Association of State Highway and Transportation Officials (AASHTO) Green Book shall be followed. For single family residential developments NCDOT Complete Street Design Guidelines shall be followed for on-street parking.

4 STORM DRAINAGE

This section is intended to provide the Town's design criteria for stormwater conveyance systems, storm drainage pipes, and structures that will eventually be maintained by the Town of Kernersville. Furthermore, it includes design consideration for subdivisions and other developments.

Although permitted by the Town, design criteria for Stormwater Best Management Practices (BMPs) or Stormwater Control Measures (SCMs) shall comply with the most current revision of the North Carolina Stormwater Best Management Practice Manual. All designs of BMPs or SCMs structures should follow the process and submission requirements specified in the Town of Kernersville Watershed and Stormwater Administrative Manuel. The State of North Carolina Department of Environmental Quality (NCDEQ), Land Quality Section of the Division of Energy, Mineral and Land Resources is the permitting authority for sediment and erosion control within the Town's jurisdiction. The State's sediment and erosion control laws and regulations apply. Grading permits covering sedimentation and erosion control measures must be obtained from the Land Quality Section of the Division of Energy, Mineral and Land Resources of NCDEQ before any regulated grading or land-disturbing activity can commence.

The Town of Kernersville requires that development and redevelopment activities properly manage and control stormwater runoff, applicable pollutants and erosion and sedimentation as necessary to protect public infrastructure, and safeguard the environment, property, health safety and welfare of its citizens.

A watershed/stormwater permit issued by the Town of Kernersville is required for any exterior development or redevelopment. Procedures for obtaining a watershed/stormwater permit are provided in the Town of Kernersville Watershed and Stormwater Administrative Manuel.

4.1 Hydrologic Analyses

Upon approval of the Town of Kernersville, the designer/engineer may choose to use any standard method, or combination of methods, for the calculation of hydrologic conditions that must be shown to be appropriate for the application. Runoff calculations shall be provided for all proposed storm drainage systems including, but not limited to culverts, pipes, inlets, drainage structures, ditches, open channels, outlet protections, etc.

The Rational Method is the recommended hydrologic method by the Town of Kernersville for determining storm drainage runoff for areas under two hundred (200) acres. For areas over two hundred (200) acres, the Town recommends using the SCS method.

Following are recommended hydrologic methods, their applications and limitations:

Table 4.1 Applications of the Recommended Hydrologic Methods

Application	Rational Method	SCS Method	USGS Equations	Basin Lag-Time	Simple Method
Gutter Flow and Inlets	✓				
Storm Drain Pipes	✓	✓	✓	✓	
Culverts	✓	✓	✓	✓	
Small Ditches	✓	✓	✓		
Water Quality Volume				✓	✓
Storage Facilities		✓	✓		
Energy Dissipation	✓	✓			
Open Channels		✓	✓	✓	
Outlet Structures	✓	✓	✓	✓	
Overbank Flood Protection (Q100)	✓	✓	✓	✓	
Limitations	0-200 ac.	0-2,000 ac.	25 ac. to 25 mi2	Greater than 100-ac.	Per NCDEQ Design Manual

Runoff coefficients listed in the Stormwater Best Management Practices Manual published by the NCDEQ shall be used.

Design of the stormwater systems for offsite stormwater shall, at a minimum, be based upon projected full build-out of the offsite/upslope properties. Full build-out of the offsite/upslope properties should be consistent with the Town's current zoning and land use plan for those areas.

4.2 Hydrologic Design Criteria (Excluding Stormwater Best Management Practices)

All designs shall be based upon fully developed land use conditions (full build-out) as shown on current Town of Kernersville Land Use Plans and Zoning Maps.

Site specific rainfall values shall be obtained from the NOAA website at http://hdsc.nws.noaa.gov/hdsc/pfds/.

4.2.1 Storm Drainage System Hydrologic Design

4.2.1.1 Roadway Storm Drainage System

Roadway inlet location, capacities and gutter spread **are** to be designed in accordance with NCDOT guidelines.

Storm drain pipe system is primarily designed for the 10-year frequency, except for the storm sewer collector system in the Central Business District, where the design frequency will be the 25-year frequency.

In sag (or sump) areas where relief by curb overflow is not provided the system standard design level (Q25-Q50) is to be used for analysis to insure traffic flow is not interrupted).

4.2.1.2 Culverts and Bridges

- Major Town Streets .....Q(50)
  Including Thoroughfares, Major, Minor and Collector Streets
- Minor Town Streets .....Q(25)
  Including Sub-collector, Local and Residential Streets
- Culverts and Bridges over FEMA regulated floodways ..... Q(100)

The design must be approved by the Town of Kernersville Planning Director

4.2.2 Drainage Area and Mapping

Provide delineation of on-site and off-site drainage areas to each inlet including the number of acres, a detailed grading plan and flow paths.

4.2.3 Roadways crossing FEMA regulate streams

Design for hydrologic criteria in accordance with FEMA rules and regulations, as well as the design criteria stated herein above. The most stringent design criteria shall apply.

4.3 Hydraulic Analyses

Pipe systems and open channels shall be designed using the Manning formula. Manning roughness coefficients listed in the current "Stormwater Best Management Practices Manual" published by the NCDEQ shall be used.

Pipe inlets and culvert situations are to be checked for inlet and outlet headwater control so as to insure that headwater will not encroach on uphill adjacent property or create a hazard to existing and future development. All storm drain systems should be analyzed to establish the hydraulic grade line. No storm drain system should be under pressure for the design storm event.

Minimum size for storm drainage pipe is fifteen (15) inches in diameter. The minimum pipe diameter for cross drainage pipes and culverts shall be 18-inches.

Minimum storm drainage pipe grade is 1.0%. When it can be shown that a 1.0% grade cannot be maintained, hydraulic design shall be such that a scour velocity of 2.5 feet per second is achieved with the flow rate from a two (2) year storm event.

Maximum storm drainage pipe grade is 10.0%.

Minimum grade for tail-ditching is 1.0%.

Manholes are required at changes in grade, changes in alignment, and at intersection of drainage pipe.

A concrete grout invert slide is required in all drainage boxes and manholes.

In all cases minimum drops in drainage structures will be dictated by the hydraulic grade line. Recommended minimum manhole drops are:

- Change in alignment 0 degrees to 45 degrees, 0.10 ft/inlet
- Change in alignment greater than 45 degrees, 0.20 ft/inlet
- Change in pipe size, match crown.
- Reverse flow conditions in a storm sewer system created by a tie-in at a structure will not be allowed unless a manhole drop equal to the diameter of the outgoing pipe is provided.

Energy dissipation to achieve a non-erosive discharge velocity is required at the discharge point of all stormwater pipes and structures. Hydraulic design for energy dissipaters shall be in accordance with NCDEQ erosion control standards.

Culverts hydraulic design according with NCDOT guidelines. Flooding from the 100-year storm event shall not affect existing upslope and downslope adjacent property improvements and ensure compliance with the Town-adopted Floodway Fringe regulations. The calculated elevation of the water surface elevation for the 100-year storm event shall be included on final plat for new developments on all lots located adjacent to stormwater channels entering or leaving culverts. Additionally, a note shall be placed on the final plat as follows:

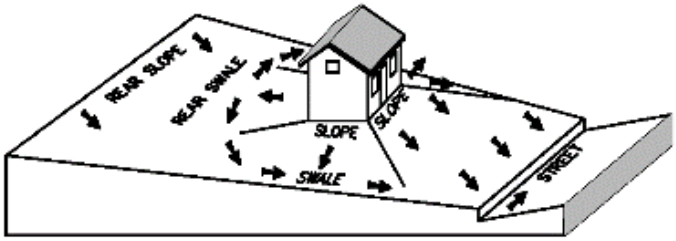
“Construction of all floor elevations intended for habitation and all essential building equipment shall be two (2) feet above the stated water surface elevation for the 100-year storm event”

4.4 Drainage for Subdivisions and Other Developments

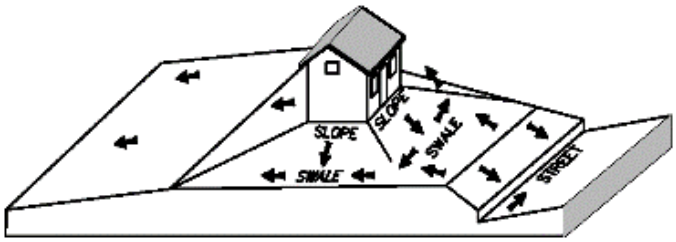
A detailed grading plan for residential development shall be submitted with construction plans for the storm drainage system. The detailed grading plan shall include, among other things, consideration of and provisions for adequate drainage of surface water between, around and away from residential living units. Finish grading in the vicinity of the building foundation shall result in a minimum slope away from the building of six (6) inches in ten (10) feet and be in compliance with the most current requirements of the North Carolina Building Code. Shallow, grassed drainage swales provided to transport surface water drainage between, around and away from the residential building shall have a minimum slope of one (1) percent. If drainage swales having a minimum slope of one (1) percent are not feasible, then a pipe system shall be installed of sufficient design capacity to carry the runoff. All storm drainage intended to transport stormwater runoff between, around and away from residential structures shall have a hydraulic design capacity sufficient to carry a 10-year storm event. See graphic illustration below.

Figure 4.1 Schematic Design for Grading for Drainage around a Building

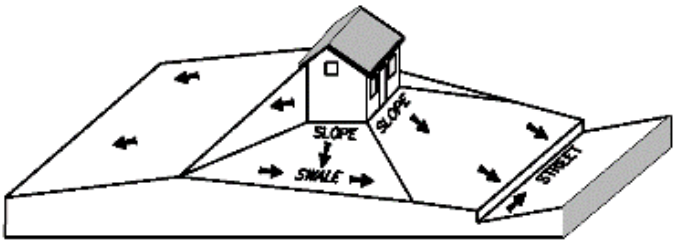
a) LOT GRADING: DRAINAGE DIRECTED TOWARD FRONT OF DWELLING



b) LOT GRADING: DRAINAGE DIRECTED TOWARD REAR OF DWELLING



c) LOT GRADING: DRAINAGE DIRECTED TOWARD FRONT AND REAR OF DWELLING



NOTE: FIGURE COPIED FROM "LAND DEVELOPMENT HANDBOOK", SECOND EDITION.

Site drainage shall be extended to tie into existing storm drainage system (either natural or man-made), where possible.

4.5 Materials (Piping and Structures)

All storm drainage pipe and structures within the public right-of-way shall be either: steel reinforced concrete (RCP), ductile iron (DIP), corrugated aluminized pipe (CAP), or structural concrete brick as specified in the current NCDOT *Standard Specifications for Roads and Structures*.

RCP shall be utilized, except where slope, vertical clearance or any other reasonable unforeseen conditions may warrant the use of another NCDOT-approved pipe material.

High Density Polyethylene (HDPE) pipe may only be utilized within the public road right-of-way when placed as cross drainage (running parallel to the roadway) under a driveway that accesses a ribbon paved street; and shall not be used as part of a stormwater conveyance system connecting stormwater drainage structures within the public right-of-way.

Except as stated herein, all storm drainage pipe, structures and construction shall meet the current NCDOT standards and specifications. Storm drainage structures such as open throat yard inlets, junction boxes, and similar structures with precast reinforced concrete tops and without removable grates, shall have a cast iron manhole ring and cover cast into the top slab; with the words “STORM DRAIN” cast into the cover. See Standard Drawing No. 308.

4.6 Other Design Requirements

In addition to Town of Kernersville requirements, all applicable federal and state agency requirements shall be incorporated into the planning and design of all drainage features.

- Storm drainage hydraulic calculations and pipe and structure information shall be listed on design tables provided in Appendix C.
- Plan and profile drawings shall also include pipe diameter, material, grade, invert elevations, structure type, grate type, and the drainage area and flow into the pipe structure that corresponds to information listed in the tables.
- Design of stormwater conveyances systems shall be along invert elevations from the inlet or outlet of pipes, and/or from the center of box to center of box (structures). Changes in horizontal or vertical alignment of pipes shall be accomplished in appropriately designed stormwater structures; curved alignment of pipes shall only be considered in extreme cases.
- A minimum of two feet of cover should be maintained over the top of drainage pipes. For special site conditions, a request for less cover may be approved by the Town of Kernersville, but must be consistent with engineering design standards and manufacture’s recommendations.
- All ditches and swales shall be indicated on the drawings complete with spot elevations, slopes, cross sections and liner materials (grass, matting, rip-rap, concrete, etc.) shown. Computations and liner information shall be provided.
- All storm drainage easements shall be shown on the plan sheet, the final plat and labeled, “Drainage Easement.” Minimum width shall be 10 feet. Larger pipes, deep lines and ditches/streams may require a wider easement as shown below in ***Table 4.2***

Minimum Drainage Easements Pipes over 20' in depth are discouraged and will be reviewed on a case-by-case basis.

Table 4.2 Minimum Drainage Easements

Piped Drainage Easement		
Pipe Size	Depth	Easement Width
≤ 42"	≤ 10'	20'
	10.01-15'	30'
	15.01-20'	40'
48" – 60"	≤ 10'	30'
	10.01-15'	40'
	15.01-20'	50'
Multiple pipes or over 66"		Shall be reviewed case-by-case.
Open Channel Drainage Easement*		
Up to 10 cfs Q50		10 feet
10 – 20 cfs Q50		15 feet
20-40 cfs Q50		20 feet
40-60 cfs Q50		30 feet
Over 60 cfs Q50		To be determined based on channel cross section

* Drainage easement widths may need to be wider based on channel cross section.

No more than 0.5cfs Q_{10} will be allowed to flow out driveway entrances into streets except in residential subdivisions.

No water shall be permitted to discharge across a roadway, sidewalk or driveway from a concentrated source (swale, ditch, pipe, etc.). Special cases will be reviewed by the Town of Kernersville.

Storm drainage pipes shall be at least five (5) feet horizontally from all water and sanitary sewer mains. Storm drainage pipes shall be designed to be deeper than the water mains but shallower than sanitary sewer mains and shall have a minimum of 12-inches vertical clearance from water and 24" from sanitary sewer mains unless sewer line is ductile iron and approved by the utility provided.

5 ENVIRONMENTAL

5.1 General

Stormwater control, watershed protection, and riparian buffer protection requirements for the Town of Kernersville are outlined in the *Watershed and Stormwater Administrative Manual*.

Stormwater controls, required by any development or redevelopment, shall be designed in accordance with the *North Carolina Stormwater Best Management Practice Manual*, latest edition, and *The North Carolina Department of Transportation Stormwater Best Management Practices Toolbox*, latest edition.

5.2 Stream Crossings and Wetlands

The 401 And Buffer Permitting Branch of the North Carolina Division of Water Resources (NCDWR) and the US Army Corps of Engineers (USACE) are the entities responsible for implementing the state waters, wetlands and riparian buffer regulatory program; and assisting with compliance and enforcement procedures.

Examples of activities that may require permits include but are not limited to:

- Any disturbance to the bed (bottom) or banks (sides) of a stream
- Any disturbance to a wetland
- The damming of a stream channel to create a pond or lake
- Placement of any material within a stream, wetland or open water, including material that is necessary for construction, culvert installation, causeways, road fills, dams, dikes or artificial islands, property protection, reclamation devices and fill for pipes or utility lines
- Temporary impacts including dewatering of dredged material prior to final disposal and temporary fill for access roads, cofferdams, storage, and work areas

5.3 Floodplain Requirements

5.3.1 Floodplain Development Permit

A floodplain development permit is required for all work in the floodplain. See the Unified Development Ordinance (UDO); Chapter C – Environmental Ordinance; Article II – Floodway and Floodway Fringe Regulations; 2-2.2 APPLICATION REQUIREMENTS for additional information. Application for a Floodplain Development Permit shall be made to the Floodplain Administrator prior to any development activities located within Special Flood Hazard Areas.

6 WATER AND SEWER

6.1 General

The majority of public water and sewer systems within the Town of Kernersville and its Extraterritorial Jurisdictional (ETJ) are owned and operated by the City County Utilities Commission (CCUC) of Winston-Salem, or The City of High Point. Before beginning utility planning or design work the engineer should consult with the Town to determine ownership of the utilities in the project area. For utilities owned and operated by others within the Town and its ETJ, consult with that particular municipalities' Public Works or Engineering Division for plan requirements or submittal procedures.

Information on water and sewer design standards and permitting for CCUC-owned utilities can be found in the *Winston-Salem Infrastructure Development Standards*, latest edition, published by the Winston-Salem Public Works Department. The Design Engineer should refer to the City of Winston-Salem's Department of Public Works, Engineering Division's *Technical Specifications and Detail Drawings*, *Water Line and Sanitary Sewer Line Construction*, latest edition, for all material specifications and detail drawings.

Information on water and sewer design standards and permitting for City of High Point owned utilities can be found in the *Standard Specifications for Water and Sewer Construction*, latest edition, and Standard Drawings for City Construction, published by the City of High Point's Engineering Division.

6.2 Utility Locations

Before beginning design work consult with the applicable review agency for the most current utility information in the project area. Any drawings provided by the town are for information only and not intended to replace an accurate site utility survey. In general, all utilities shall be located behind the curb line, unless located within a Traditional Neighborhood Development (TND). See street cross-sections in the standard drawings at appendix A.

7 EROSION CONTROL

7.1 General

All projects which disturb more than one (1) acre within the Town of Kernersville and its Extraterritorial Jurisdictional (ETJ) must have an approved Erosion and Sedimentation Control Plan and Permit from NCDEQ.

Information on erosion and sedimentation control design standards and permitting can be found in the NCDEQ, Land Quality Section, Division of Energy, Mineral and Land Resource's *Erosion and Sedimentation Control Planning and Design Manual*, latest edition. The Design Engineer shall provide a copy of the approved plan and permit to the Town before final approval of construction drawings.

8 PLAN REVIEW

8.1 Plan Approval Process

8.1.1 Preliminary Plan Reviews

Site plans will be reviewed by the Community Development Department for Engineering, Stormwater or Transportation related requirements through the Community Development Department review process.

8.1.2 Construction Plan Review

Before engineering design plans will be reviewed and approved for construction by the Community Development Department, the project must have Community Development Department approval.

Address all comments and resubmit corrections to the Community Development Department for final review and approval.

If further revisions are required address all comments and resubmit corrections.

Prior to final approval of construction drawings, copies of all related permits for erosion control, stream crossing, water & sewer, etc. must be submitted to the Community Development Department.

A check for the appropriate amount in accordance with the latest Schedule of Fees will be required before plan approval.

8.1.3 Construction Scheduling

Construction of all infrastructure intended for acceptance for maintenance by the Town of Kernersville or other relevant infrastructure covered by this manual shall not begin until drawings are signed by the Community Development Director and the Public Services Director. A preconstruction meeting will be required with the Chief Construction Inspector.

8.1.4 Plats

Preliminary and final plats will be reviewed by the Community Development Department for Engineering, Stormwater or Transportation related requirements.

8.2 Construction Drawing Submission Requirements

When plans are submitted to the Town of Kernersville Community Development Department, they shall be accompanied by a cover letter (or transmittal note) stating:

- The project name
- Contact person and phone number
- The reason they are being submitted
- Attach Community Development approval (rezoning, subdivision, special use, etc.) to the plans
- Appropriate Engineering checklist

Failure to identify the project and the reason it is being submitted will cause delay in the review process.

For first time submittal of construction drawings, three (3) complete bound sets of prints, one (1) electronic PDF file and one (1) electronic CAD file copy are submitted to the Town Community Development Department.

Submit a copy of the Development Utility Contact Information Sheet. An example copy is attached at Appendix D.

Submit drawings to the appropriate Utility Division office if requiring a water and/or sewer plan review.

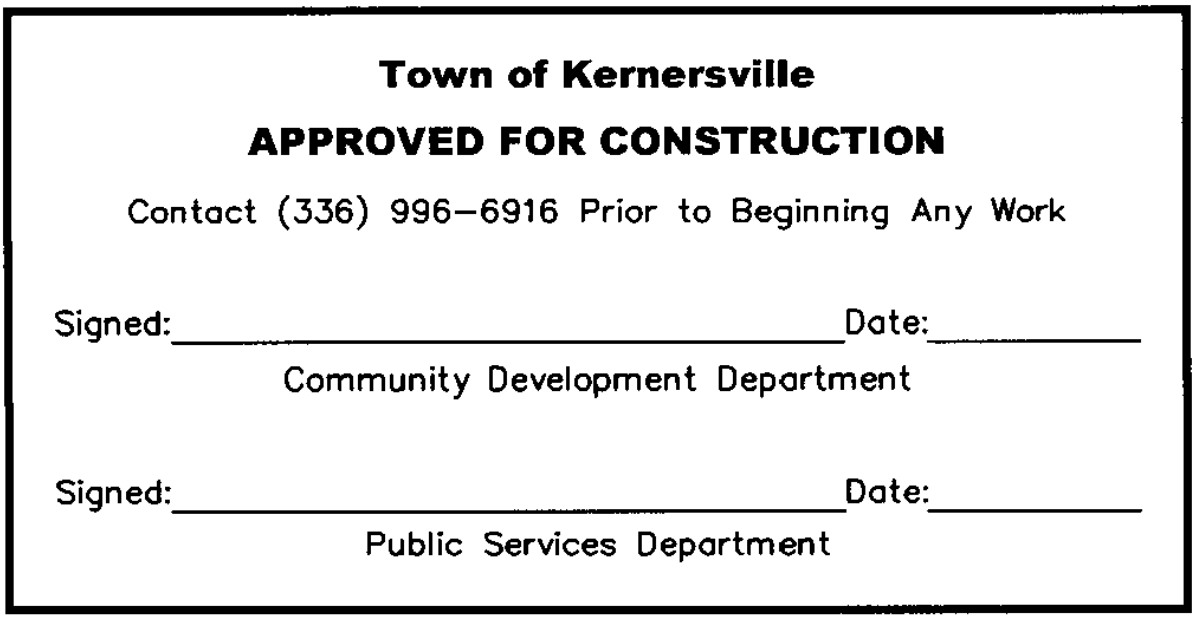
Once approved by all agencies involved, three (3) hard copies one (1) electronic PDF file and one (1) electronic CAD file copy of approved drawings with all appropriate signatures must be submitted to the Community Development Department. Prints are logged in, reviewed, stamped "Approved for Construction," signed, and distributed as follows:

- One (1) hard copy on file in the Engineering Division
- One (1) hard copy for the Street Division
- One (1) hard copy will be returned to the submitting Engineer

8.3 Construction Drawings "Approved for Construction"

All approved drawings must have the following stamp of approval on each sheet.

Figure 8.1 Stamp of Approval



8.4 Community Development Department Site Plan Submittal Checklist

The following section provides a list, which should be used by the applicant before any site plan submittal so that applicants are aware of the minimum requirements in order to receive a complete review. The checklists in this section are intended as a guide and may not be inclusive of all the required information. The site plan review checklist is not a submittal requirement.

Project Information

Development Name:	Phase:	
Owner:	Phone:	Email:
Contact Person:	Phone:	Email:

General Requirements

_____ 1. Cover letter
_____ 2. Appropriate checklist completed and attached

8.4.1 General Information Required on All Plans

_____ 1. Development Name
_____ 2. Owner(s) Name(s) & Contact Information
_____ 3. Preparer Name & Contact Information

_____ 4. Vicinity Map (Scale of 1" = 2,000')
_____ 5. Graphic Scale, Date & North Arrow
_____ 6. Property Boundaries w/ Bearings & Distances
_____ 7. Adjoining Property Owners w/ Tax Pin Numbers & Zoning Information
_____ 8. Adjoining Roadways w/ Right-of-Way Dimensions
_____ 9. Current Zoning (and Proposed Zoning if applicable)
_____ 10. Total Site Acreage
_____ 11. Existing Easements & Building Setback Limits shown
_____ 12. Proposed Easements, ROW, Common Areas, Areas Dedicated to Public Use
_____ 13. Building Footprints w/ Square Footages & Finished Floor Elevations
_____ 14. Location of Existing & Proposed Utilities
_____ 15. Limits of Proposed Pavement w/ Dimensions & Curve Radii
_____ 16. Limits of 100 Year Floodplain where applicable
_____ 17. Location of Existing Structures

8.4.2 Stormwater Requirements

Note: See the Town of Kernersville Stormwater and Administrative Manual for a full set of requirements.

A. Watershed Site Data Block

_____ 1. Watershed Name & Classification
_____ 2. Total Site Acreage = "A"
_____ 3. Existing Impervious Areas prior to 1993 = "B"
_____ 4. Existing Impervious Areas after 1993 = "C"
_____ 5. Total Undeveloped Acreage under regulations = "D" = A-B
_____ 6. New acreage of Impervious Area Proposed = "E"
_____ 7. Percentage of Impervious area proposed = "P" = [(C+E) / (D)]*100

B. Delineation of on-site and off-site drainage areas including number of acres

C. Direction of stormwater flow and exits from the site

D. Plan view and profiles of the stormwater drainage system

_____ 1. Location of inlets, manholes, pipe lines, and other storm drainage structures
_____ 2. Location of existing and proposed conveyance systems such as grass channels, swales, natural vegetated conveyance, etc.
_____ 3. Clearly defined lines delineating areas drainage to each inlet
_____ 4. Ditches, swales, pipes, and drainage easements which are adjacent to the proposed project
_____ 5. Drainage Easement widths, where required for closed systems
_____ 6. Drainage Calculations (include Data Sheet tables for stormwater Drainage Structures Design and Stormwater Drainage pipe design)
_____ 7. A detailed grading plan that should include finish grading for the residential unit in case of subdivision and other developments

E. Delineation of Predominant Soil Types (from soil surveys if available)

F. Delineation of Existing Predominant Vegetation

G. Location and boundaries of other natural feature protection and conservation areas such as wetlands, lakes, ponds, floodplains, stream buffer and features used in designing buffers and meeting any applicable buffer requirements. Other setbacks (e.g. drinking water well setbacks, septic setbacks, etc.).

H. Preliminary selection, size, calculations and location of proposed Stormwater Control Measures (SCMs) or structural Best Management Practices (BMP's). Low-impact design elements if applicable.

8.4.3 Transportation Requirements

A. Site Information

_____ 1. # of units
_____ 2. Specific use of each proposed building (if special use)
_____ 3. Anticipated trips generated (ITE trip gen manual) with distributions
_____ 4. TIS ___Yes ___No (required on trips over ___/day or ___/peak hour)
_____ 5. Off sight improvements required (___Yes ___No)
_____ 6. Phasing plan (___Yes ___No)

B. Functional Criteria for every proposed street or connecting street

_____ 1. Functional classification
_____ 2. Target speed
_____ 3. Traffic volume
_____ 4. Design vehicle
_____ 5. Block lengths
_____ 6. Cross-section

C. Design Requirements for every proposed street or connecting street

_____ 1. Sight distance
_____ 2. Street grades
_____ 3. Centerline radius
_____ 4. Bridges or culverts (___Yes ___No)

D. Intersections

_____ 1. Type of stop control
_____ 2. Turn lanes
_____ 3. Pedestrian accommodations
_____ 4. Interconnectivity with adjacent properties
_____ 5. Label street stubs for future extension
_____ 6. Label street terminations
_____ 7. Curb radii

E. Driveways

_____ 1. Type
_____ 2. Location

_____ 3. Spacing
_____ 4. Vertical profile
_____ 5. Width

F. Pedestrians/Bicycles

_____ 1. Access into/out of site
_____ 2. Internal access to all structures or parking
_____ 3. Greenways or other biped infrastructure not attached to streets

G. Parking

_____ 1. Parking Lots
_____ 2. Private driveways
_____ 3. Public-On street
_____ 4. Public-Off street

H. Traffic Management Plans

_____ 1. Loading zones must be indicated
_____ 2. Fire infrastructure access management plan
_____ 3. Refuse Location and access plan

8.5 Community Development Department Construction Plan Submittal Checklist

The following section provides a list, which should be used by the applicant before any engineering design submittal so that applicants are aware of the minimum requirements in order to receive a complete review. The checklists in this section are intended as a guide and may not be inclusive of all the required information. The engineering design review checklist is a submittal requirement.

Project Information

Development Name:	Phase:	
Owner:	Phone:	Email:
Contact Person:	Phone:	Email:

General Requirements

_____ 1. Cover letter
_____ 2. Attach Community Development approval (rezoning, subdivision, special use, etc.) to the plans
_____ 3. Appropriate checklist completed and attached

8.5.1 General Information Required on All Plans

_____ 1. Development Name
_____ 2. Owner(s) Name(s) & Contact Information

_____ 3. Preparer Name & Contact Information
_____ 4. Vicinity Map (Scale of 1" = 2,000')
_____ 5. Graphic Scale, Date & North Arrow
_____ 6. Property Boundaries w/ Bearings & Distances

_____ 7. Adjoining Property Owners w/ Tax Pin Numbers & Zoning Information
_____ 8. Adjoining Roadways w/ Right-of-Way Dimensions
_____ 9. Current Zoning (and Proposed Zoning if applicable)
_____ 10. Total Site Acreage
_____ 11. Existing Easements & Building Setback Limits shown
_____ 12. Proposed Easements, ROW, Common Areas, Areas Dedicated to Public Use
_____ 13. Building Footprints w/ Square Footages & Finished Floor Elevations
_____ 14. Location of Existing & Proposed Utilities
_____ 15. Limits of Proposed Pavement w/ Dimensions & Curve Radii
_____ 16. Limits of 100 Year Floodplain where applicable
_____ 17. Location of Existing Structures

8.5.2 Engineering Requirements

A. Lighting Plan

_____ 1. Preparer Name & Contact Information (Duke Energy)
_____ 2. Specify the Type of Lighting being used & Total Number Proposed
_____ 3. Roadway Rights-of-Way & all Lots w/ Lot Numbers
_____ 4. Typical Street Section Detail

B. Grading & Erosion Control Plan

_____ 1. Clearing Limits
_____ 2. Existing & Proposed Contours (2' contour interval)
_____ 3. Location of Erosion Control Measures
_____ 4. Location of Perennial and Intermittent Streams w/ applicable buffers

8.5.3 Stormwater Requirements

Note: See the Town of Kernersville Stormwater and Administrative Manual for a full set of requirements.

1. Site plan at a scale of not less than one (1) inch equals one hundred (100) feet.
2. Property lines with bearings and distances of the land to be developed; names of the owners of all adjacent land.
3. Watershed Site Data Block. Including in this Data Block:
    a. Watershed Name & Classification
    b. Total Site Acreage = "A"
    c. Existing Impervious Areas prior to 1993 = "B"
    d. Existing Impervious Areas after 1993 = "C"
    e. Total Undeveloped Acreage under regulations = "D" = A-B
    f. New acreage of Impervious Area Proposed = "E"

g. Percentage of Impervious area proposed = "P" = [(C+E) / (D)]*100

4. Drainage System. Proposed facilities, including location, dimensions, and calculations for open channels, storm sewers, culverts, and any other drainage features.
5. Topographic contours at an interval of two (2) feet, showing existing and proposed contours.
6. Stream buffer access, streams, lakes, ponds, wetlands, drain-ways, floodways and floodway fringe areas within two hundred (200) feet of the subject property.
7. All existing right-of-ways, drainage easements or other dedication to the use of public or others with widths. All existing structures and built-upon areas, including parking, expressed in square feet, with surface treatments indicated.
8. All proposed right-of-ways, easements, parks, playgrounds and other areas proposed to be dedicated to public or common use, or designed for such use; including finished elevations on all streets and stub streets.
9. Proposed lot lines, dimensions of lots. Lot number and total number of lots, and proposed use of land.
10. Location of right-of-way widths of all existing and proposed streets; water and sewer lines.
11. The legend of the development plat shall contain the name of the owner(s) of the property and of the authorized agent, if any; the name of the engineer or landscape architect with registration seal, responsible for the plan; north arrow; scale; date; total area, stated in acres, of the land to be developed.
12. Engineered Stormwater Control Measures (SCMs) or Best Management Practices (BMPs). Including location, dimension, and calculations for:

    a. Total stormwater runoff from design storm, both for pre-development and post-development conditions.
    b. Location, dimensions, and calculations for open channels and storm drainage system, including channel linings for design storm.
    c. Plans, calculations, and specifications for Best Management Practices or Stormwater Control Measures (wet detention ponds, bio-retention areas, sand filters, etc.) proposed.

13. Vicinity map at a scale of not less than one (1) inch to 1000 feet showing the relation of the property to adjoining property and to all streets, roads, and existing drainage ways within 200 feet of any part of the property to be developed.
14. Where the plan for subdivision includes a lake or pond of one (1) acre or more in size, existing or proposed, the plan shall show the location of dams, spillways or other structures and the location and extent of inundation at full reservoir. The plan shall be accompanied by a profile of the proposed dam structure(s) including all appurtenances thereto.
15. Erosion and Sedimentation Control Plan (Confirmation of approval by City/County Inspections Department in charge, if required).
16. Delineation of on-site and off-site drainage areas including number of acres.
17. Detailed proposed grading plan and flow paths.
18. Operation and Maintenance Plan for each storm water control structure proposed.
19. Operation and Maintenance Agreement for each storm water control structure Proposed.
20. Deed of Easement (must be recorded after signatures).
21. Covenants and Restrictions (If applicable*).

22. Contractor's estimated cost for construction of BMP(s) or SCM(s) if applicable.
23. Performance Surety for Construction and Maintenance of BMP(s) or SCM(s) if applicable. If owner's association is to own the best management practice(s), the association covenants and restrictions must be approved prior to permit issuance.

Items listed above shall be submitted, reviewed and approved to issuance of a Watershed/Stormwater Management Permit.

8.5.4 Transportation Requirements

A. Coordination with approved site plan

_____ 1. Site plan hasn't changed
_____ 2. Functional criteria for each street listed matches approved site plan
_____ 3. Intersections match approved site plan
_____ 4. Driveways match approved site plan
_____ 5. Biped accommodations match approved site plan
_____ 6. Traffic Management plans match approved site plan

B. Functional Criteria for every proposed street or connecting street

_____ 1. Functional classification
_____ 2. Target speed
_____ 3. Traffic volume
_____ 4. Design vehicle
_____ 5. Block lengths
_____ 6. Cross-section

C. Horizontal Design

_____ 1. Alignment shown and labeled on plan view
_____ 2. Curve Data on plans
_____ 3. Pavement width identified
_____ 4. Taper
_____ 5. Guardrail
_____ 6. Islands/Medians

D. Vertical Design

_____ 1. Roadway profile with centerline and back of curb elevations shown
_____ 2. Vertical curve data on plans
_____ 3. Grades
_____ 4. Drainage profiles shown

E. Storm Drainage

_____ 1. Calculations attached
_____ 2. Table on plans
_____ 3. All pipes and structures shown and labeled on plan & profile
_____ 4. Drainage areas identified on plan view
_____ 5. Gutter spread
_____ 6. Ditch cross-sections

F. Utilities

_____ 1. CCUC or City of High Point approval for water/sewer
_____ 2. Water/sewer in approved cross-sectional corridor
_____ 3. Utilities in approved cross-sectional corridor
_____ 4. Minimum cover

_____ 5. Street lights

G. Cross-sections

_____ 1. Pavement width, depth and type
_____ 2. Superelevation
_____ 3. Drainage ways
_____ 4. Furniture zone
_____ 5. Biped accommodations
_____ 6. ROW & Easements shown
_____ 7. Utility corridors identified
_____ 8. Cut/fill slopes

H. ROW & Easements

_____ 1. ROW
_____ 2. Utility Easements
_____ 3. PDE
_____ 4. Sight distance triangles
_____ 5. Setbacks
_____ 6. Buffer yards

I. Bridges and culverts

_____ 1. Independent Review

J. Intersections

_____ 1. Stop control
_____ 2. Storage lengths
_____ 3. Curb radii
_____ 4. Pedestrian treatments
_____ 5. Sight distance

K. Driveways

_____ 1. Type
_____ 2. Location
_____ 3. Spacing
_____ 4. Vertical profile
_____ 5. Width

L. Biped

_____ 1. Sidewalks
_____ 2. Pedestrian crossing
_____ 3. Greenways

M. Parking

_____ 1. On street-marked
_____ 2. On street-unmarked
_____ 3. Private Lot
_____ 4. Private drives

N. Details

_____ 1. Non-standard items

O. Traffic Control

_____ 1. Signage
_____ 2. Markings

P. Other

_____ 1. Fire Prevention Infrastructure
_____ 2. Refuse/Recycling Infrastructure

8.6 Revisions to Approved Plans

Any revisions (including any revised phasing) made to construction plans that have been approved will void the approved plans and must be re- submitted through the review process for approval.

All revisions must be "hi-lighted" on all copies each time they are submitted. Any revisions not "hi-lighted" will not be reviewed.

8.7 Record Drawings

After the water, sewer, storm drainage and roadway improvements have been constructed, and prior to final acceptance, a "Record Drawing" must be submitted.

A "Record Drawing" shall be marked as such and the Construction Services Staff will inspect the job site to verify accuracy of the "Record Drawing." If errors are found, the drawing must be corrected and re-submitted.

Once the Community Development Department has verified the "Record Drawing" to be accurate, the Submitting Engineer must submit the following:

- Two (2) digital copies of "Record Drawing" (one DWG format and one PDF format), and one (2) digital copies of the final plat (one DWG format and one PDF format).

Note: Project must be submitted on one disk. Use a DVD or CD as needed.

8.8 Record Drawing Checklist

The following section provides a list, which should be used by the applicant before any record drawing submittal so that applicants are aware of the minimum requirements in order to receive a complete review. The checklists in this section are intended as a guide

and may not be inclusive of all the required information. The record drawing checklist **IS** a submittal requirement.

8.8.1 Community Development Department Record Drawing Submittal Checklist

The following section provides a list, which should be used by the applicant before any engineering design submittal so that applicants are aware of the minimum requirements in order to receive a complete review. The checklists in this section are intended as a guide and may not be inclusive of all the required information. The record drawing review checklist **IS** a submittal requirement.

Development Name:	Phase:	
Owner:	Phone:	Email:
Contact Person:	Phone:	Email:

General Requirements

_____ 1. Cover letter
_____ 2. Community Development approval attached
_____ 3. Appropriate checklists completed and attached
_____ 4. All required construction inspection documentation as defined in Chapter 10
_____ 5. Distances should scale to within five (5) feet along with corrected stations shown on plan and profile view.
_____ 6. All installed pipe sizes, pipe materials and pipe locations shall be indicated.
_____ 7. Water and sewer connections shall be shown in plan view.
_____ 8. On the plan view, show stations on all water line valves, tees, bends, hydrants, etc. Use street centerline stationing when applicable, with an offset distance left or right of the street centerline. (Example: 8" G.V. & Box, CL Sta. 10+45, 17' LT.)
_____ 9. Label all valves on the plan view.
_____ 10. "Record Drawing" stations for all sanitary sewer manholes shall be shown in the plan and profile views. Use street centerline stationing when applicable, with an offset distance left or right of the street centerline. (Example: MH Sta. 3+01.59, 20' RT.)
_____ 11. Profile view for sanitary sewer shall have "Record Drawing" depths for manholes.
_____ 12. "Record Drawing" manhole invert elevations for all incoming and outgoing lines shall be shown in profile view.
_____ 13. "Record Drawing" grades shall be shown in profile view with grades carried out two decimal places (Example: 2.68%)
_____ 14. Changes in horizontal alignment of water, sewer and storm drainage lines shall be shown in plan view.

_____ 15. "Record Drawing" grades, inverts and locations of all storm drainage structures (storm lines, catch basins, yard inlets, etc.) shall be shown in plan and/or profile view.

_____ 16. Remove "Proposed" from all manholes, pipes, etc.

Record drawings should meet **ALL** items listed for detailed design as well as all utility owner requirements from the appropriate water and sewer service provider listed below:

8.8.2 Winston-Salem/Forsyth County Utility Division

Winston-Salem Infrastructure Development Standards

http://www.cityofws.org/Home/Departments/Engineering/Articles/Publications

(Section II Pages 25-26 in the February 2013 edition)

8.8.3 City of High Point Public Services Department

Infrastructure Inspection Policy for Land Development

http://www.highpointnc.gov/cengr/docs/InspectionPolicy.pdf

9 PERMITTING

9.1 General

New construction with in the Town or its ETJ may require the developer to obtain several different permits. Below is a list of permits that may be required along with the appropriate contacts and their contact information. If you are not sure if a permit is needed, please contact the Community Development Department for assistance.

All permit applications and associated fees should accompany the final submittal of construction drawings. Copies of blank permit applications are available online at http://toknc.com

9.2 Driveway Permits

Prior to installation of any new driveway(s), or modifications to existing driveways, accessing Town of Kernersville or NCDOT maintained streets and road rights-of- way, either an approved Town of Kernersville Driveway Permit, or an approved NCDOT Driveway permit (whichever is applicable) is required. ***Note: As of the date of this manual, a **single-family residential driveway connection to an **NCDOT** maintained roadway, does **not** require a driveway permit from NCDOT.*

All new driveway connections to Town of Kernersville maintained streets will require a concrete driveway apron per Town Standard No. 335,336 or 337 whichever is applicable. A copy of the Town's Driveway Permit Application is available from the Community Development Office at Town Hall or online at http://toknc.com/. Copies of the NCDOT driveway permit can be obtained on line at http://www.ncdot.gov/ or at the NCDOT division offices.

Contacts:

Town of Kernersville: Community Development Department
336-992-0605

For Forsyth County: NCDOT, District Engineer
375 Silas Creek Parkway
Winston-Salem, NC 27127
336-703-6500

For Guilford County: NCDOT, District Engineer
P.O. Box 14996
Greensboro, NC 27415
336-487-0100

9.3 Encroachment Permit

An encroachment permit is required when any developer, contractor, utility company or other government agency proposes work of any nature, other than routine maintenance, in the Town of Kernersville's Right-Of-Way. A copy of the town's permit application is online at http://toknc.com on the Public Services Department page or at the Public Services facility located at 720 McKaughan Street.

Contact:

Town of Kernersville: Community Development Department
336-992-0605

A three-party NCDOT encroachment agreement is required when any developer, contractor, utility company or other government agency proposes work of any nature, other than routine maintenance, in NCDOT's Right-Of-Way. Copies of the three party encroachment agreement are available on the NCDOT web site at www.ncdot.gov.

Contacts:

For Forsyth County: NCDOT, District Engineer
375 Silas Creek Parkway
Winston-Salem, NC 27127
336-747-7900

For Guilford County: NCDOT, District Engineer
P.O. Box 14996
Greensboro, NC 27415
336-487-0100

9.4 Stormwater and Watershed Protection

A Watershed/Stormwater Permit is required for all development and redevelopment, unless exempt by the stormwater and watershed ordinances. The permit is intended to provide a mechanism for the review, approval, and inspection of the approach to be used for the management and control of stormwater for the development or redevelopment site consistent with the requirements of the stormwater and watershed ordinances, whether the approach consists of structural BMPs or other techniques such as low-impact or low- density design. A copy of the town's permit application is available in the Town's Watershed and Administrative Manual, or on line at http://toknc.com

Contact:

Town of Kernersville: Watershed Administrator / Stormwater Engineer
336-564-1615

9.5 Stream Crossings or Wetlands Disturbance

Any development or redevelopment activity that proposes to cross or disturb any length of stream or disturb more than 0.1 (one-tenth) of an acre of wetlands may require a notification or a permit obtained through USACE (US Army Corps of Engineers), and the NCDEQ Division of Water Resources 401 & Buffer Permitting Branch.

9.6 Water and Sewer Permits

Any development or redevelopment that requires a new or upgraded connection to public or private water and sewer systems will require a water and/or sewer permit. These permits are obtained through CCUC or The City of High Point.

Contact: City County Utilities
Plans Review Coordinator
336-771-5121

Contact: City of High Point
Engineering Services Department Director
336-883-3194

9.7 Sediment and Erosion Control

All projects which disturb more than one acre within the Town of Kernersville and its Extraterritorial Jurisdictional (ETJ) must have an approved Erosion and Sedimentation Control Permit from NCDEQ. Copies of the required forms and checklist can be found at http://portal.ncdenr.org/web/lr/forms, or by contracting the Winston-Salem regional office.

Contact: NCDEQ, Winston-Salem Regional Office
Regional Engineer
336-776-9654

9.8 Floodplain Permit

Contact the Community Development Department for copies of the required permits for development in a floodplain.

9.9 Public Trees and Landscaping Plans

9.9.1 Public Trees

The Town of Kernersville adopted on December 7, 2010, the “Kernersville Public Tree Ordinance” which regulates and controls the planting, maintenance and removal of trees and shrubs on Town owned or controlled property, which is property owned or leased by the Town of Kernersville or is property that the Town controls through rights-of-way and

easements for public purposes, such as streets, the construction and maintenance of public utilities, the provision of pedestrian access across private land, the development and maintenance of greenways and open space, or the protection of water quality.

This ordinance requires that an “Encroachment Permit” be issued by the Town of Kernersville Public Service Department to public utilities, other government agencies, developers, contractors; civic groups and individuals to perform work on trees, plants or shrubs on Town controlled Public Rights-of-way in accordance with the terms and conditions indicated in the ordinance. Therefore, any project that involves work on trees and shrubs as conditioned in the preceding paragraph must submit a copy of the approved encroachment permit prior to obtaining project approval by the Public Services Department, and comply with the Kernersville Public Tree Ordinance. For more information about the Encroachment Permit and the Kernersville Public Tree Ordinance, please visit The Town of Kernersville web site.

9.9.2 Landscaping

All landscape plans for new construction or up fits to changes in landscape to existing sites will be reviewed and approved by the Community Development Department as a part of the building permit process. Developers will be required to meet the Town of Kernersville Unified Development Ordinance standards.

10 CONSTRUCTION/INSPECTION STANDARDS

10.1 General

Construction shall not begin until the following applicable items have been obtained:

1. Town of Kernersville UDO Approval. (Community Development Department)
2. Erosion and Sedimentation Control Permit (NCDEQ)
3. Construction Drawing Approvals (Community Development Department)

The following additional permits or approved drawings must be obtained before work can begin on their respective areas.

1. Construction Drawing Approvals (Community Development Department)
2. Watershed/Stormwater Permit (Stormwater Administrator)
3. Utility Installation Permits (CCUC)
4. Encroachment Agreement (TOK and/or NCDOT)
5. Driveway Permit(s) (Community Development Department or NCDOT)

Failure to adhere to these preliminary requirements as well as the requirements contained in this section titled CONSTRUCTION/INSPECTION STANDARDS shall constitute an immediate issuance of a "Stop Work Order" from the Public Services Director. Penalty of continuation of work after a "Stop Work Order" has been issued is $200.00/calendar day.

Refer to the Stormwater Administrative Manual for inspections on Stormwater BMPs.

10.2 General Construction Requirements

Each phase of the work will be satisfactorily completed as shown on the "Approved" plans before the next phase will be allowed to begin, except those items of work that may be performed concurrently.

All construction tolerances and materials will conform to NCDOT standard drawings and specifications or as may be included in this manual.

Should construction be discontinued during the winter, the entire project will be re-evaluated in the spring. All necessary corrections to prior work will be made at that time and the project can proceed to the next phase.

Following the completion of all work items, the developer and/or their engineer will inspect the project for compliance with the construction drawings. At this point, shoulders shall be graded to typical section, all utility adjustments shall be made, and all underground lines shall be free of silt debris.

After the developer and/or their engineer have inspected the development and verified that any needed corrections have been made, the Streets Division shall be contacted to schedule a final inspection. If the project is not accepted, the Streets Division will provide the developer or their representative with a checklist of corrections (punch list).

Once a final inspection has been conducted, the developer will be required to sign a one (1) year warranty on all roadway and storm drainage improvements. The Developer and/or Engineer shall submit "Record Drawings" and "Final Plat" both in hard copy (1) and electronically (one disc).

10.3 Chief Construction Inspector (CCI) Status

10.3.1 General

The CCI is the Town's primary representative and is responsible for insuring that all work in subdivisions and public rights of way is constructed in accordance with the approved construction drawings, this manual and the NCDOT Standard Specifications. The CCI will insure that the above is accomplished through supervision of the Construction Inspectors and communications with the developer/contractor. The CCI is also the chief liaison between the developer and other Town Officials. The authorities and limitations of the CCI are set forth below:

10.3.2 Authority

The CCI has all the same authorities as listed for the Construction Inspector.

The CCI also has the authority to request any documents needed to show proof of payment to Contractors and Sub-Contractors or material suppliers for the verification of bonding amounts.

The CCI also has the authority to order the developer/contractor (at their cost) to perform surveys, materials testing or other engineering inspections as may be required to insure that the standards in this manual, NCDOT Standard Specifications and/or Manufacturers guidelines are adhered to.

The Public Services Director has the authority to temporarily suspend work until any conflict in interpretation of the construction drawings, specifications and manufacturers' guidelines can be clarified with the design engineer and changes made as needed.

10.3.3 Limitations

The CCI may not approve or disapprove any changes in the scope of work as approved by the Board of Aldermen (BoA).

The CCI may not specify the contractor's means and methods of construction; however, he may make recommendations. If the Contractor's means and methods are producing work that does not meet the standards of this Manual, the CCI or Inspector will notify the contractor that he/she must change their means and methods to conform to these requirements.

The CCI is not responsible for the safety programs instituted by the contractor or required by the Occupational Safety and Health Act.

The CCI is not responsible for the enforcement of the Sedimentation Control Act; however, he/she may inform the contractor when in violation. If contractor does not remedy the violation, the CCI may contact the NCDEQ, Land Quality Section for a formal inspection.

10.4 Construction Inspector's Status

10.4.1 General

The Construction Inspector is the Town's primary resident representative and is responsible for insuring that all work is constructed in accordance with the approved construction drawings, this manual and the NCDOT Specifications. The Inspector will insure that the above is accomplished through visual inspections, surveys, materials testing and communications with the developer and/or contractor. The Inspector is also responsible for maintaining a written record of daily progress to be filed with the permanent project records. The authorities and limitations of the Inspector are set forth below:

10.4.2 Authority

The Inspector has the authority to reject materials and workmanship that do not meet the requirements of this manual, NCDOT Standards (if applicable), shop drawings, manufacturer's specifications and the construction drawings. The Developer/Contractor will uncover or safe-up any item of work that the Inspector wishes to see.

The Inspector has the authority to maintain a written record of daily events and to photograph any item of work.

The Inspector has the authority to temporarily stop construction for any item of work if materials testing must be performed, an inspection conducted or if the item does not meet the requirements of the plans and specifications. All work may be temporarily stopped if the Inspector observes a life-threatening hazard to himself, the contractor's forces or the general public.

10.4.3 Limitations

The Inspector may not approve or disapprove any changes in the scope of work or issue any field orders.

The Inspector may not specify the contractor's means and methods of construction; however, he/she may make recommendations. If the Contractor's means and methods are producing work that does not meet the standards of this Manual, the Inspector will notify the contractor that he/she must change to conform to these requirements.

The Inspector is not responsible for the safety programs instituted by the contractor or required by the Occupational Safety and Health Act.

The Inspector is not responsible for the enforcement of the Sedimentation Control Act;

however, he/she may inform the contractor when in violation. If contractor does not remedy the violation, the Inspector will inform the Construction Services Manager.

10.5 Construction Procedures for Town Inspected Projects

10.5.1 Beginning Construction

Hold a preconstruction meeting with the Town's Community Development Department and Public Services Department after final plans have been approved, and prior to the start of construction.

10.5.1.1 Clearing and grubbing operations may begin while construction drawings are being approved. An erosion control permit must be obtained from the NCDEQ prior to any land disturbing activities over one (1) acre in size. Erosion Control and Division of Water Resources permits must be obtained as site conditions dictate.

10.5.1.2 Contractors shall have "Approved" plans on the job site while any work other than clearing and grubbing is being performed.

10.5.1.3 Any work done without proper inspection will be subject to being uncovered or removed as required to fully verify compliance with the "Approved" plans, specifications, and proper construction practices.

10.5.2 Construction Sequence

The Street Division has the responsibility to control the order of construction phases, check the materials used, and to determine the acceptability of construction operations relative to recognized standards and specifications. Unless specifically approved by the Street Division, the construction sequence should follow ***Table 10.1 Construction Sequence Guideline for Town Inspected Construction*** below. The Town's Inspector will check items listed under Town's Inspector as the work progresses. An inspection is REQUIRED under items listed under the Inspection required column before the next step of construction can proceed.

Table 10.1 Construction Sequence Guideline for Town Inspected Construction

#	Inspection Activity	Town's Inspector	Inspection Required
Note: Clearing may be started prior to plan approval			
1	Conduct Preconstruction Conference	X	
2	Obtain all Permits, Encroachment, Erosion, etc.	X	
3	Have an approved final set of plans	X	
4	Stake the clearing limits		

5	Stake and install all of the erosion control devices possible prior to grubbing	X	
6	Clear and grub the site	X	
7	Stake and install the remaining erosion control devices	X	
8	Slope stake		
9	Rough grade within R/W and utility easements	X	X
10	Temp. seeding and mulching shall be performed as needed to meet the erosion control permit Requirements	X	
11	Density testing as needed	X	
12	Stake and install the storm drainage and sewer mains and services. All services to be outside of the sidewalk limits	X	X
13	Install erosion control devices around storm drain structures	X	
14	Stake and install all water mains and services. All services to be outside of the sidewalk limits		
15	Stake and install the utility conduits lines		
16	Density testing as needed on trench lines, specifically within R/W	X	
17	Sub-grade fine grading	X	
18	Sub-grade, proof roll and density testing as needed	X	X
19	First lift of ABC placement	X	
20	Staking and placement of C&G	X	X
21	Backfill of C&G	X	
22	Completion of ABC placement, fine grading and setting up of the ABC	X	
23	Proof roll and grade check of ABC, density testing as needed	X	X
24	Placement of Intermediate course asphalt	X	X
25	Shoulder and utility easements to be close to final grade ± 0.1	X	
26	Install utility lines within the utility easements	X	
27	Street light installation	X	
28	Grade and place sidewalks	X	X
29	Finish dressing up shoulders and utility easements	X	
30	Placement of surface course asphalt	X	X
31	Core samples collected on Roadway	X	

32	Installation of pavement markings if required	X	
33	Final seeding of R/W and utility easements	X	
34	Final Inspection conducted and certifications submitted	X	X

10.5.3 Notification for Inspections

It is the responsibility of the contractor to notify the Street Division **before each work phase begins**. Failure to notify the Street Division for an inspection may result in the need to uncover completed work. The Town reserves the right to deny final acceptance of streets and storm drainage systems where developers failed to construct as per the standards in this manual and/or fail to make repairs as directed by the Inspector. Notification should be made two (2) days in advance.

For an inspection, call the Street Division- at (336) 996-8008. Call between 7:30 a.m. and 4:00 p.m. to schedule an inspection. For BMP inspections refer to the Stormwater Administrative manual.

Failure to properly notify will result in work being uncovered or removed as required to fully verify compliance with the "Approved" plans, specifications, and proper construction practices. Schedule of Inspections:

10.5.4 Required Inspections

Rough Grade Inspections – Periodic rough grade inspections will be conducted by the Inspector. The developer/owner shall immediately notify the Street Division upon discovery of unsuitable soils such as, alluvial material, gumbo, underground springs, old fill material such as stumps, trees, top soil, trash, etc.

Storm Drainage Inspections – Periodic storm drainage installation inspections will be conducted by the Inspector to insure approved materials are being used and the installation conforms to the standards found in this manual and the NCDOT Standard Specifications. The developer/owner shall notify the Street Division before storm drainage work is scheduled to begin.

Subgrade Proof Roll – Forty-eight (48) hours prior to base placement, the subgrade shall be proof rolled by a loaded tandem dump or larger dump truck with certified weight ticket provided by the developer/owner under inspection of the Street Division. The developer/owner shall notify the Street Division before the proof roll to set up an appointment with the Inspector. If rain occurs between the proof roll and prior to base placement, another proof roll may be required. It is the responsibility of developer/owner to make corrections to the subgrade when sections of the roadway fail the proof roll test.

Curb & Gutter Placement Inspection – Periodic curb and gutter placement inspections will be conducted by the Inspector to insure approved materials are being used and the installation conforms to the standards found in this manual and the NCDOT Standard Specifications. The developer/owner shall notify the Street Division before curb and

gutter placement is scheduled to begin. No concrete will be placed until the forms and subgrade have been approved by the Inspector.

Roadway ABC Stone Base Proof Roll – The ABC stone base will be proof rolled by a loaded tandem or larger truck with certified weight ticket provided by the developer/owner under inspection of the Street Division. The developer/owner shall notify the Street Division before the proof roll to set up an appointment with the Inspector. It is the responsibility of developer/owner to make corrections to the ABC stone base and/or subgrade when sections of the roadway fail the proof roll test.

Plant Mix Asphalt Placement and Density Inspections – Periodic asphalt placement inspections will be conducted by the Inspector to insure approved materials are being used and the installation conforms to the standards found in this manual and the NCDOT Standard Specifications. The developer/owner shall notify the Street Division before asphalt placement is scheduled to begin. The Inspector may require another ABC proof roll if it has been longer than 72-hours since the last proof roll, significant rainfall event, or base has been damaged.

Sidewalk Placement Inspections – Periodic sidewalk placement inspections will be conducted by the Inspector to insure approved materials are being used and the installation conforms to the standards found in this manual and the NCDOT Standard Specifications. The developer/owner shall notify the Street Division before sidewalk placement is scheduled to begin. No concrete will be placed until the forms and subgrade have been approved by the Inspector.

Final Inspection – Prior to roadway maintenance acceptance by the Town of Kernersville a final inspection must be conducted. All "Record Drawing" requirements and punch list items must be completed, and a one (1) year warranty statement must be signed by the developer/owner for all improvements in the right-of-way and easements.

10.6 Construction Procedures for Privately Inspected Projects

10.6.1 Order of Construction

The Street Division has the responsibility to control the order of construction phases, check the materials used, and to determine the acceptability of construction operations relative to recognized standards and specifications. Unless specifically requested by the developer or their engineer and approved by the Street Division, the construction sequence should follow ***Table 10.2*** below.

Table 10.2 Construction Sequence for Privately Inspected Construction

#	Inspection Activity	Developers Inspector	Inspection Report Filed	Certification Filed ***	TOK Spot Inspection
Note: Clearing may be started prior to plan approval					
1	Conduct Preconstruction Conference	X			

2	Obtain all Permits, Encroachment, Erosion, etc.	X			
3	Have an approved final set of plans	X			
4	Stake the clearing limits	X	X		
5	Stake and install all of the erosion control devices possible prior to grubbing	X	X		
6	Clear and grub the site	X	X		
7	Stake and install the remaining erosion control devices	X	X		
8	Slope stake	X	X		
9	Rough grade within R/W and utility easements	X	X		X
	Interim Certifications			X	
10	Temp. seeding and mulching shall be performed as needed to meet the erosion control permit requirements	X	X		
11	Density testing as needed	X	X		
12	Stake and install the storm drainage and sewer mains and services. All services to be outside of the sidewalk limits	X	X		X
13	Install erosion control devices around storm drain structures	X	X		
14	Stake and install all water mains and services. All services to be outside of the sidewalk limits	X	X		
15	Stake and install the utility conduits lines	X	X		
16	Density testing as needed on trench lines, specifically within R/W	X	X		
	Interim Certifications			X	
17	Sub-grade fine grading	X	X		
18	Sub-grade, proof roll and density testing as needed	X	X		X
19	First lift of ABC placement	X	X		
20	Staking and placement of C&G	X	X		
21	Backfill of C&G	X	X		

	Interim Certifications			X	
22	Completion of ABC placement, fine grading and setting up of the ABC	X	X		
23	Proof roll and grade check of ABC, density testing as needed	X	X		X
	Interim Certifications			X	
24	Placement of Intermediate course asphalt	X	X		X
25	Shoulder and utility easements to be close to final grade +/- 0.1	X	X		
26	Install utility lines within the utility easements *	X	X		
27	Street light installation	X	X		
28	Grade and place sidewalks	X	X		
29	Finish dressing up shoulders and utility easements	X	X		
30	Placement of surface course asphalt	X	X		X
31	Core samples collected on Roadway	X	X		
32	Installation of pavement markings if required	X	X		X
	Interim Certifications			X	
33	Final seeding of R/W and utility easements	X	X		
34	Final Inspection conducted and certifications submitted **	X	X		X
	Certification of Completed Project			X	

* Utility locations will be approved by the Town and utility installations will be under the inspection of the appropriate utility company. All ditches will be proof rolled prior to base placement.

** Backfill, seeding and mulching, adjustments, cleanup, etc. shall be complete prior to final acceptance.

*** An example certification is at Appendix F.

10.7 Private Inspections

10.7.1 Purpose

To ensure that new construction inspected by others (consultants, testing laboratories, etc.) meet the Town of Kernersville standards before it is accepted into the town system.

10.7.2 Requirements

All new construction inspected by others (consultants, testing laboratories, etc.) which is to be accepted into the town system must be certified by a registered Professional Engineer.

10.7.3 Expectations

When work which is to be accepted into the town system has been completed, a "Certification of Final Completion" (see Appendix F) by the designing engineer is expected.

10.7.4 Permits

Verify that all Federal, State and Local permits have been acquired.

A copy of any USACE and DEQ permits (including any approved modifications) must be submitted with the final certification package.

A "Verification of Compliance with Environmental Regulations" form must be submitted with the final package (if form hasn't already been submitted during plan approval).

10.7.5 Alignment

Field verify that vertical and horizontal alignment of all aspects of construction are in reasonable close conformance to the approved plans and to the TOK Standards and Specifications.

Verify that new construction is centered in the platted right of way or utility easement. Verify that all materials meet TOK Specifications and are installed at the proper elevation and centered on the "public" easements.

10.7.6 Grading and Proof Rolling

Verify subgrade elevation ± 0.1 foot. Verify shoulder width and slope.

Verify ditch locations and depth.

Prepare the trench for stone base placement, which should be the approved pavement width + 3 feet.

Compact the top 8 inches of the subgrade to a density of 100%.

Perform a proof roll of the full width of the compacted subgrade with a fully loaded dump truck with a total gross weight of at least 40,000 lbs.

All failures must be repaired and rechecked to complete the proof roll.

A copy of the proof roll report must be submitted with the final package.

10.7.7 Aggregate Base Course Placement for Roadways

Place ABC base material at the required depth with a spreader to avoid segregation and to avoid contaminating the material with earth from the edge of the trench.

Add water if necessary to achieve the proper moisture content of the material prior to compaction.

Uniformly compact the material to the required compacted thickness at a density of 100%. Verify the top width of the compacted ABC base material to be the approved plan pavement width + 6 inches on each side.

Verify the approved plan thickness and correct density of the ABC base material prior to placement of any asphalt surface material.

10.7.8 Asphalt Surface Material Placement

Submit a Job Mix Formula Sheet for all asphalt mixes to be used in the work to the District Engineer's Office, 30 days prior to the anticipated placement of the material.

All asphalt, used in the work, must come from an NCDOT approved asphalt plant.

A QMS Certified Plant Technician must be present at the plant during the production of the material.

A QMS Certified Roadway Technician must be present on site during all placement of hot mix asphalt.

The approved plan thickness and density for each layer must be verified by an approved testing method performed by the Certified Technician.

A copy of the Roadway Technician's Report, the completed Job Mix Formula Sheet and the Certification of Pavement Conformance must be submitted with the final package.

A copy of all thickness and density testing reports must be submitted with the final package.

10.7.9 Roadway Shoulder Construction and Seeding and Mulching

The shoulders should be constructed in accordance with the approved typical section as soon after the placement of the final surface layer of asphalt as practical using caution not to damage the asphalt.

Seeding & mulching of shoulders, ditches and back slopes, utility easements and other disturbed areas must be completed within 14 days per NCDEQ of completing the construction or required by NCDEQ.

All required erosion control measures must remain in place until an adequate stand of vegetation is established.

10.8 Guardrail Placement

Guardrail will be placed when warranted and in accordance with the approved plans & NCDOT certified materials.

10.8.1 Sign Placement

Stop signs at intersections and signing for round-a-bouts will be placed on each road in accordance with the MUTCD and the approved plans.

A final inspection letter will not be issued until all required signs are properly installed to the appropriate standard with NCDOT approved materials and inspected.

All design and construction details not covered above or in the approved plans, should be found in the current editions of both the "NCDOT Subdivision Roads – Minimum Construction Standards" and the "NCDOT Standard Specifications for Roads and Structures" manuals.

10.9 Post Sidewalk Inspection Procedure

10.9.1 Purpose

To ensure that new sidewalks installed in the Town limits of Kernersville are in a proper workman condition prior to the issuance of a Certificate of Occupancy (CO).

10.9.2 Time of Inspection

The sidewalk inspection will be conducted at the end of the construction inspection process prior to the issuance of a Certificate of Occupancy.

10.9.3 Inspection Procedure

The Town of Kernersville Street Division shall conduct the inspection. The inspector shall examine the sidewalk for damage such as cracks, missing pieces, etc. If no damage is observed, the sidewalk will be passed. If damage is observed, the sidewalk will fail.

10.9.4 Failure of CO

If a sidewalk has been failed during an inspection, the Certificate of Occupancy will be denied until such repairs have been made to the satisfaction of the Street Division.

10.9.5 Referral of Failure

A copy of the inspection ticket with the location of failure will be sent to the Town of

Kernersville Street Division. The Street Division will determine the disposition of the failure.

10.9.6 Notification of Abatement of Failure

Once the owner and/or future occupant have made the repairs required by the Street Division, the Street Division shall notify the Community Development Department, and furnish a copy of the inspection ticket with a statement of the repairs.

APPENDIX A STANDARD DRAWINGS

TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT

Design Criteria:

Aggregate Size--Use 2-3 inch washed stone.

Dimensions of gravel pad--

Thickness: 6 inches minimum

Width: 12-ft minimum or full width at all points of the vehicular entrance and exit area, whichever is greater

Length: 50-ft minimum

Location--Locate construction entrances and exists to limit sediment from leaving the site and to provide for maximum utility by all construction vehicles. Avoid steep grades and entrances at curves in public roads.

Maintenance maintain the gravel pad in a condition to prevent mud or sediment from leaving the construction site. This may require periodic topdressing with 2-inch stone. After each rainfall, inspect any structure used to trap sediment and clean it out as necessary. Immediately remove all objectionable materials spilled, washed, or tracked onto public roadways.

Washing--If conditions at the site are such that most of the mud and sediment are not removed by vehicles traveling over the gravel, the tires should be washed. Washing should be done on an area stabilized with crushed stone that drains into a sediment trap or other suitable disposal area. A wash rack may also be used to make washing more convenient and effective.

Construction Specifications:

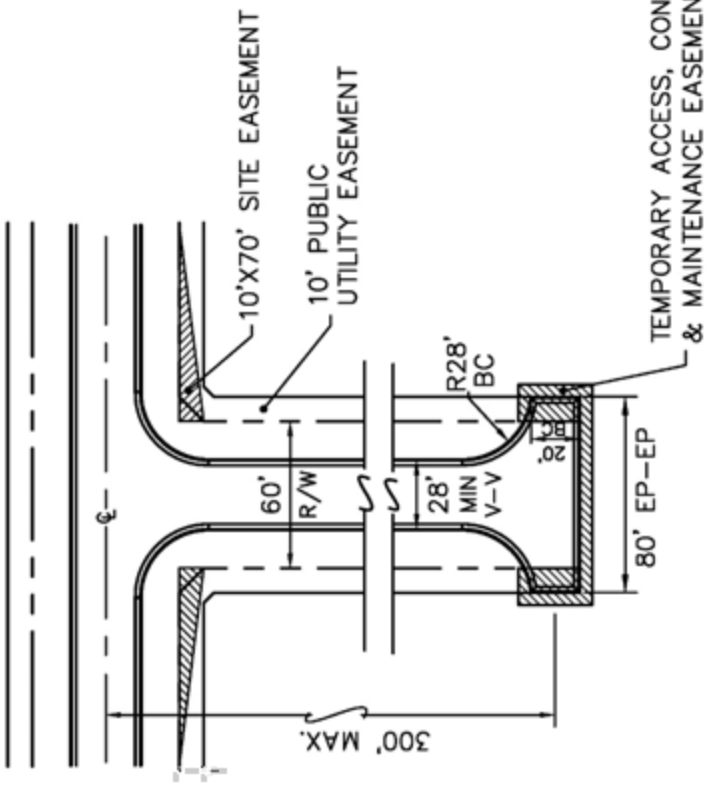
1. Clear the entrance and exit area of all vegetation, roots, and other objectionable material and properly grade it.
2. Place the gravel to the specific grade and dimensions shown on the plans, and smooth it.
3. Provide drainage to carry water to a sediment trap or other suitable outlet.
4. Use geotextile fabrics because they improve stability of the foundation in locations subject to seepage or high water table.

TOWN OF KERNERSVILLE
P.O. DRAWER 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-6916 FAX.: (336) 996-4059

CONSTRUCTION STANDARD
ROADWAY STD. No. 210

DATE: FEB. 01 SHEET OF

DRAWN BY: MWT | APPROVED BY: TS



PERMANENT
" T "
TURNAROUND

LEGEND

FC	FACE OF CURB
BC	BACK OF CURB
EP	EDGE OF PAVEMENT
V-V	VALLEY TO VALLEY

NOTES:

1) A PERMANENT "T" TURNAROUND SHALL BE UTILIZED ONLY WHEN TOPOGRAPHY PROHIBITS THE CONSTRUCTION OF A CIRCULAR TURNAROUND.
2) PAVEMENT SCHEDULE FOR "T" TURNAROUNDS WILL BE THE SAME AS FOR THE ROADWAY SECTION.

TOWN OF KERNERSVILLE
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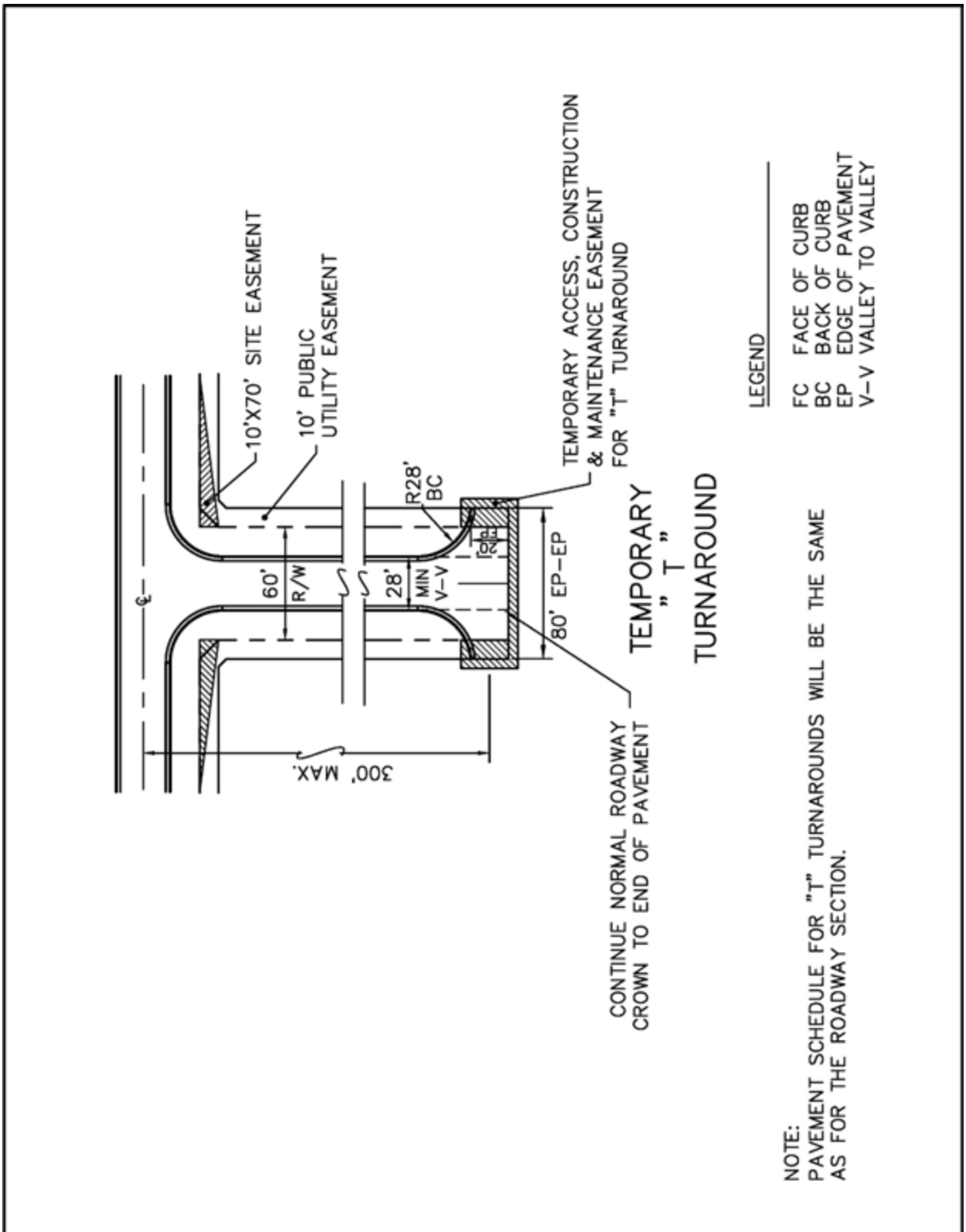
CONSTRUCTION STANDARD
ROADWAY STD. No. 307A

DATE: AUG. 2015 SHEET OF

DRAWN BY: MWT APPROVED BY: BH



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KERNERSVILLE, NORTH CAROLINA 27285
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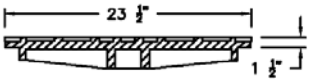
CONSTRUCTION STANDARD
ROADWAY STD. No. 307B

DATE: NOV., 2016 SHEET OF

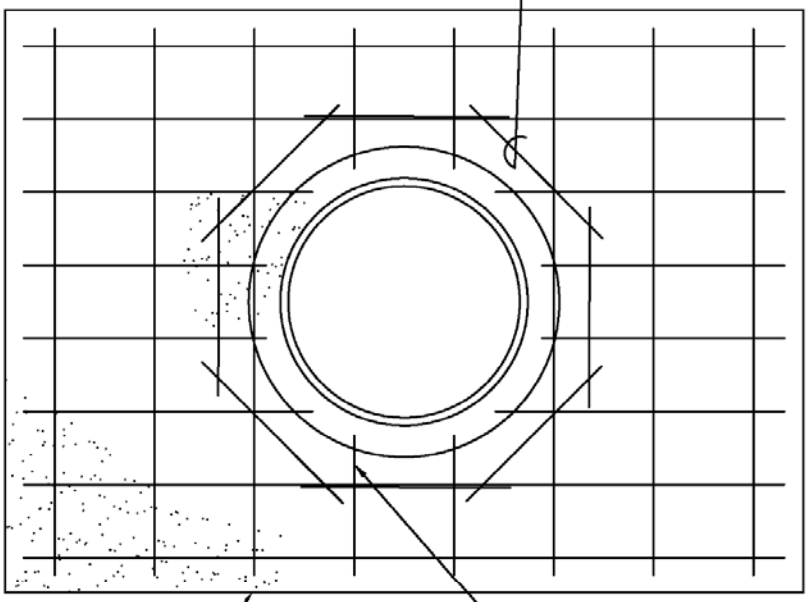
DRAWN BY: MWT APPROVED BY: DCM

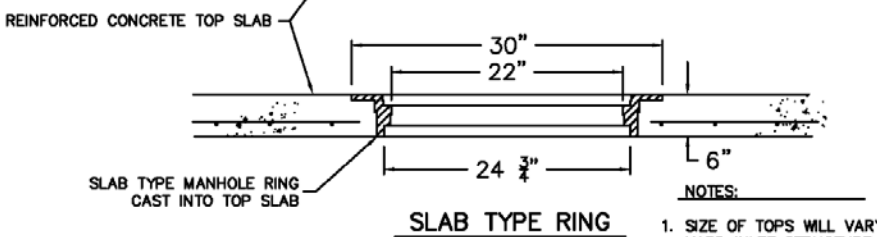
NOTE:
COVER SHALL BE LABELED "STORM" OR "STORM DRAIN".



SECTION A–A

COVER





SLAB TYPE RING

NOTES:

1. SIZE OF TOPS WILL VARY DEPENDING UPON YARD INLET STRUCTURE SIZE.
2. YARD INLET STRUCTURES WILL BE CONSTRUCTED TO NCDOT STANDARD SPECIFICATIONS. SEE THE LATEST EDITION OF NCDOT ROADWAY STANDARD DRAWINGS.
3. CONCRETE SHALL BE CLASS "A" 3,000 PSI, WITH STEEL REINFORCEMENT MEETING THE LATEST EDITION OF THE NCDOT STANDARD SPECIFICATIONS.

REINFORCED CONCRETE TOP FOR OPEN THROAT YARD INLETS

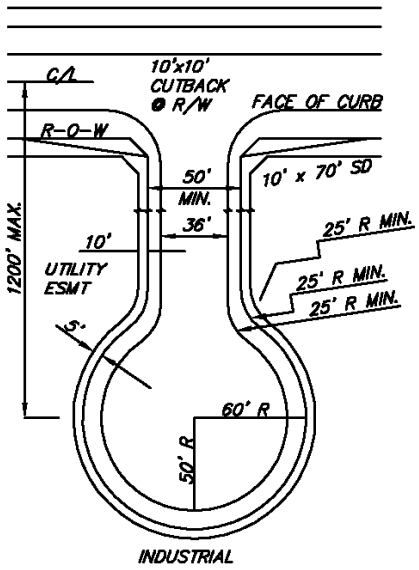
NOT TO SCALE

TOWN OF KERNERSVILLE
P.O. BOX 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996–3121 FAX.: (336) 996–4822

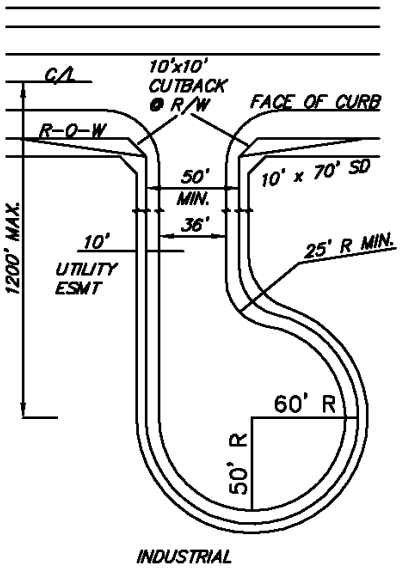
CONSTRUCTION STANDARD
ROADWAY STD. No. 308

DATE: SEP., 2016 SHEET OF

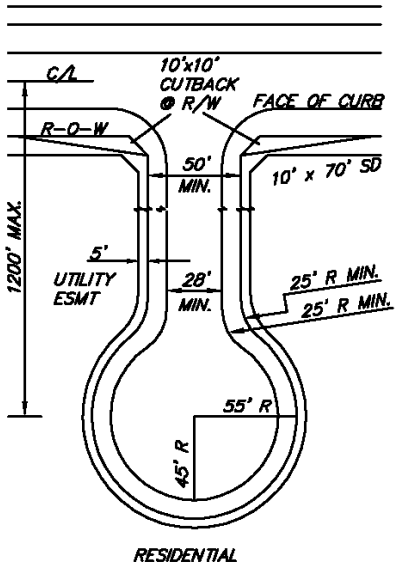
DRAWN BY: MWT APPROVED BY: DCM



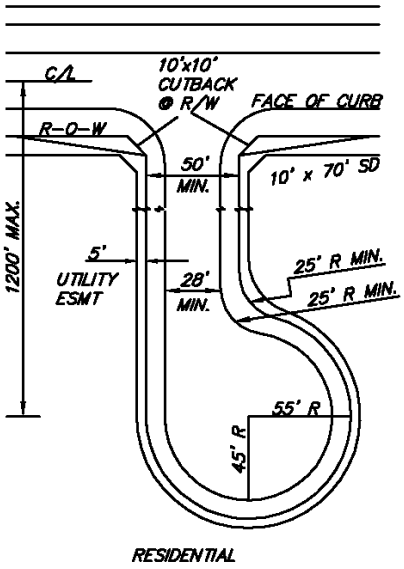
CIRCULAR
cul-de-sac



OFF-SET
cul-de-sac



CIRCULAR
cul-de-sac



OFF-SET
cul-de-sac

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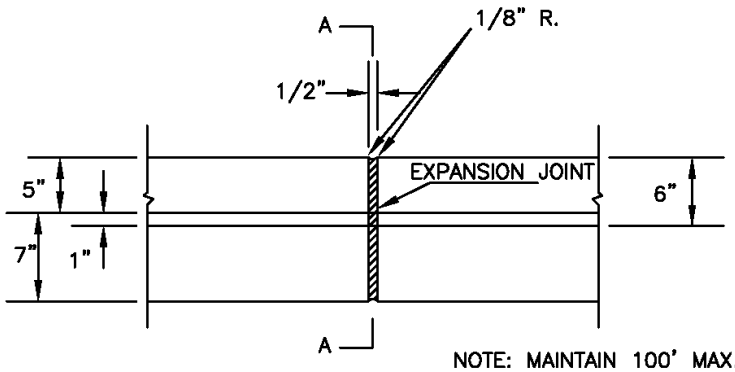
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-6916 FAX.: (336) 996-4059

CONSTRUCTION STANDARD
ROADWAY STD. No. 310

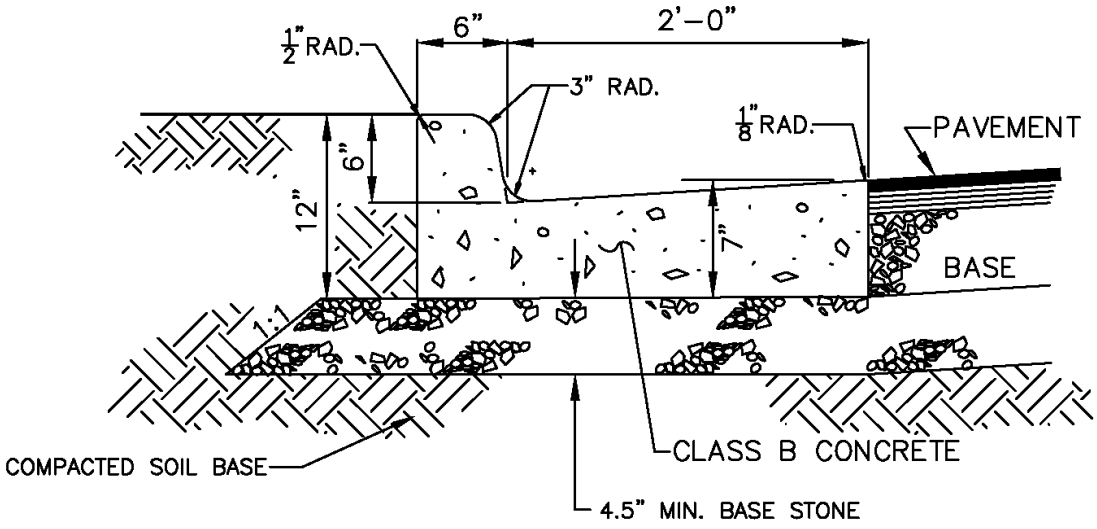
DATE: FEB. 01 SHEET OF

DRAWN BY: HSB | APPROVED BY: TS



NOTE: MAINTAIN 100' MAX. BETWEEN JOINTS
AN EXPANSION JOINT SHALL BE LOCATED
10' ON EACH SIDE OF A CURB INLET,
OR OTHER RIGID OBJECT.

FRONT ELEVATION
TRANSVERSE EXPANSION JOINT



SECTION A–A
SIDE ELEVATION

NOTES:

1. CONCRETE SHALL BE NCDOT CLASS B STANDARD MIX DESIGN.
2. CONTRACTION JOINTS SHALL BE SPACED AT 10' INTERVALS.(A 15' SPACING WILL BE ALLOWED WHEN A MACHINE IS USED.)
3. FINISH ALL CONCRETE WITH CURING COMPOUND

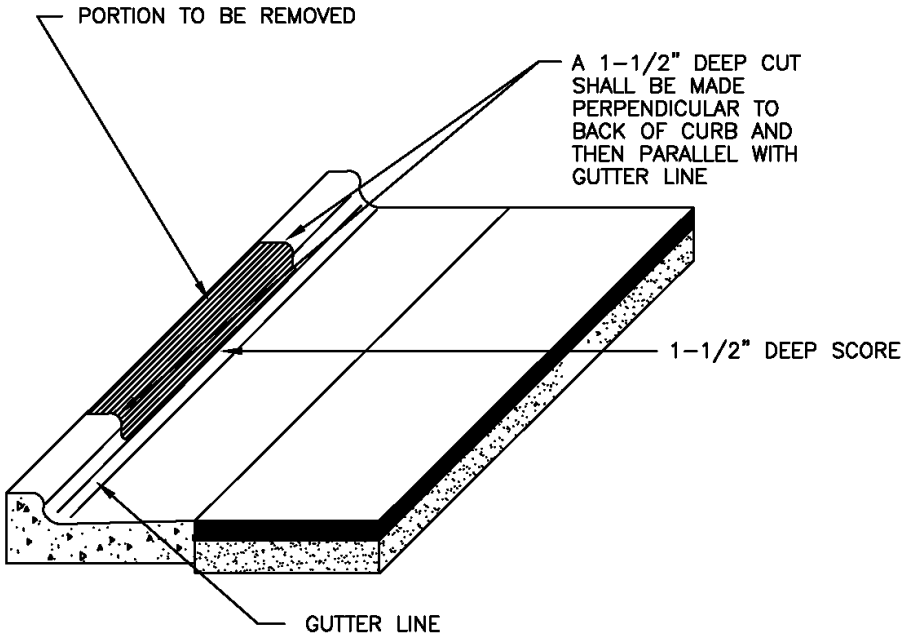
STANDARD CONCRETE CURB AND GUTTER

TOWN OF KERNERSVILLE
P.O. BOX 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-3121 FAX.: (336) 996-4822

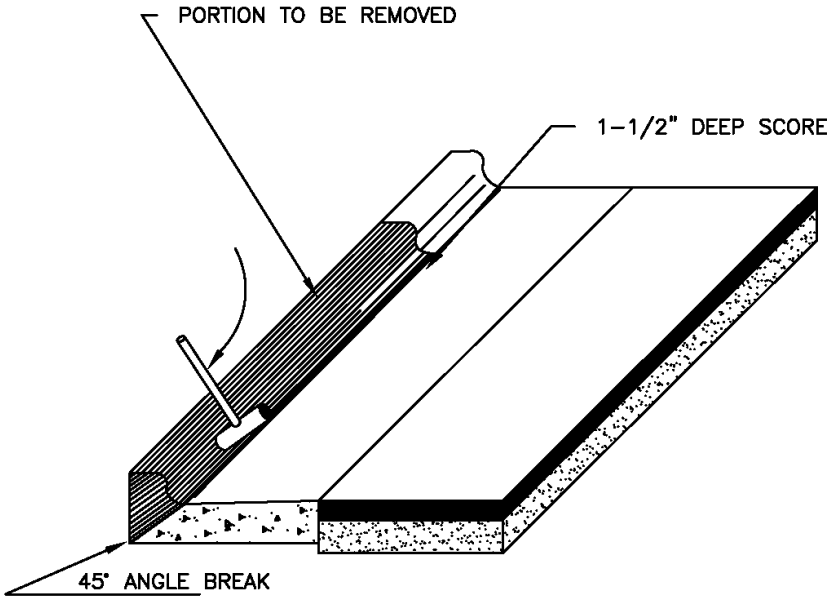
CONSTRUCTION STANDARD
ROADWAY STD. No. 311

DATE: APRIL 2013 SHEET OF

DRAWN BY: MWT | APPROVED BY: RDR



STEP ONE



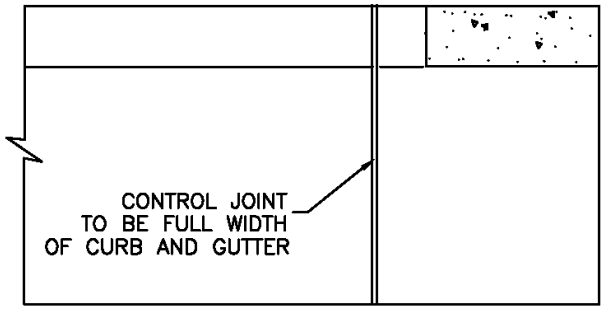
STEP TWO

NOTES:
CURB AND GUTTER SECTION SHALL BE REMOVED IN ACCORDANCE WITH DRIVEWAY WIDTH APPROVED BY THE TOWN.
IF PERPENDICULAR CUT IS WITHIN 12" FROM A JOINT, THEN THE PARALLEL CUT SHALL BE MADE TO THAT JOINT.

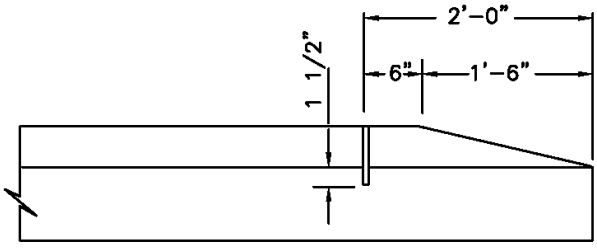
STANDARD METHOD OF REMOVING EXISTING CURB
(FOR A DRIVEWAY APRON INSTALLATION)

TOWN OF KERNERSVILLE
P.O. DRAWER 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-6916 FAX.: (336) 996-4059

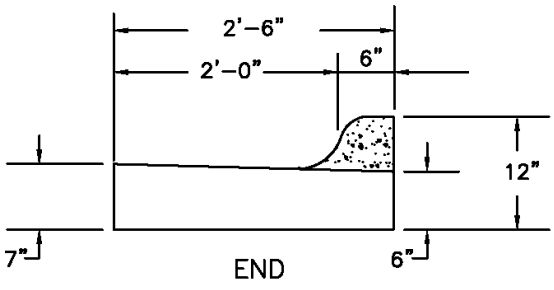
CONSTRUCTION STANDARD ROADWAY STD. No. 312	
DATE: FEB. 01 SHEET OF	
DRAWN BY: MWT	APPROVED BY: TS



PLAN



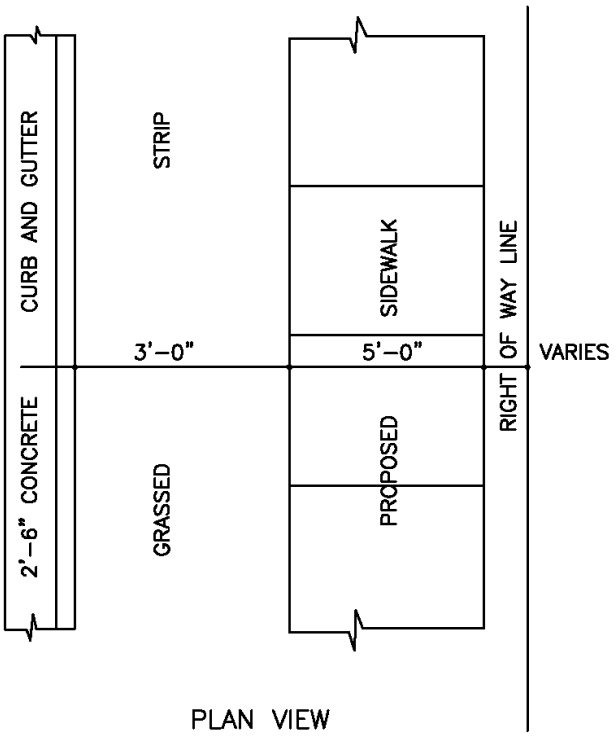
FRONT



END

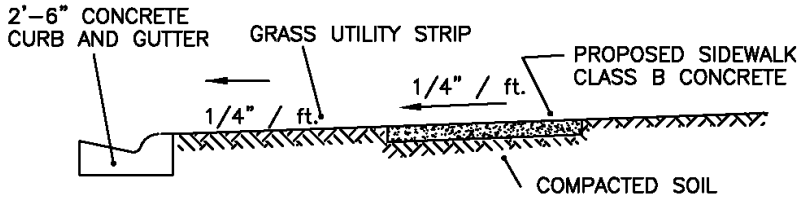
STANDARD METHOD OF ENDING CURB AND GUTTER

TOWN OF KERNERSVILLE P.O. BOX 728 KERNERSVILLE, NORTH CAROLINA 27285 TEL.: (336) 996-3121 FAX.: (336) 996-4822	CONSTRUCTION STANDARD ROADWAY STD. No. 313
	DATE: APRIL 2013 SHEET OF
	DRAWN BY: MWT APPROVED BY: RDR

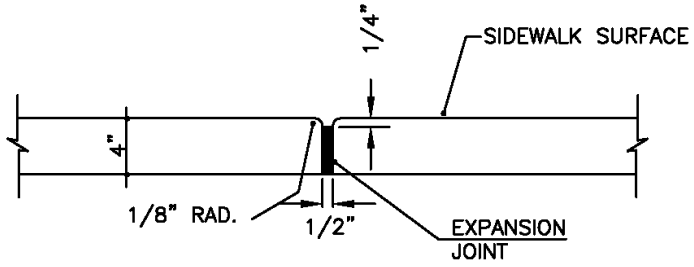


PLAN VIEW

NOTES:
1. TRANSVERSE EXPANSION JOINT TO BE A MAX OF 50 FEET.
2. ALL CONCRETE TO BE FINISHED WITH CURING COMPOUND



TYPICAL SECTION



TRANSVERSE EXPANSION JOINT

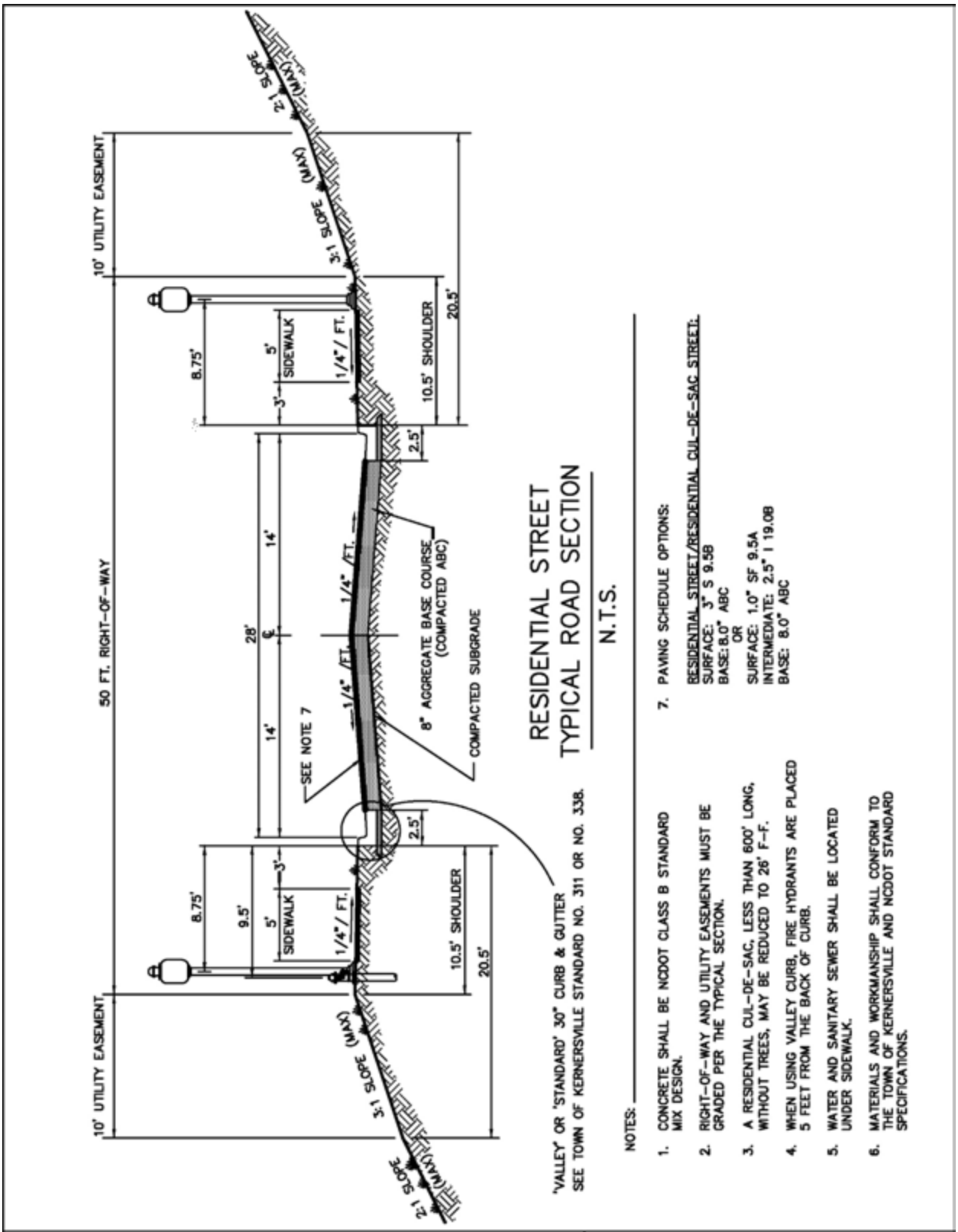
STANDARD CONCRETE SIDEWALK

TOWN OF KERNERSVILLE
P.O. BOX 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-3121 FAX.: (336) 996-4822

CONSTRUCTION STANDARD
ROADWAY STD. No. 316

DATE: APRIL 2013 SHEET OF

DRAWN BY: MWT APPROVED BY: RDR



RESIDENTIAL STREET
TYPICAL ROAD SECTION
N.T.S.

"VALLEY" OR "STANDARD" 30" CURB & GUTTER
SEE TOWN OF KERNERSVILLE STANDARD NO. 311 OR NO. 338.

NOTES:

1. CONCRETE SHALL BE NCDOT CLASS B STANDARD MIX DESIGN.
2. RIGHT-OF-WAY AND UTILITY EASEMENTS MUST BE GRADED PER THE TYPICAL SECTION.
3. A RESIDENTIAL CUL-DE-SAC, LESS THAN 600' LONG, WITHOUT TREES, MAY BE REDUCED TO 26' F-F.
4. WHEN USING VALLEY CURB, FIRE HYDRANTS ARE PLACED 5 FEET FROM THE BACK OF CURB.
5. WATER AND SANITARY SEWER SHALL BE LOCATED UNDER SIDEWALK.
6. MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE TOWN OF KERNERSVILLE AND NCDOT STANDARD SPECIFICATIONS.
7. PAVING SCHEDULE OPTIONS:

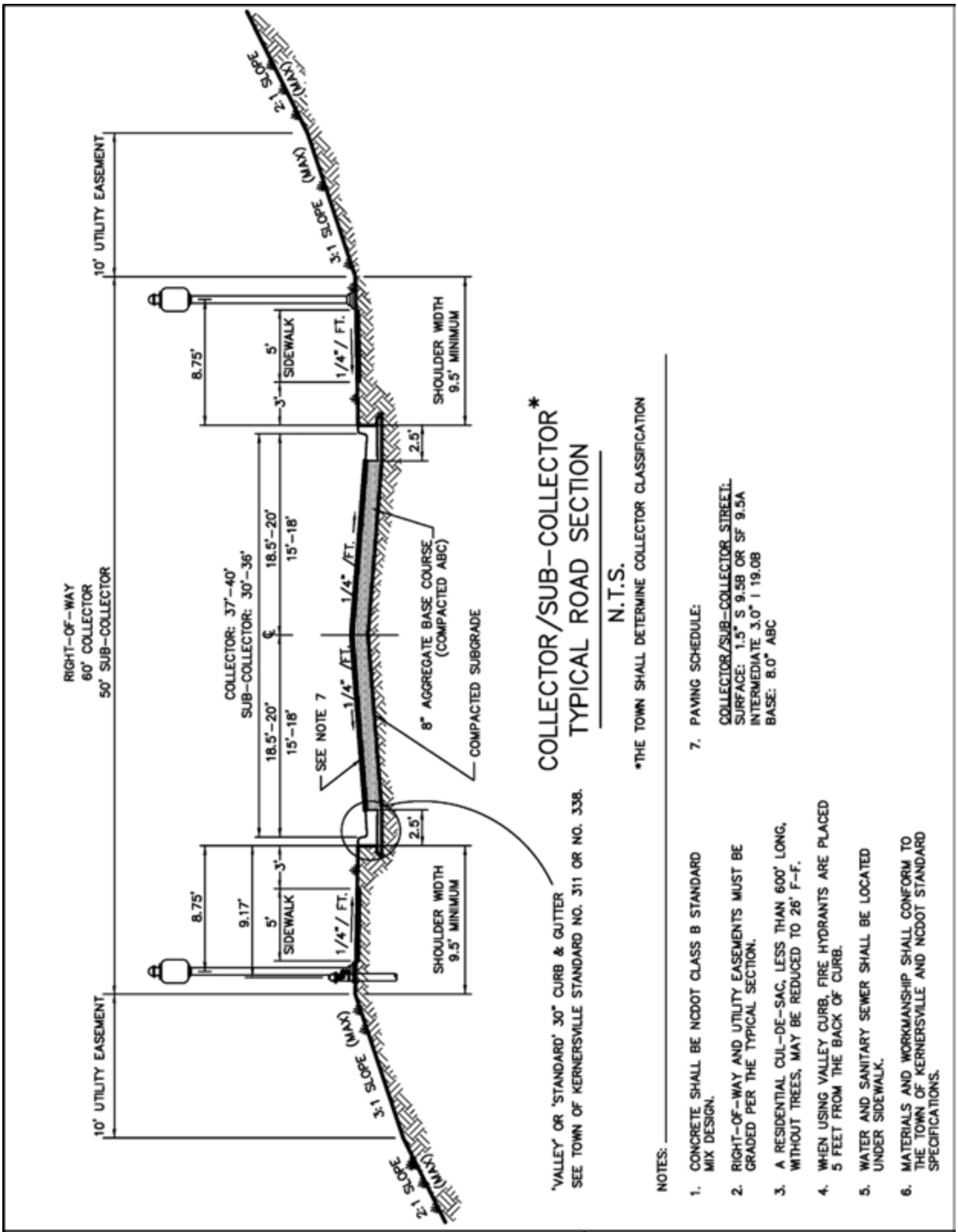
RESIDENTIAL STREET/RESIDENTIAL CUL-DE-SAC STREET:
SURFACE: 3" S 9.5B
BASE: 8.0" ABC
OR
SURFACE: 1.0" SF 9.5A
INTERMEDIATE: 2.5" I 19.0B
BASE: 8.0" ABC

TOWN OF KERNERSVILLE
P.O. BOX 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-3121 FAX.: (336) 996-4822

CONSTRUCTION STANDARD
ROADWAY STD. No. 321

DATE: NOV., 2016 SHEET OF

DRAWN BY: MWT APPROVED BY: DCM



COLLECTOR/SUB-COLLECTOR* TYPICAL ROAD SECTION

N.T.S.

*THE TOWN SHALL DETERMINE COLLECTOR CLASSIFICATION

NOTES:

1. CONCRETE SHALL BE NCDOT CLASS B STANDARD MIX DESIGN.
2. RIGHT-OF-WAY AND UTILITY EASEMENTS MUST BE GRADED PER THE TYPICAL SECTION.
3. A RESIDENTIAL CUL-DE-SAC, LESS THAN 600' LONG, WITHOUT TREES, MAY BE REDUCED TO 26' F-F.
4. WHEN USING VALLEY CURB, FIRE HYDRANTS ARE PLACED 5 FEET FROM THE BACK OF CURB.
5. WATER AND SANITARY SEWER SHALL BE LOCATED UNDER SIDEWALK.
6. MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE TOWN OF KERNERSVILLE AND NCDOT STANDARD SPECIFICATIONS.
7. PAVING SCHEDULE:

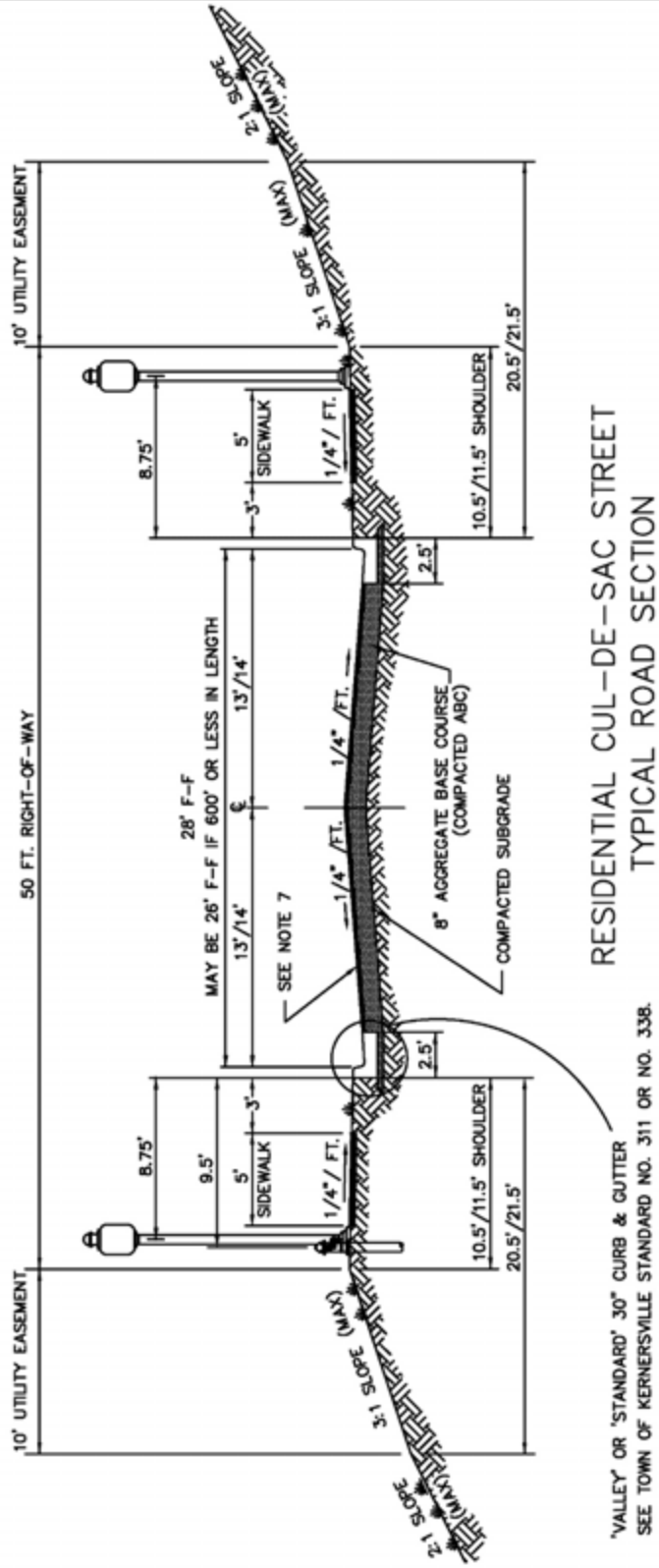
   COLLECTOR/SUB-COLLECTOR STREET:
   SURFACE: 1.5" S 9.5B OR SF 9.5A
   INTERMEDIATE 3.0" I 19.08
   BASE: 8.0" ABC

TOWN OF KERNERSVILLE
P.O. BOX 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-3121 FAX.: (336) 996-4822

CONSTRUCTION STANDARD
ROADWAY STD. No. 321A

DATE: NOV., 2016 SHEET OF

DRAWN BY: MWT APPROVED BY: DCM



'VALLEY' OR 'STANDARD' 30" CURB & GUTTER
SEE TOWN OF KERNERSVILLE STANDARD NO. 311 OR NO. 338.

RESIDENTIAL CUL-DE-SAC STREET
TYPICAL ROAD SECTION

N.T.S.

NOTES:

1. CONCRETE SHALL BE NCDOT CLASS B STANDARD MIX DESIGN.
2. RIGHT-OF-WAY AND UTILITY EASEMENTS MUST BE GRADED PER THE TYPICAL SECTION.
3. A RESIDENTIAL CUL-DE-SAC, LESS THAN 600' LONG, WITHOUT TREES, MAY BE REDUCED TO 26' F-F.
4. WHEN USING VALLEY CURB, FIRE HYDRANTS ARE PLACED 5 FEET FROM THE BACK OF CURB.
5. WATER AND SANITARY SEWER SHALL BE LOCATED UNDER SIDEWALK.
6. MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE TOWN OF KERNERSVILLE AND NCDOT STANDARD SPECIFICATIONS.
7. PAVING SCHEDULE OPTIONS:

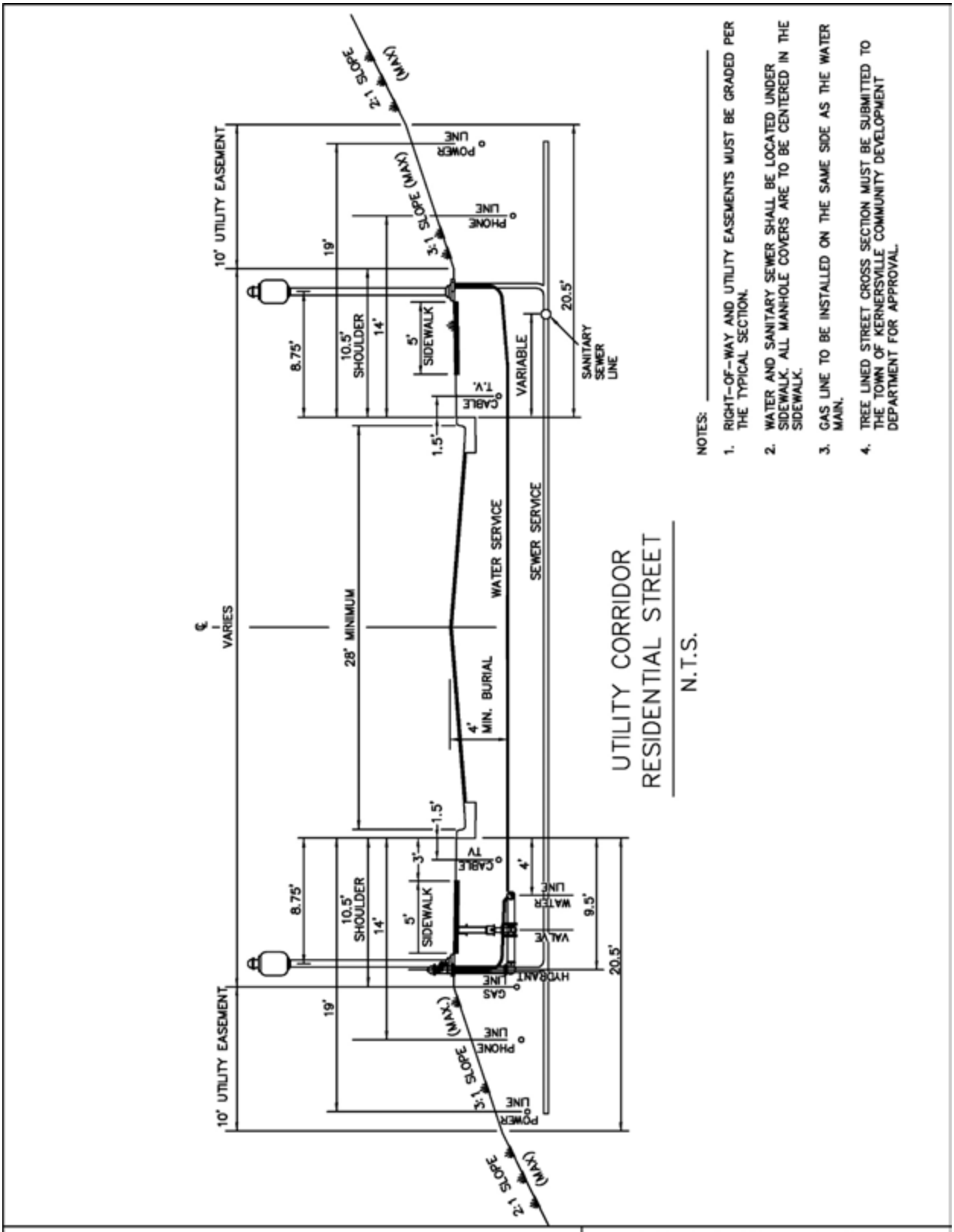
RESIDENTIAL STREET/RESIDENTIAL CUL-DE-SAC STREET:
SURFACE: 3" S 9.5B
BASE: 8.0" ABC
OR
SURFACE: 1.0" SF 9.5A
INTERMEDIATE: 2.5" I 19.0B
BASE: 8.0" ABC

TOWN OF KERNERSVILLE
P.O. BOX 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-3121 FAX.: (336) 996-4822

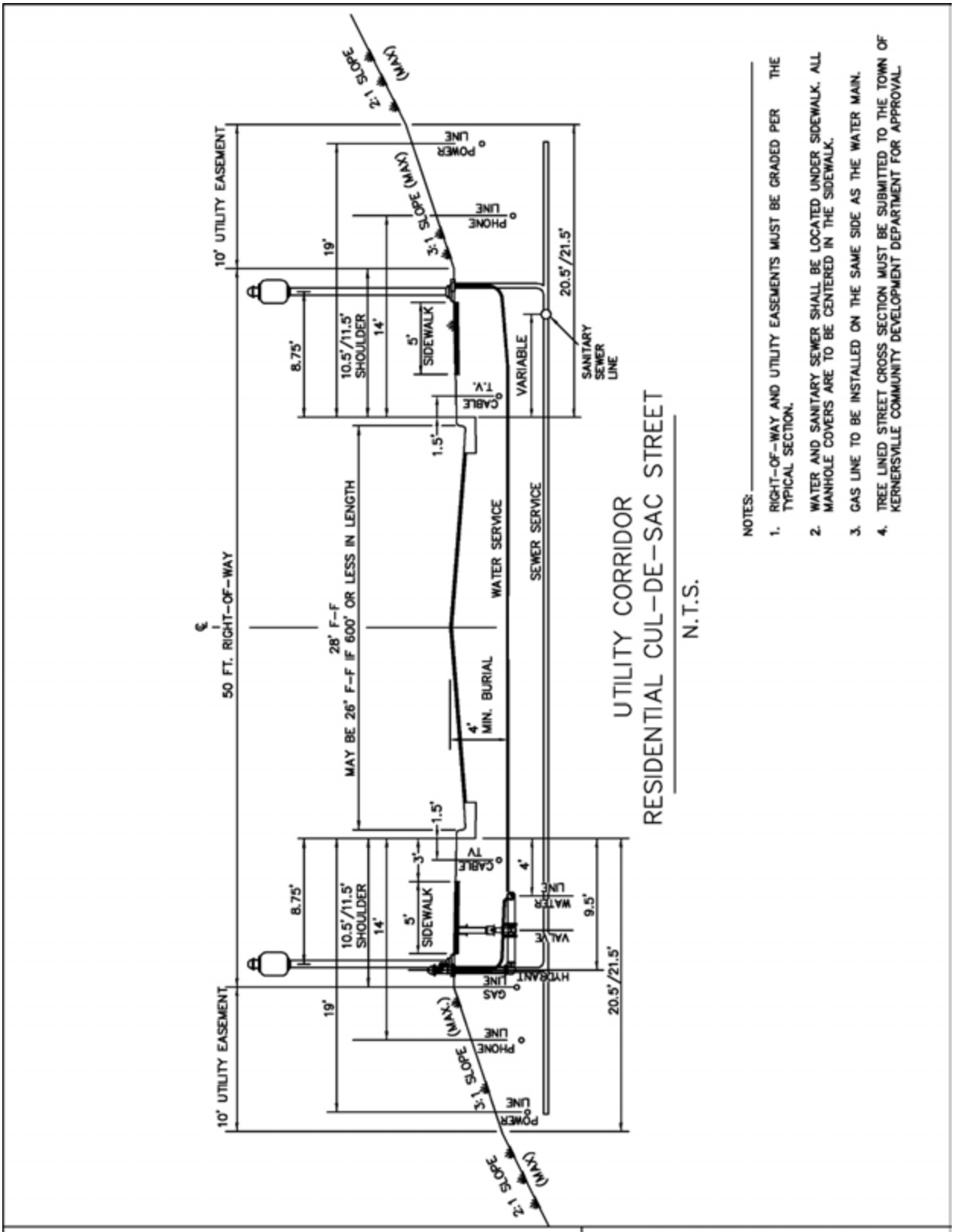
CONSTRUCTION STANDARD
ROADWAY STD. No. 321B

DATE: NOV., 2016 SHEET OF

DRAWN BY: MWT APPROVED BY: DCM



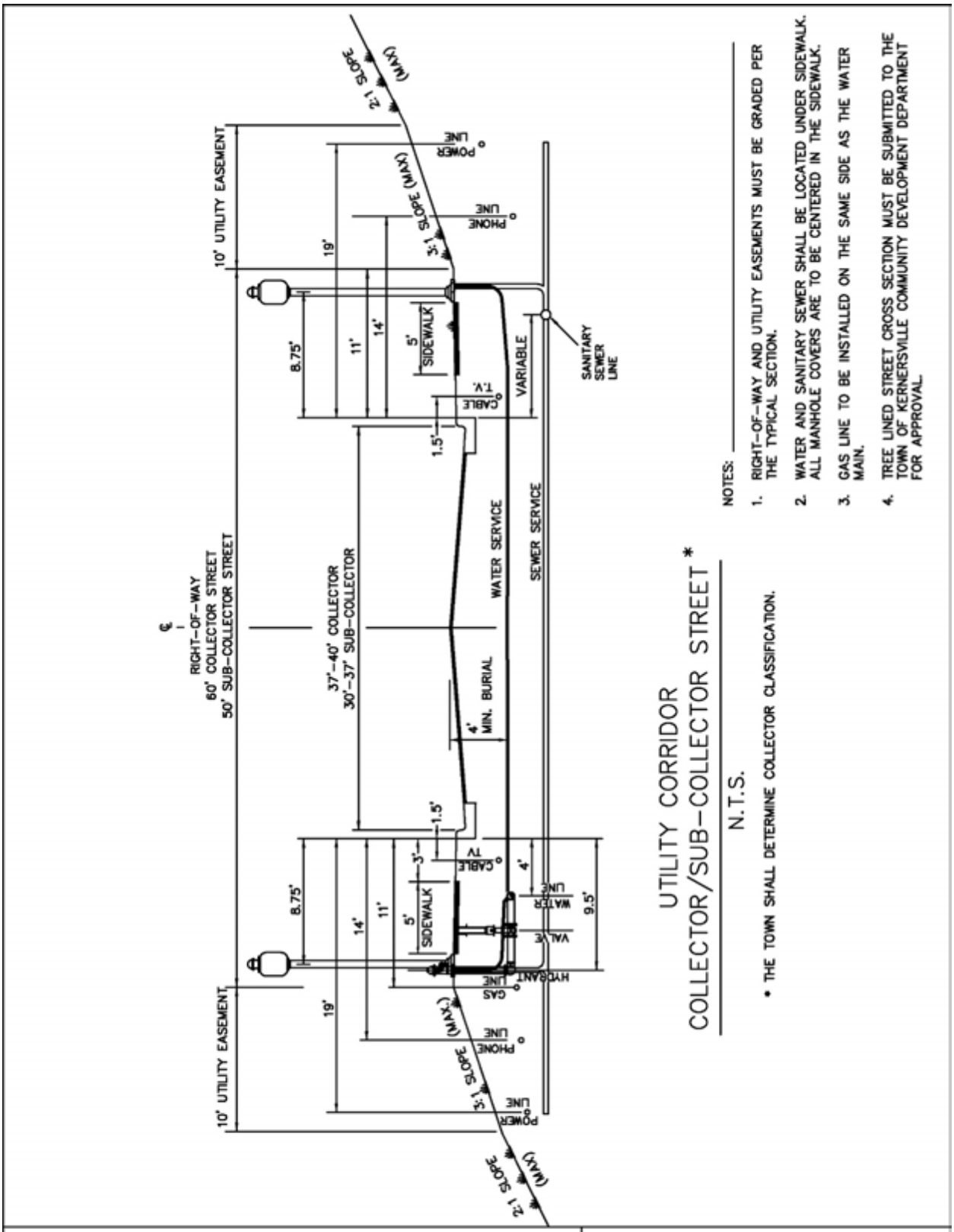
TOWN OF KERNERSVILLE P.O. BOX 728 KERNERSVILLE, NORTH CAROLINA 27285 TEL.: (336) 996-3121 FAX.: (336) 996-4822	CONSTRUCTION STANDARD ROADWAY STD. No. 322
	DATE: NOV., 2016 SHEET OF
	DRAWN BY: MWT APPROVED BY: DCM



TOWN OF KERNERSVILLE
P.O. BOX 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-3121 FAX.: (336) 996-4822

CONSTRUCTION STANDARD
ROADWAY STD. No. 322A

DATE: NOV., 2016	SHEET OF
DRAWN BY: MWT	APPROVED BY: DCM



UTILITY CORRIDOR
COLLECTOR/SUB-COLLECTOR STREET *

N.T.S.

* THE TOWN SHALL DETERMINE COLLECTOR CLASSIFICATION.

NOTES:

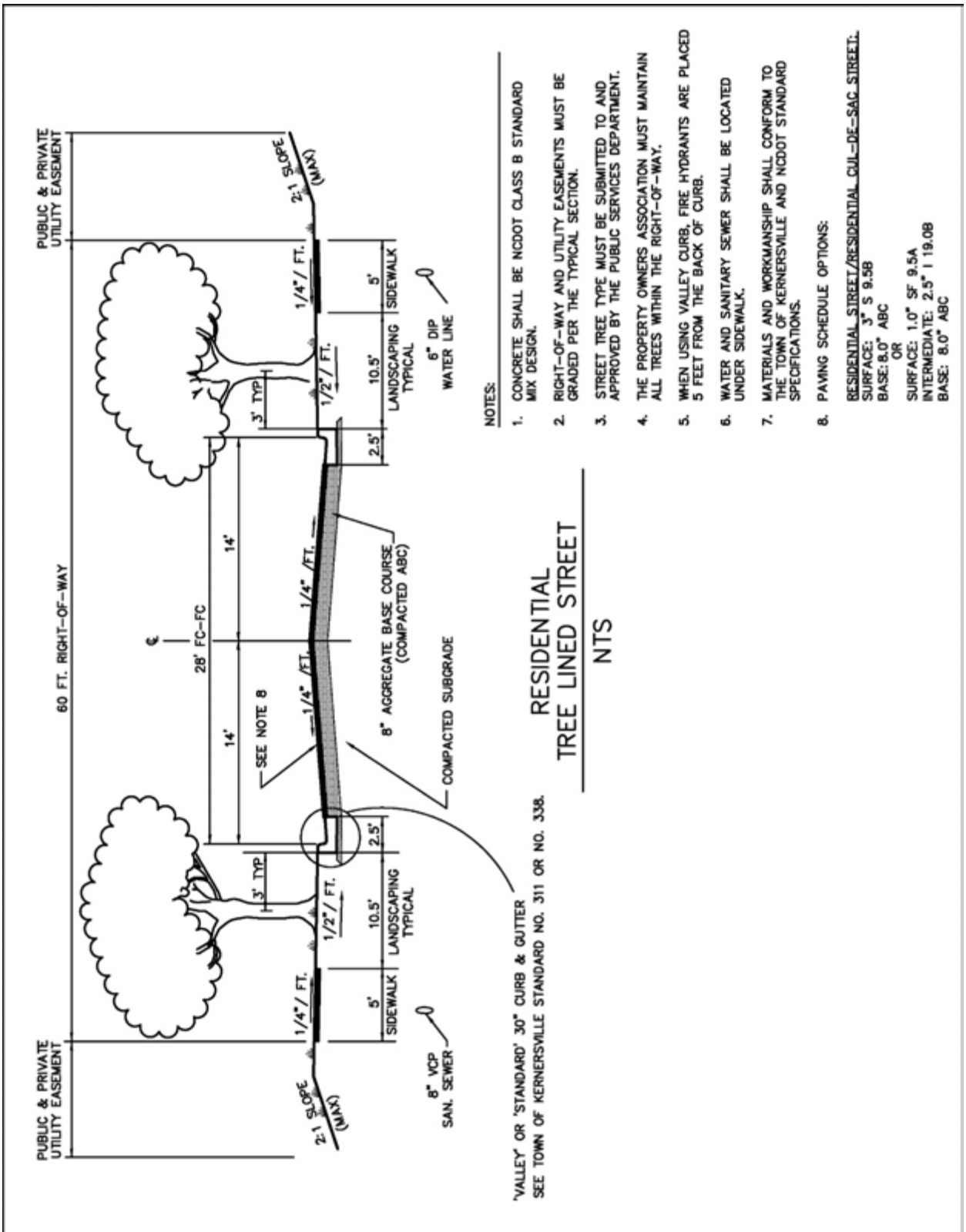
1. RIGHT-OF-WAY AND UTILITY EASEMENTS MUST BE GRADED PER THE TYPICAL SECTION.
2. WATER AND SANITARY SEWER SHALL BE LOCATED UNDER SIDEWALK. ALL MANHOLE COVERS ARE TO BE CENTERED IN THE SIDEWALK.
3. GAS LINE TO BE INSTALLED ON THE SAME SIDE AS THE WATER MAIN.
4. TREE LINED STREET CROSS SECTION MUST BE SUBMITTED TO THE TOWN OF KERNERSVILLE COMMUNITY DEVELOPMENT DEPARTMENT FOR APPROVAL.

TOWN OF KERNERSVILLE
P.O. BOX 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-3121 FAX.: (336) 996-4822

CONSTRUCTION STANDARD
ROADWAY STD. No. 322B

DATE: NOV., 2016 SHEET OF

DRAWN BY: MWT | APPROVED BY: DCM



'VALLEY' OR 'STANDARD' 30" CURB & GUTTER
SEE TOWN OF KERNERSVILLE STANDARD NO. 311 OR NO. 338.

RESIDENTIAL
TREE LINED STREET
NTS

NOTES:

1. CONCRETE SHALL BE NCDOT CLASS B STANDARD MIX DESIGN.
2. RIGHT-OF-WAY AND UTILITY EASEMENTS MUST BE GRADED PER THE TYPICAL SECTION.
3. STREET TREE TYPE MUST BE SUBMITTED TO AND APPROVED BY THE PUBLIC SERVICES DEPARTMENT.
4. THE PROPERTY OWNERS ASSOCIATION MUST MAINTAIN ALL TREES WITHIN THE RIGHT-OF-WAY.
5. WHEN USING VALLEY CURB, FIRE HYDRANTS ARE PLACED 5 FEET FROM THE BACK OF CURB.
6. WATER AND SANITARY SEWER SHALL BE LOCATED UNDER SIDEWALK.
7. MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE TOWN OF KERNERSVILLE AND NCDOT STANDARD SPECIFICATIONS.
8. PAVING SCHEDULE OPTIONS:

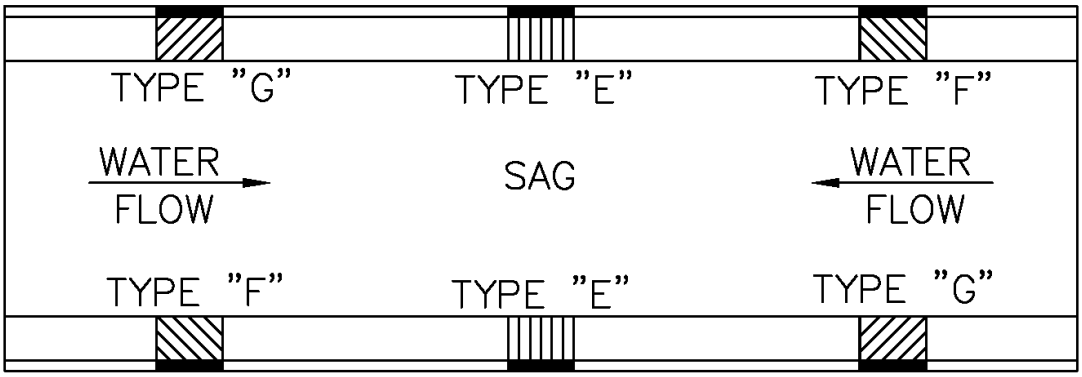
RESIDENTIAL STREET/RESIDENTIAL CUL-DE-SAC STREET:
SURFACE: 3" S 9.5B
BASE: 8.0" ABC
OR
SURFACE: 1.0" SF 9.5A
INTERMEDIATE: 2.5" I 19.0B
BASE: 8.0" ABC

TOWN OF KERNERSVILLE
P.O. DRAWER 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-6916 FAX.: (336) 996-4059

CONSTRUCTION STANDARD
ROADWAY STD. No. 323

DATE: NOV., 2016 SHEET OF

DRAWN BY: MWT APPROVED BY: DCM



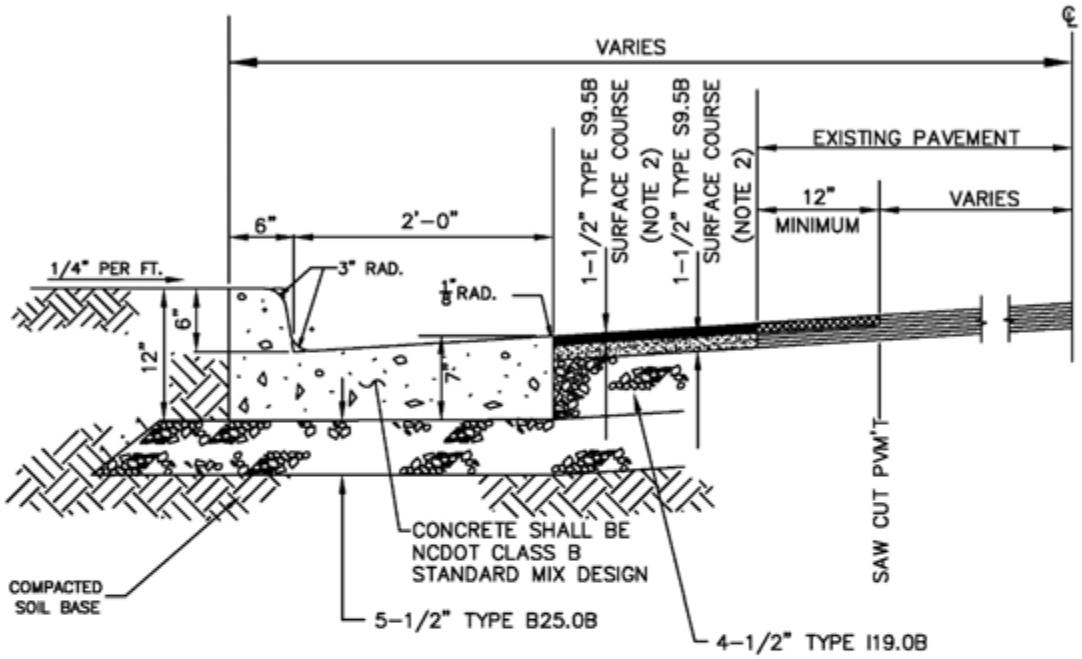
GRATE CONFIGURATION

TOWN OF KERNERSVILLE
ENGINEERING DEPARTMENT
P.O. BOX 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-3121 FAX.: (336) 996-4822

CONSTRUCTION STANDARD
ROADWAY STD. No. 326

DATE: APRIL 2013 SHEET OF

DRAWN BY: MWT | APPROVED BY: RDR



STANDARD STREET WIDENING
N.T.S.

NOTES:

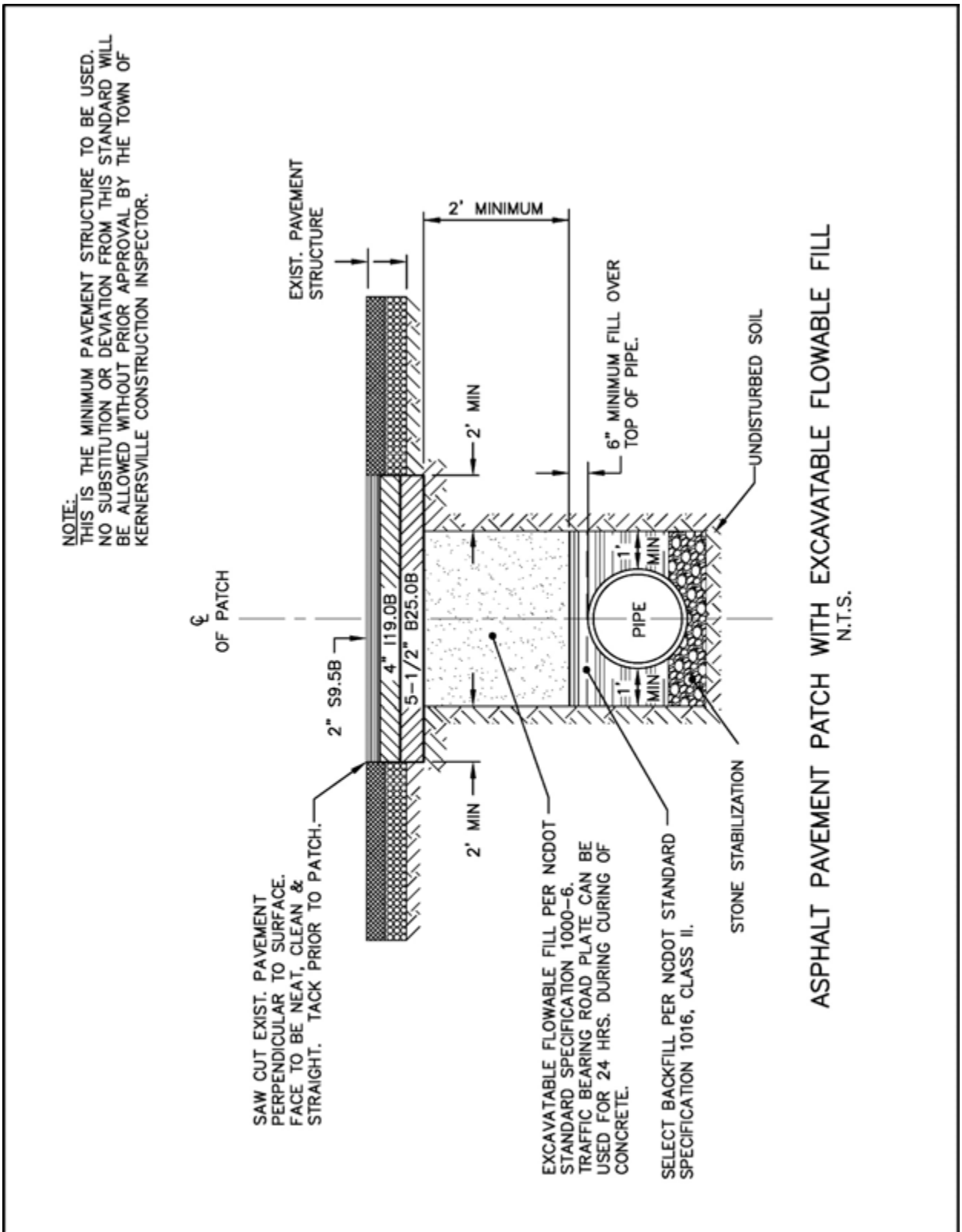
1. SAW AND REMOVE TOP 1 – 1/2" OF EXISTING PAVEMENT A MINIMUM OF 12" FROM EDGE, OR AS DIRECTED BY TOWN AND WEDGE NEW SURFACE OVER EXISTING BASE. PAVEMENT DESIGN MAY VARY FOR EACH PROJECT.
2. 2 LIFTS OF 1–1/2" EA. ASPHALT CONCRETE SURFACE COURSE, TYPE S 9.5B, AT AN AVERAGE RATE OF 112 LBS. PER IN. PER S.Y. FOR A TOTAL THICKNESS OF 3.0".

TOWN OF KERNERSVILLE
P.O. DRAWER 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996–3121 FAX.: (336) 996–4822

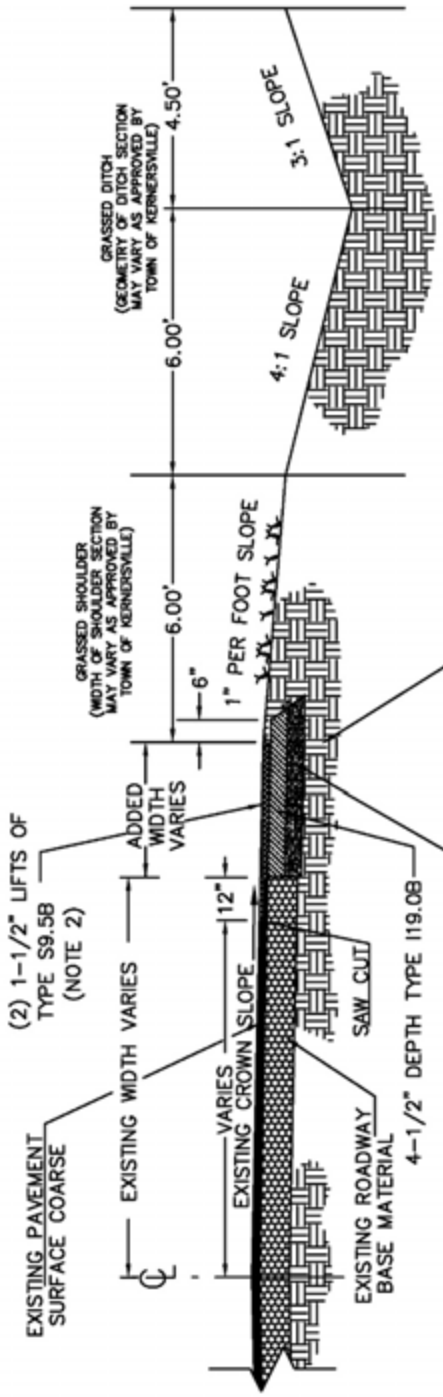
CONSTRUCTION STANDARD
ROADWAY STD. No. 327

DATE: NOV., 2016 SHEET OF

DRAWN BY: MWT APPROVED BY: DCM



TOWN OF KERNERSVILLE P.O. DRAWER 728 KERNERSVILLE, NORTH CAROLINA 27285 TEL.: (336) 996-6916 FAX.: (336) 996-4059	CONSTRUCTION STANDARD ROADWAY STD. No. 328A
	DATE: OCTOBER, 2016 SHEET OF
	DRAWN BY: MWT / APPROVED BY: DCM



STREET WIDENING DETAIL
(RIBBON PAVING)
NTS

NOTES:

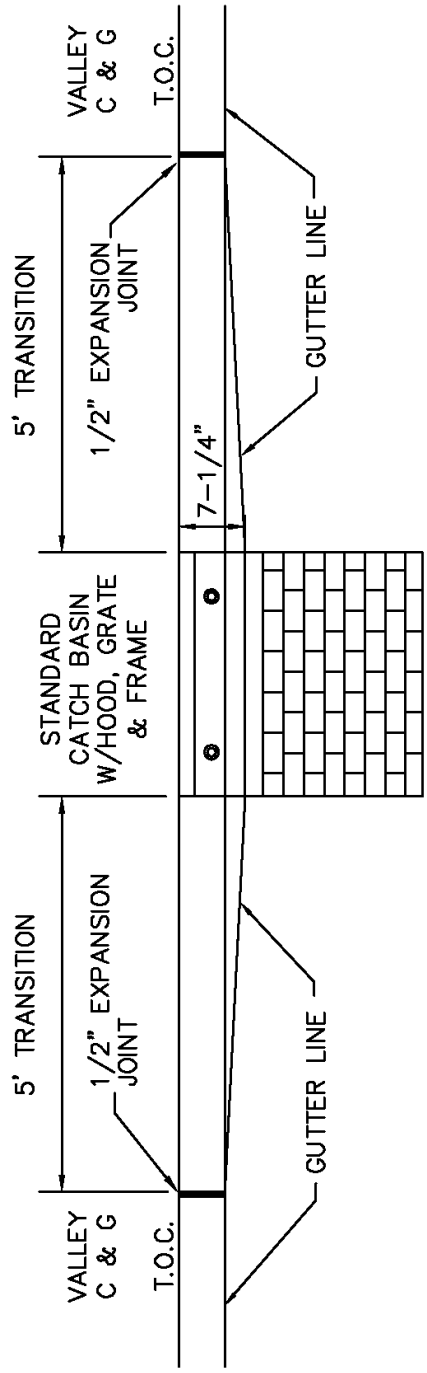
1. SAW CUT AND REMOVE TOP 1 – 1/2" OF EXISTING PAVEMENT A MINIMUM OF 12" FROM EXISTING EDGE OF PAVEMENT, OR AS DIRECTED BY TOWN OF KERNERSVILLE, AND WEDGE NEW SURFACE COARSE OVER EXISTING BASE PAVEMENT. DESIGN MAY VARY FOR EACH PROJECT.
2. 1-1/2" ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER IN. PER SQ. YD.

TOWN OF KERNERSVILLE
P.O. BOX 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-3121 FAX.: (336) 996-4822

CONSTRUCTION STANDARD
ROADWAY STD. No. 333

DATE: NOV., 2016 SHEET OF

DRAWN BY: MWT APPROVED BY: DCM



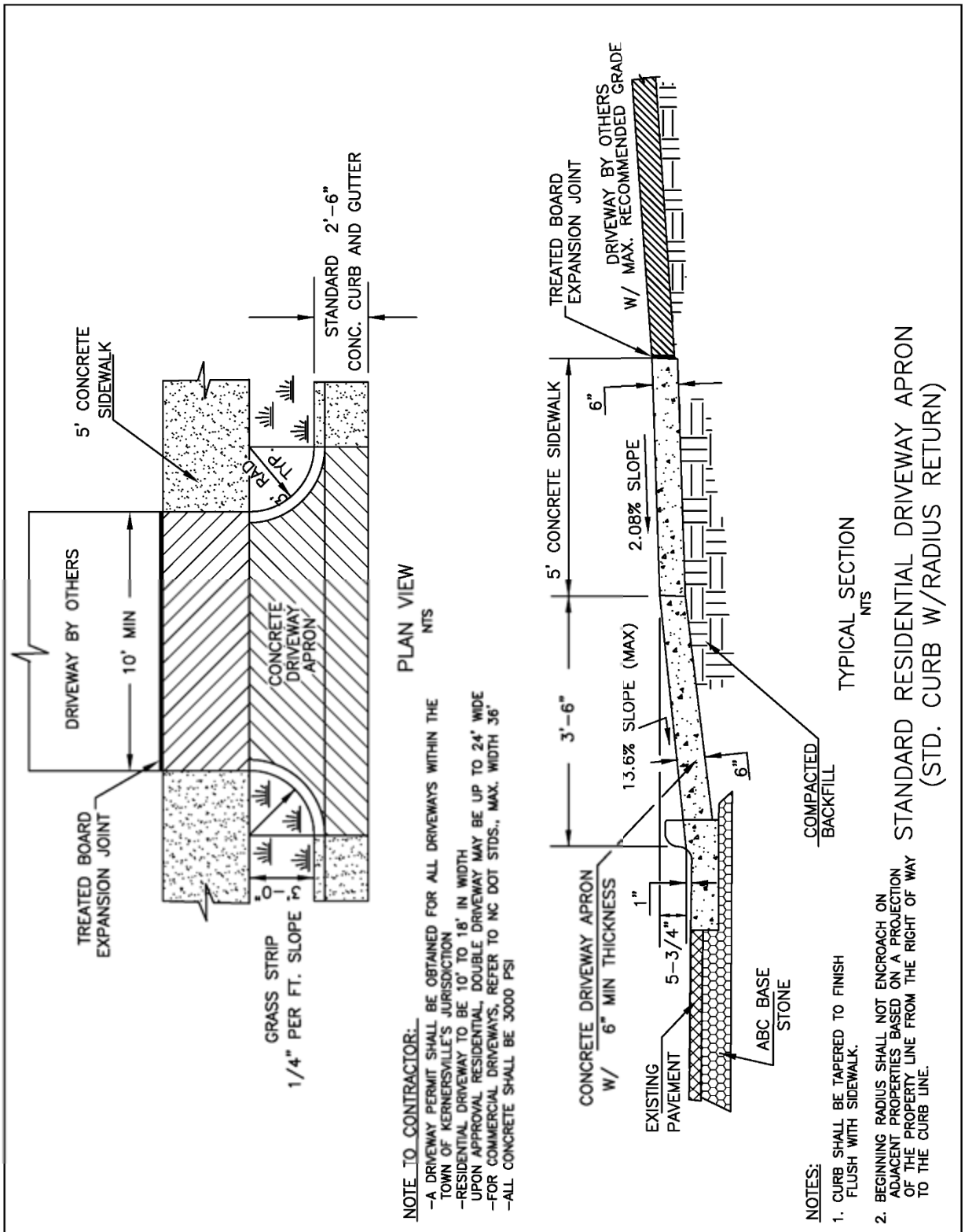
TRANSITION DETAIL
FROM VALLEY CURB & GUTTER
TO STANDARD HOOD, GRATE & FRAME
CITY OF WINSTON-SALEM STANDARD
NTS

TOWN OF KERNERSVILLE
P.O. BOX 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-3121 FAX.: (336) 996-4822

CONSTRUCTION STANDARD
ROADWAY STD. No. 334

DATE: APRIL 2013 SHEET OF

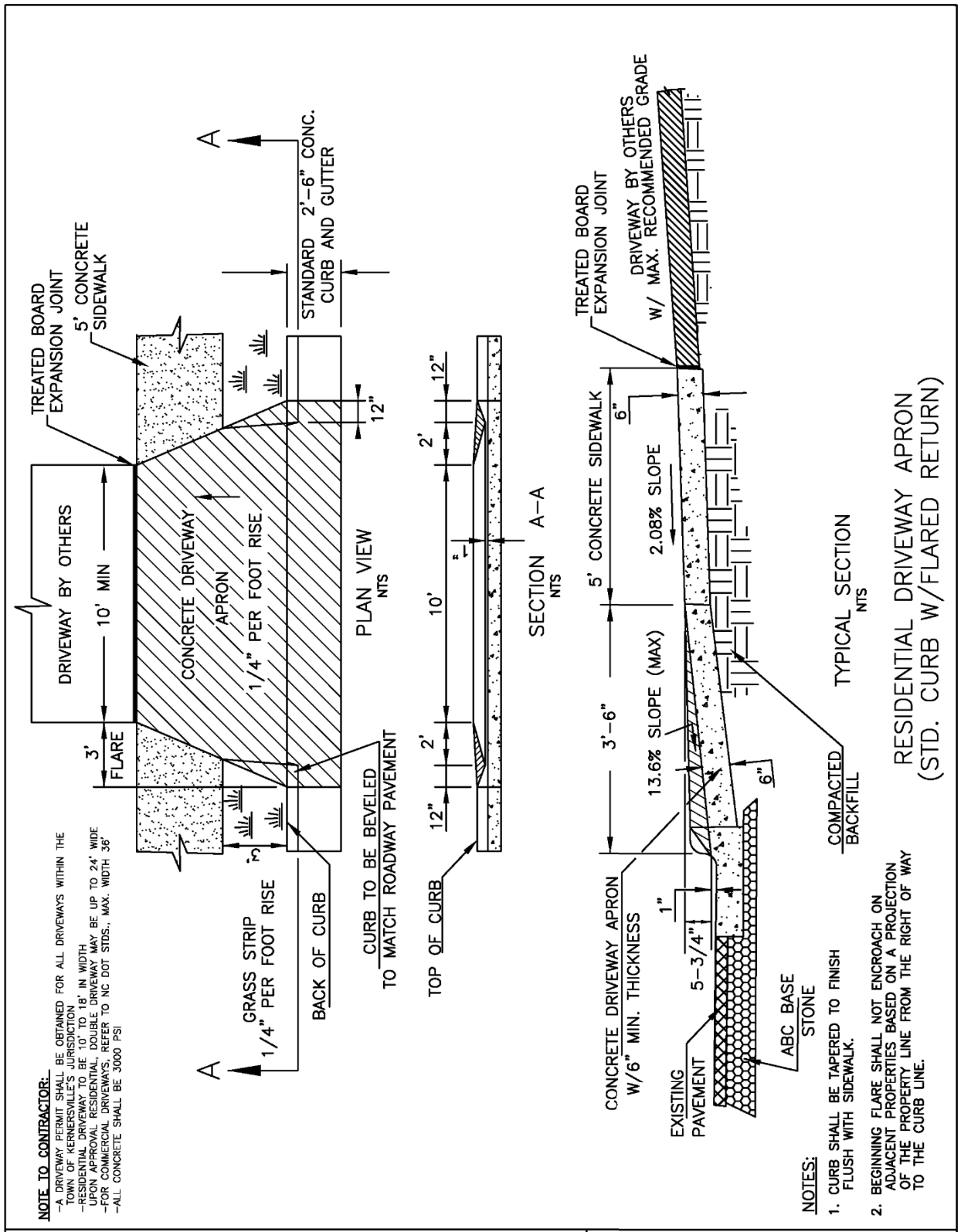
DRAWN BY: MWT | APPROVED BY: RDR

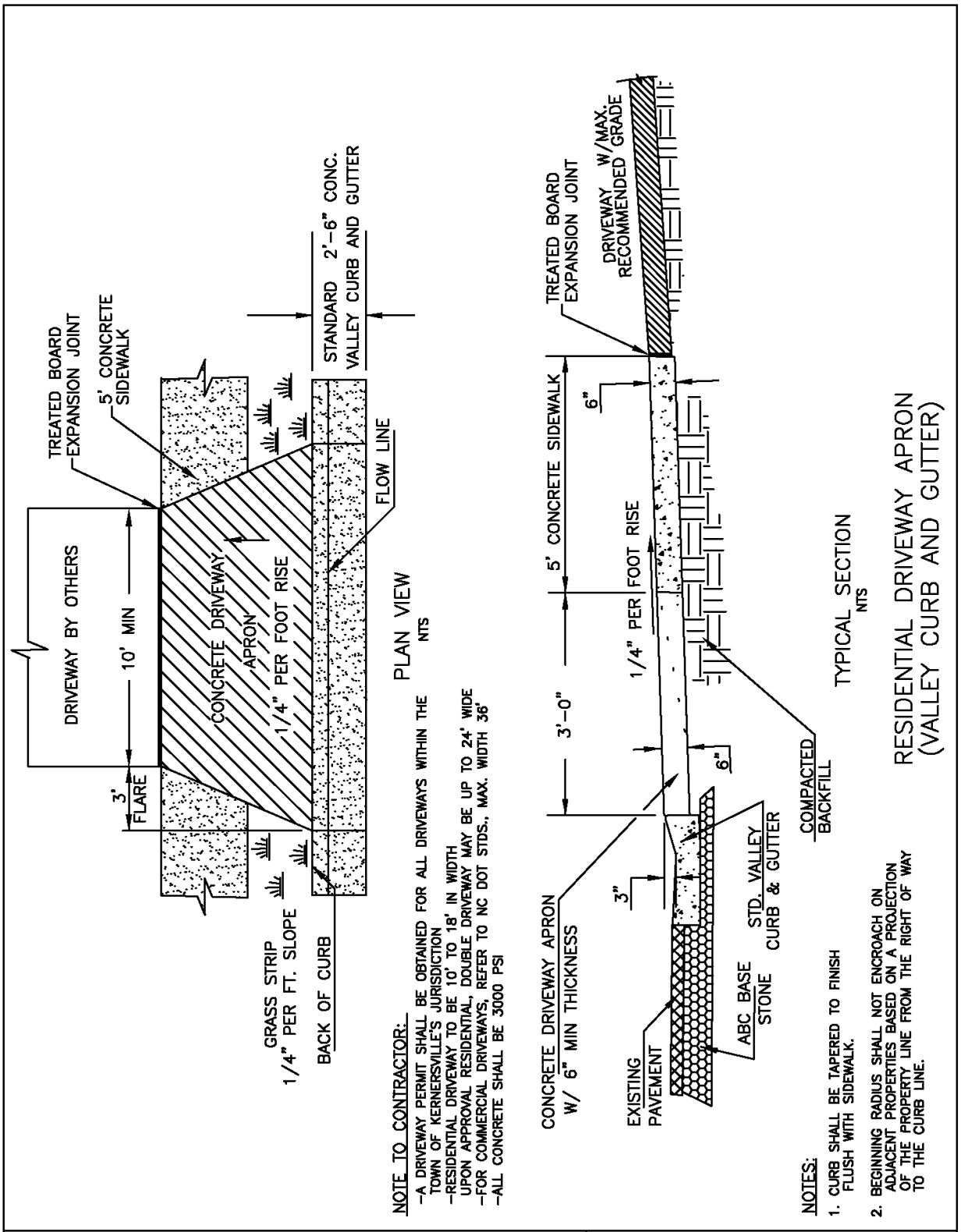


TOWN OF KERNERSVILLE
P.O. BOX 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-3121 FAX.: (336) 996-4822

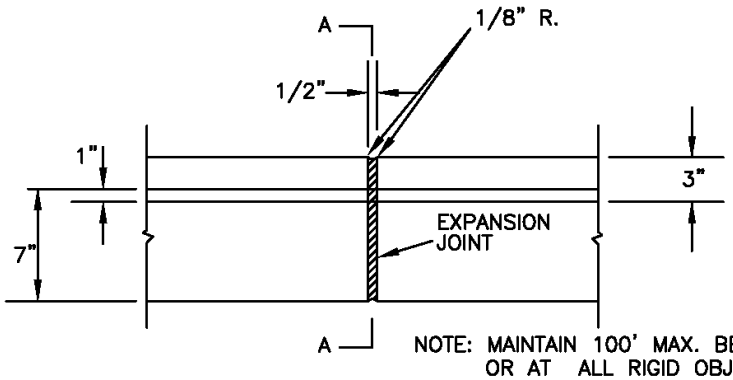
CONSTRUCTION STANDARD
ROADWAY STD. No. 335

DATE: APRIL 2013	SHEET OF
DRAWN BY: MWT	APPROVED BY: RDR


RESIDENTIAL DRIVEWAY APRON
(STD. CURB W/FLARED RETURN)
PLAN VIEW
NTS
SECTION A–A
NTS
TYPICAL SECTION
NTS
TREATED BOARD EXPANSION JOINT
5' CONCRETE SIDEWALK
STANDARD 2'-6" CONC. CURB AND GUTTER
DRIVEWAY BY OTHERS
10' MIN
3' FLARE
CONCRETE DRIVEWAY APRON
1/4" PER FOOT RISE
GRASS STRIP
1/4" PER FOOT RISE
BACK OF CURB
CURB TO BE BEVELED TO MATCH ROADWAY PAVEMENT
TOP OF CURB
12"
2'
10'
5' CONCRETE SIDEWALK
3'-6"
13.6% SLOPE (MAX)
2.08% SLOPE
6"
DRIVEWAY BY OTHERS W/ MAX. RECOMMENDED GRADE
CONCRETE DRIVEWAY APRON W/6" MIN. THICKNESS
EXISTING PAVEMENT
1"
5-3/4"
ABC BASE STONE
COMPACTED BACKFILL
NOTE TO CONTRACTOR:
-A DRIVEWAY PERMIT SHALL BE OBTAINED FOR ALL DRIVEWAYS WITHIN THE TOWN OF KERNERSVILLE'S JURISDICTION
-RESIDENTIAL DRIVEWAY TO BE 10' TO 18' IN WIDTH UPON APPROVAL RESIDENTIAL, DOUBLE DRIVEWAY MAY BE UP TO 24' WIDE
-FOR COMMERCIAL DRIVEWAYS, REFER TO NC DOT STDS., MAX. WIDTH 36'
-ALL CONCRETE SHALL BE 3000 PSI
NOTES:
1. CURB SHALL BE TAPERED TO FINISH FLUSH WITH SIDEWALK.
2. BEGINNING FLARE SHALL NOT ENCROACH ON ADJACENT PROPERTIES BASED ON A PROJECTION OF THE PROPERTY LINE FROM THE RIGHT OF WAY TO THE CURB LINE.
TOWN OF KERNERSVILLE
P.O. BOX 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-3121 FAX.: (336) 996-4822
CONSTRUCTION STANDARD
ROADWAY STD. No. 336
DATE: APRIL 2013 SHEET OF
DRAWN BY: MWT
APPROVED BY: RDR



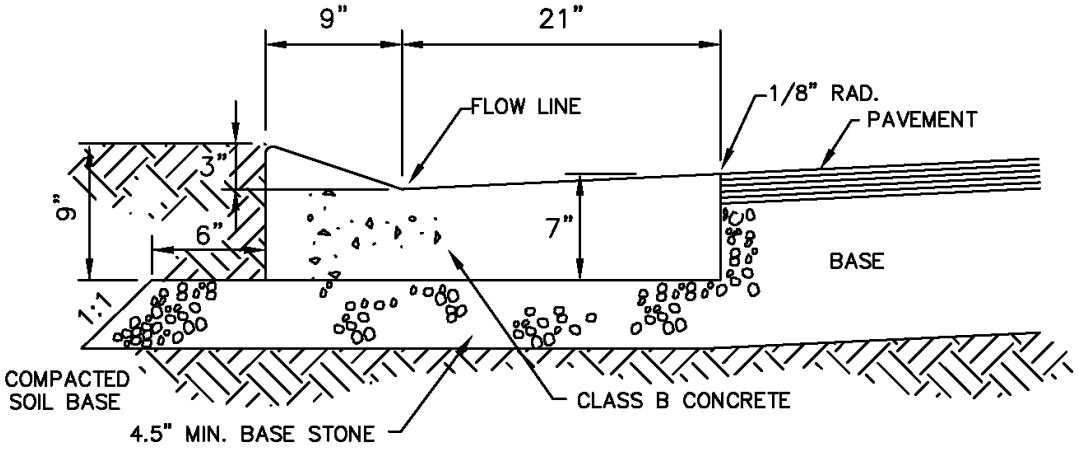
TOWN OF KERNERSVILLE P.O. BOX 728 KERNERSVILLE, NORTH CAROLINA 27285 TEL.: (336) 996-3121 FAX.: (336) 996-4822	CONSTRUCTION STANDARD ROADWAY STD. No. 337
	DATE: APRIL 2013 SHEET OF
	DRAWN BY: MWT / APPROVED BY: RDR



NOTE: MAINTAIN 100' MAX. BETWEEN JOINTS OR AT ALL RIGID OBJECTS

* AN EXPANSION JOINT SHALL BE LOCATED 5' ON EACH SIDE OF A CURB INLET OR OTHER RIDGID OBJECT.

FRONT ELEVATION
TRANSVERSE EXPANSION JOINT



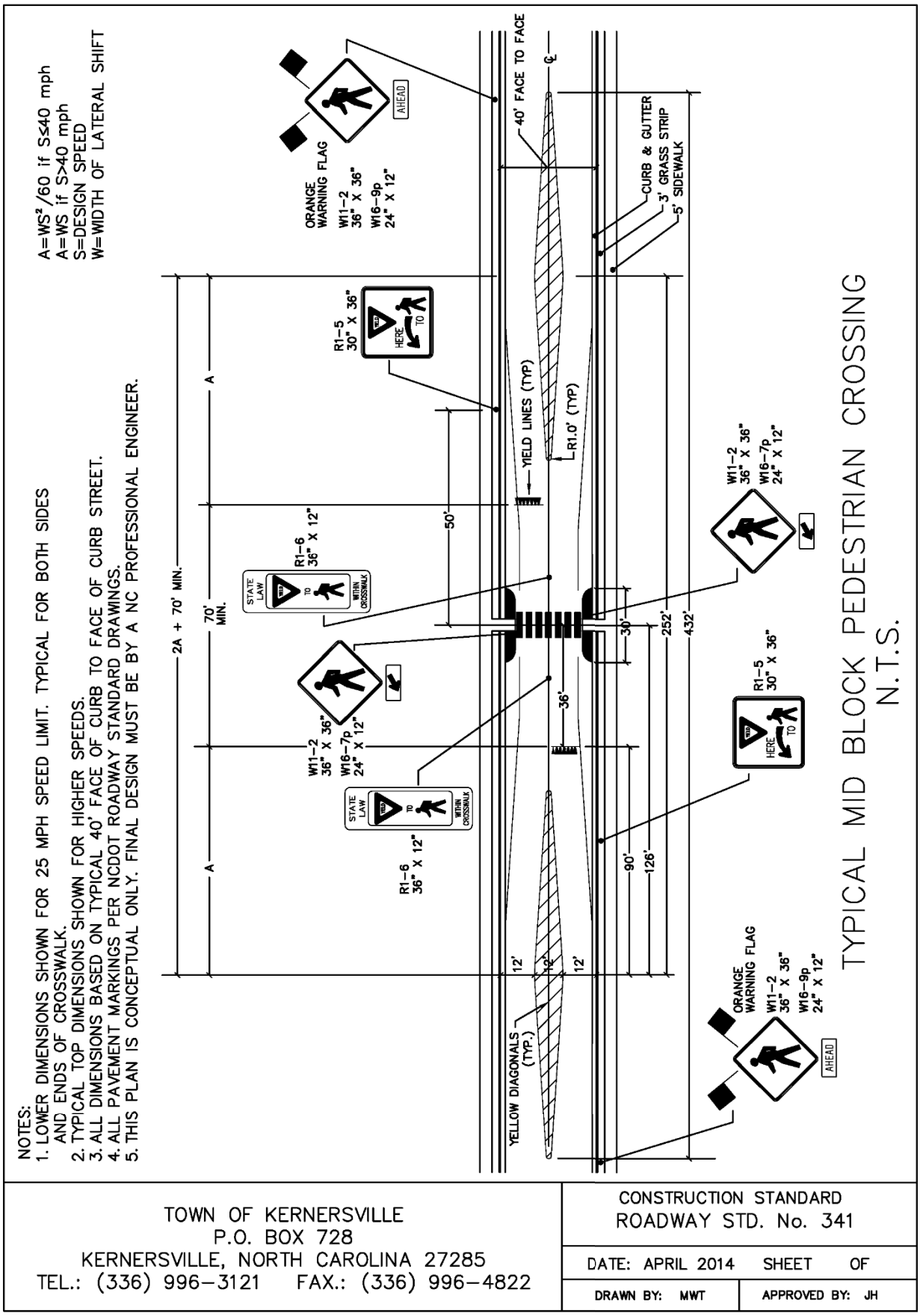
NOTES:

1. CONCRETE SHALL BE NCDOT CLASS B STANDARD MIX DESIGN.
2. CONTRACTION JOINTS SHALL BE SPACED AT 10' INTERVALS.(A 15' SPACING WILL BE ALLOWED WHEN A MACHINE IS USED.)
3. FINISH ALL CONCRETE WITH CURING COMPOUND

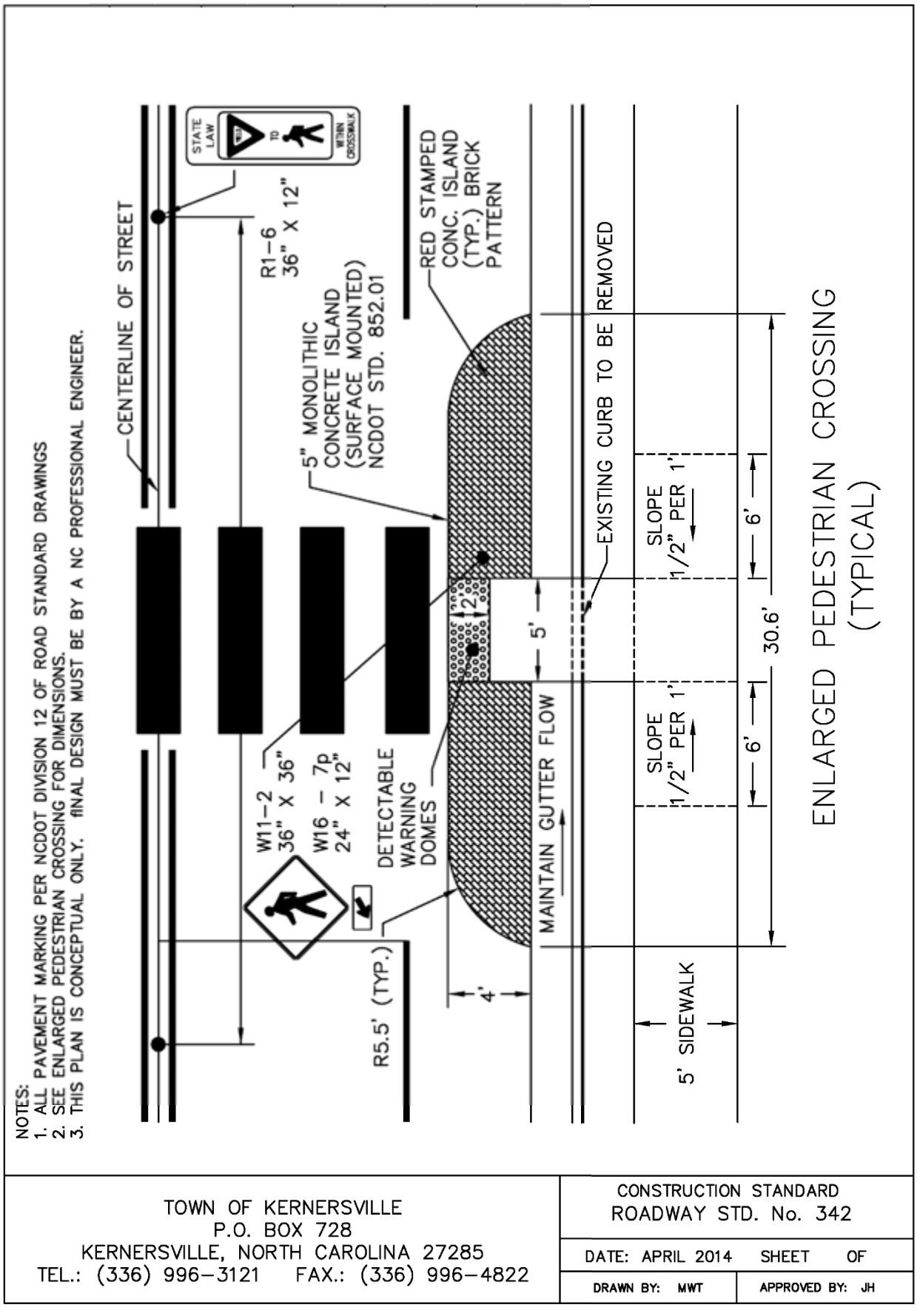
STANDARD VALLEY TYPE, CONCRETE CURB AND GUTTER

TOWN OF KERNERSVILLE
P.O. BOX 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-3121 FAX.: (336) 996-4822

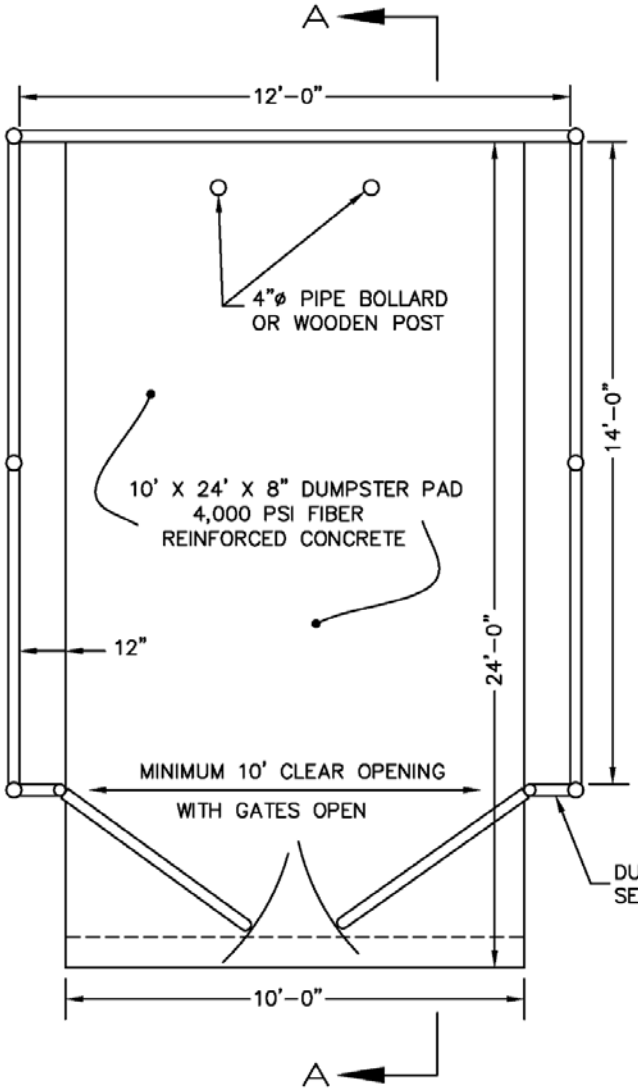
CONSTRUCTION STANDARD ROADWAY STD. No. 338	
DATE: APRIL 2013	SHEET OF
DRAWN BY: MWT	APPROVED BY: RDR



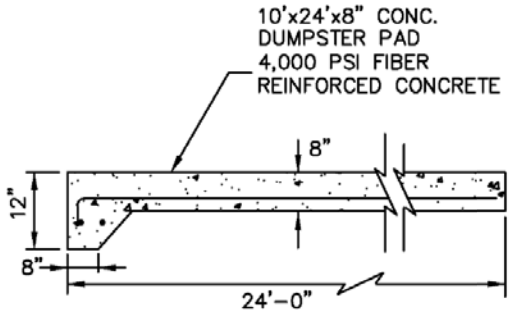
TOWN OF KERNERSVILLE P.O. BOX 728 KERNERSVILLE, NORTH CAROLINA 27285 TEL.: (336) 996-3121 FAX.: (336) 996-4822	CONSTRUCTION STANDARD ROADWAY STD. No. 341
	DATE: APRIL 2014 SHEET OF
	DRAWN BY: MWT / APPROVED BY: JH



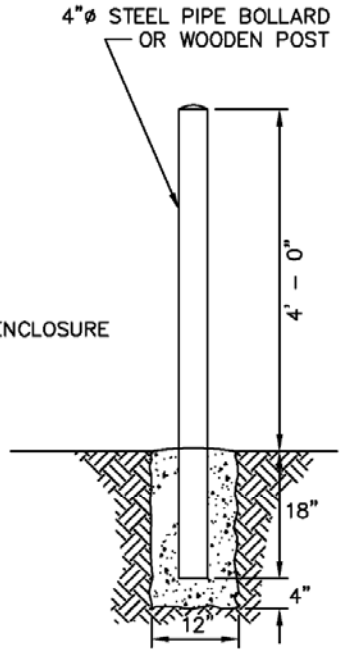
TOWN OF KERNERSVILLE P.O. BOX 728 KERNERSVILLE, NORTH CAROLINA 27285 TEL.: (336) 996-3121 FAX.: (336) 996-4822	CONSTRUCTION STANDARD ROADWAY STD. No. 342
	DATE: APRIL 2014 SHEET OF
	DRAWN BY: MWT / APPROVED BY: JH



PLAN
N.T.S.



SECTION A — A
N.T.S. (SEE STANDARD No. 901)



BOLLARD DETAIL
N.T.S.

NOTES:

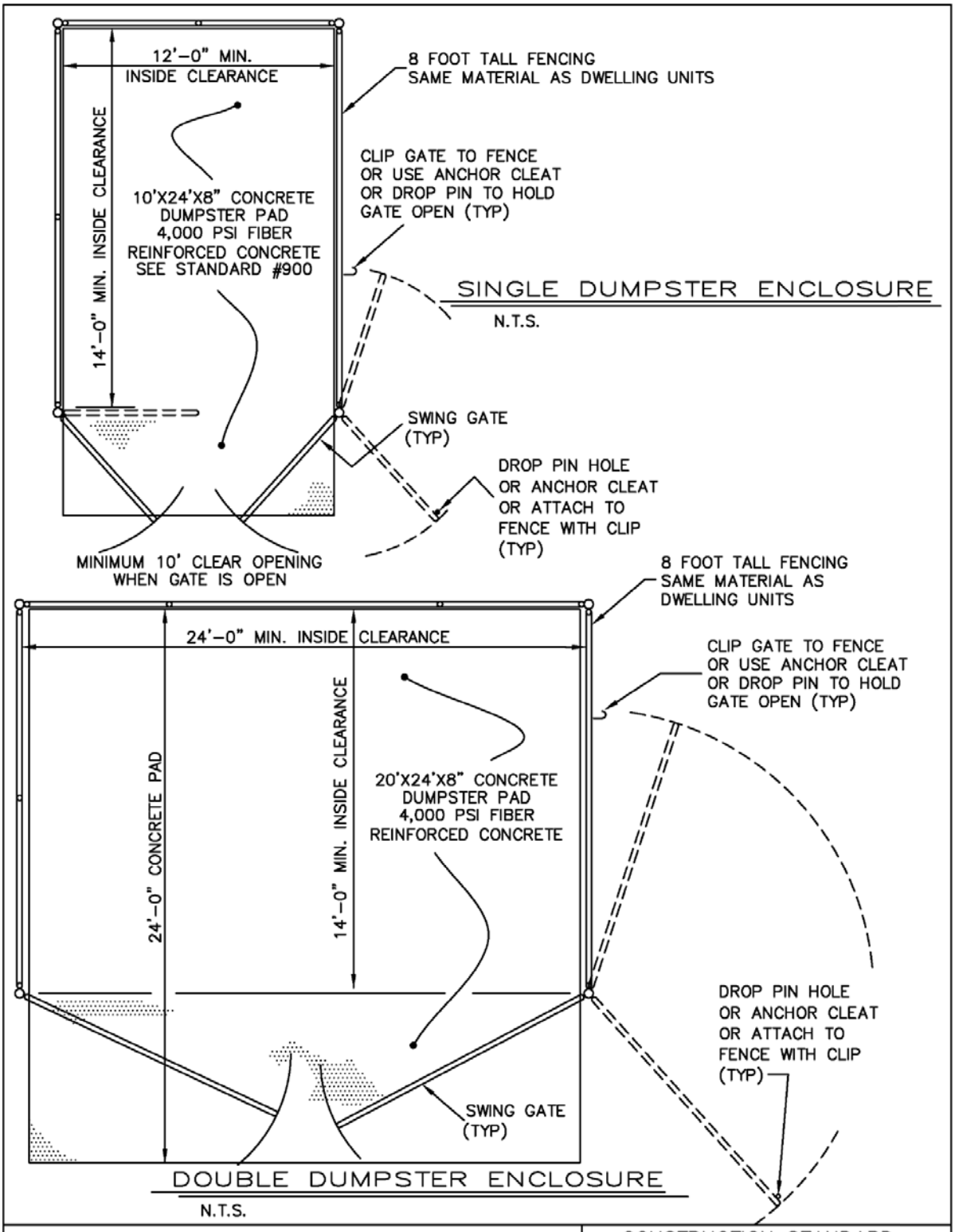
1. DUMPSTER ENCLOSURE TO BE 8' TALL WITH MINIMUM 12'X14' CLEAR INTERIOR DIMENSIONS, AND CONSTRUCTED OF THE SAME MATERIAL AS DWELLING UNITS.
2. GATE IS REQUIRED TO BE SECURED TO MIDDLE OF PIPE BOLLARD OR WOODEN POST TO INSURE MINIMUM OF 10' CLEAR OPENING ON GATE INSTALLATION.

TOWN OF KERNERSVILLE
P.O. BOX 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-3121 FAX.: (336) 996-4822

CONSTRUCTION STANDARD
ROADWAY STD. No. 900

DATE: SEPT. 2016 SHEET OF

DRAWN BY: MWT | APPROVED BY: TB/GR

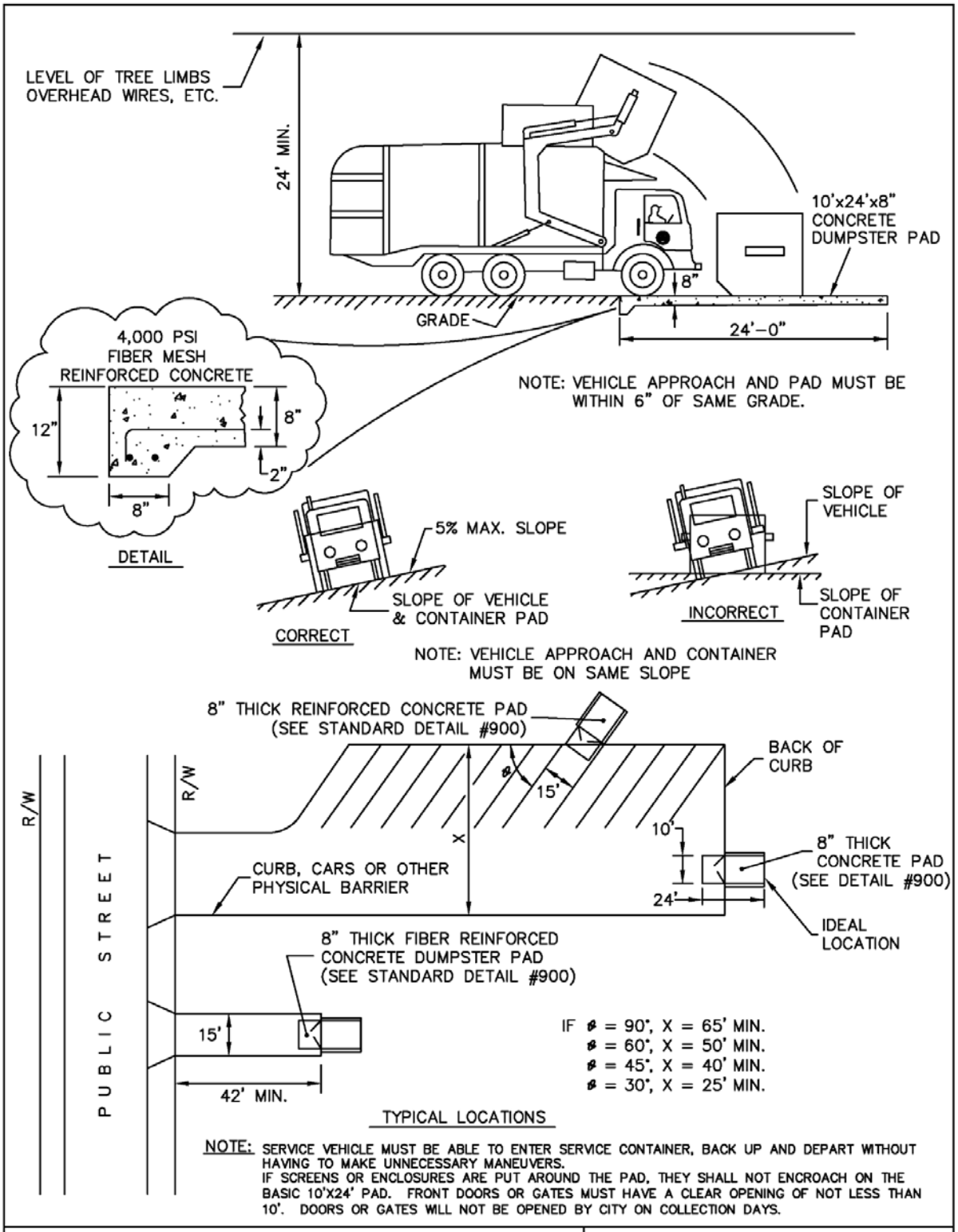


TOWN OF KERNERSVILLE
P.O. DRAWER 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996–6916 FAX.: (336) 996–4059

CONSTRUCTION STANDARD
NO. 900–B

DATE: SEPT., 2016 SHEET OF

DRAWN BY: MWT | APPROVED BY: TB/GR



NOTE: SERVICE VEHICLE MUST BE ABLE TO ENTER SERVICE CONTAINER, BACK UP AND DEPART WITHOUT HAVING TO MAKE UNNECESSARY MANEUVERS.
IF SCREENS OR ENCLOSURES ARE PUT AROUND THE PAD, THEY SHALL NOT ENCROACH ON THE BASIC 10'X24' PAD. FRONT DOORS OR GATES MUST HAVE A CLEAR OPENING OF NOT LESS THAN 10'. DOORS OR GATES WILL NOT BE OPENED BY CITY ON COLLECTION DAYS.

TOWN OF KERNERSVILLE
P.O. BOX 728
KERNERSVILLE, NORTH CAROLINA 27285
TEL.: (336) 996-3121 FAX.: (336) 996-4822

CONSTRUCTION STANDARD
ROADWAY STD. No. 901

DATE: SEPT., 2016 SHEET OF

DRAWN BY: MWT | APPROVED BY: TB/GR

APPENDIX B PROCEDURES FOR SURITY SUBMITTALS

PROCEDURE FOR BONDING IMPROVEMENTS

Bond Required:

When developer wishes to record Subdivision Plat and Public Improvements are incomplete or have not been accepted by the Town of Kernersville.

Procedures:

Step 1 – Developer(s) must contact Community Development Department and inform them of their desire to plat. Developer(s) must provide copy of the plat that will be submitted. The Community Development Department will complete Section 1 of the *Surety Guarantee Worksheet* and submit to Engineering for Cost Estimate

Step 2 – Community Development Department will prepare estimate for all remaining improvements; including, Public Services, City/County Utilities and others as needed. Community Development Department will contact Developer to submit Proof-of-Payment Documents for all material suppliers and contractors that have performed work to date. Community Development Department will complete Section 2 of the Guarantee Worksheet and submit to the Town Manager.)

Step 3 – The Town Manager will contact Developer and Bank to submit the appropriate type bond for the estimated amount. Once the Bond has been submitted, the Town Manager will complete Section 3 of the Surety Guarantee Worksheet and provide copy to Community Services and Public Services Department.

Step 4 – Once the Community Development and Public Services Departments have received the completed Surety Guarantee Worksheet. The plat will be signed for recording.

Additional Coordination:

The above procedures must also be followed for the submission of Landscape and Watershed Bonds.

PROOF OF PAYMENT DOCUMENT

THIS IS TO CERTIFY that

furnished the labor and materials for the construction of

_____

in the development known as

_____

located in Kernersville, NC.

That the total cost of construction of _____ was

$ _____.

That _____ has been paid in full by _____

for these improvements and all contractors and subcontractors have been paid in full.

This _____ day of _____ , _____.

Company Name: _____

By: _____

Title: _____

Sworn and subscribed before me

this _____ day of _____ , _____.

Notary Public _____

My commission expires _____

PROCEDURE FOR THE COMPLETION OF "PROOF OF PAYMENT DOCUMENT"

Required:

When developer wishes to Bond, Reduce Bond or have all surety released by the Town of Kernersville.

Submit:

Street Division
PO Drawer 728
Kernersville, NC 27285

Procedures:

Step 1 – Contact Street Division and inform of Developer's desire to reduce or release surety.

Step 2 – Complete documentation. All sub-contractors and material suppliers involved in project must submit this document. Document must be completed in full, signed and notarized for it to be accepted.

Step 3 – Submit to the address listed above. Once documents are verified and project has been inspected, memorandum will be submitted to the Town Manager requesting the reduction or release of surety.

Coordination:

If the developer and/or contractors require assistance or additional information, please contact the:

Street Division
(336) 996-6916

EXAMPLE ONLY – USE ORGINAL ON TOK WEB PAGE

APPENDIX C STORM DRAINAGE DESIGN TABLES

<u>DATA SHEET: STORMWATER DRAINAGE PIPE DESIGN</u>

PROJECT:	ENGINEER:
LOCATION:	DATE:
DESIGN STORM FREQUENCY ( ) YEARS	JOB NUMBER:

Pipe Location		Drainage Area											HGL Elevation		Grnd/Rim Elev.					
From	To	Incr. (ac)	Total (ac)	Runoff Coeff (cc)	Design Storm Freq. (years)	Rainfall Inten. I (in/hr)	Design Flowrate Q (cfs)	Length of Pipe (lf)	Pipe Diam. (in)	Slope (%)	Invert Elev. In/up (ft)	Invert Elev. Out/Dn (ft)	Down (ft)	Up (ft)	Down (ft)	Up (ft)	Pipe Cap. (cfs)	Flow Velocity (f/s)	Pipe Mat.	Station Remarks

DATA SHEET: STORMWATER DRAINAGE STRUCTURE DESIGN

PROJECT:	ENGINEER:
LOCATION:	DATE:
DESIGN STORM FREQUENCY ( ) YEARS	JOB NUMBER:

DRAINAGE AREA								ROADWAY			INLET					
Structure Number	Incr (Ac)	Total (Ac)	Runoff Coeff. (c)	Rainfall Intensity I (in/hr)	Discharge from D.A. (cfs)	Discharge Carryover (cfs)	Total Discharge (cfs)	Grade (ft/ft)	Cross Slope (ft/ft)	Top Elevation (ft)	Spread T (ft)	Intercept QI (cfs)	Bypass QB (cfs)	Struct. Stand. No	Frame Stad. No.	Station Remarks

APPENDIX D DEVELOPMENT UTILITY INFORMATION SHEET

REPRODUCIBLE FORM

DEVELOPMENT UTILITY INFORMATION SHEET

Complete and submit to the Public Services Department during the project design phase.

Subdivision: _____ Phase: _____ Section: _____

Owner(s): _____

Project Manager/
Key Contact: _____

Address: _____

Office #: _____ Fax #: _____ Emergency #: _____

Home #: _____ Mobile #: _____ Pager #: _____

Designing
Engineer: _____

Office #: _____ Fax #: _____

Utilities that will be installed in subdivision:

Check the boxes that apply and a "?" mark in the blank if you do not know the information requested.

Power Company: _____ Contact: _____

Gas Company: _____ Contact: _____

Water
Contractor: _____ Contact: _____

Sewer Contractor: _____ Contact: _____

Phone Company: _____ Contact: _____

Cable Company: _____ Contact: _____

Electrical Engineer: _____ Contact: _____

Street Lighting – (Standard Wood Poles with HPS fixtures)

There is no charge for standard wood pole lighting.

Street Lighting – (Decorative Poles and fixtures)

See Decorative Street Lighting Procedures for decorative information. Developer is responsible for all coordination of utilities including street light wiring.

Roadway
Contractor: _____ Contact: _____

Office #: _____ Fax #: _____ Emergency #: _____

REPRODUCIBLE FORM

APPENDIX E PERMIT FORMS

PROCEDURE FOR THE COMPLETION OF A DRIVEWAY PERMIT

Permit Required: When Developer or Contractor proposes the installation of a driveway that will connect to the public street system.

Permit Obtained: Community Development Department at (336) 992-0605 or reproduce a copy from the Town of Kernersville website.

Permit Submitted: Community Development Department
PO Drawer 728
Kernersville, NC 27285

Procedures:

Step 1 – Obtain copy of permit and complete all required sections.

Step 2 – Submit permit to the above address.

Step 3 – The Community Development Department will review and process request within 5 days of receipt. Additional requirements may be attached to the permit after review and depending upon the situation or location of proposed driveway.

Step 4 – Approved permit will be returned to permittee. Cost is determined by the applicable Schedule of Fees. If denied, permittee will be provided with a written statement as to the reason(s) for denial.

Coordination: If Permitee requires assistance or additional information, please contact the Community Development Department at (336) 992-0605.

CONSTRUCTION REQUIREMENTS

1. The roadway structural integrity must be protected at all times.
2. Minimum vertical clearances of overhead wires and cables above all roadways must conform to clearances set out in the National Electric Safety Code.
3. All areas of construction shall be backfilled and tamped to achieve a density of at least 95% density and 100% in the last 12."
4. All pavement shall be removed by cutting on a straight line with vertical edges.
5. Utility cut repair shall be according to the attached detail.
6. An as-built drawing will be required if the utility is installed in a different location than originally requested.
7. All construction and installation shall conform to the latest OSHA standards.
8. Street signs shall be properly replaced as necessary.

Applicant hereby agrees to indemnify and save harmless the Town of Kernersville from: a) All damages and claims for damage that may arise by reason of the installation and maintenance of this utility, and b) all damages to this utility and claims for such damages that may occur while the Town of Kernersville or its contractors are maintaining and installing streets and/or utilities owned by the Town of Kernersville.

The Chief Construction Inspector, or his authorized agent, shall have the authority to inspect any construction and at any time to determine proper compliance with Town standards.

The Town of Kernersville does not guarantee the right-of-way on this road, nor will it be responsible for any claim for damages brought by any property owner by reason of the installation.

Agent for
Applicant: _____

ATTACHMENT

Permit to Encroach On Public Right-Of-Ways:

This agreement must be accompanied, in the form of an attachment, by plans or drawings illustrating the following applicable information:

1. All roadways and ramps.
2. Right of way lines and where applicable, the control of access lines.
3. Location of the existing and/or proposed encroachment.
4. Length, size and type of encroachment.
5. Method of installation.
6. Dimensions of the distance from the encroachment to edge of pavement, shoulders, structures, etc.
7. Location by highway survey station number. If station number cannot be obtained location should be shown by distance from some identifiable point, such as a bridge, road, intersection, etc.
8. Drainage structures or bridges if affected by encroachment (show vertical and horizontal dimensions from encroachment to nearest part of structure).
9. On underground utilities, the depth of bury under all traveled lanes, shoulders, ditches, sidewalks, etc.
10. Length, size and type of encasement where required.
11. On underground crossings, notation as to method of crossing – boring and jacking, open cut, etc. – individual approval must be granted.

PROCEDURE FOR THE COMPLETION OF ENCROACHMENT PERMIT

Permit Required: When Developer, Contractor, Utility Company or other Government Agency proposes work of any nature other than routine maintenance in the Town of Kernersville Right-Of- Way.

Permit Obtained: Contact Public Services Department @ (336)996-6916 for a blank copy or copy from these specifications.

Permit Submitted: Street Division
PO Drawer 728
Kernersville, NC 27285

Procedures: Step 1 – Obtain copy of permit and complete all required sections.

Note: Please pay special attention to the attachment that details what must be included in the Encroachment request. Accurate drawings and notes will aid in the processing time of your request.

Step 2 – Submit permit to the above address.

Step 3 – Street Division will review and process request within 5 days of receipt. Additional requirements may be attached to the permit after review and depending upon the situation and/or location of proposed work.

Step 4 – Approved permit will be mailed to permittee with a bill for $100.00 or letter stating why permit request was denied.

Coordination: If Permitee requires assistance or additional information, please contact the Street Division at (336) 996-6916.

APPENDIX F EXAMPLE PE CERTIFICATION

ENGINEER'S CERTIFICATE OF INTERIM COMPLETION

TO: Town of Kernersville, Community Development Department

FROM: _____

DATE: _____

RE: Certification of Interim Completion

Name of Project: _____

Improvement Completed: _____

I, the undersigned, hereby certify:

That based upon my periodic inspection, the improvements referenced above have been installed in accordance with the approved plans and specifications, and the standard specifications and requirements of the Town of Kernersville.

_____
SIGNATURE OF PROFESSIONAL ENGINEER

PE SEAL

_____
DATE

_____
FIRM NAME

ENGINEER'S CERTIFICATE OF FINAL COMPLETION

TO: Town of Kernersville, Community Development Department

FROM: _____

DATE: _____

RE: Certification of Final Completion

Name of Project: _____

Improvement Completed: _____

I, the undersigned, hereby certify:

1. That based upon my periodic inspection, the improvements referenced above have been installed in accordance with the approved plans and specifications and the standard specifications and requirements of the Town of Kernersville.
2. That based upon my periodic inspection, the improvements to the above referenced project is substantial compliance with the approved plans, dated _____ ___.
3. That the improvements to the above referenced project have been installed as shown on the digital "as built" drawing submitted to the Town of Kernersville, Engineering Division.

_____
SIGNATURE OF PROFESSIONAL ENGINEER

PE SEAL

_____
DATE

_____
FIRM NAME